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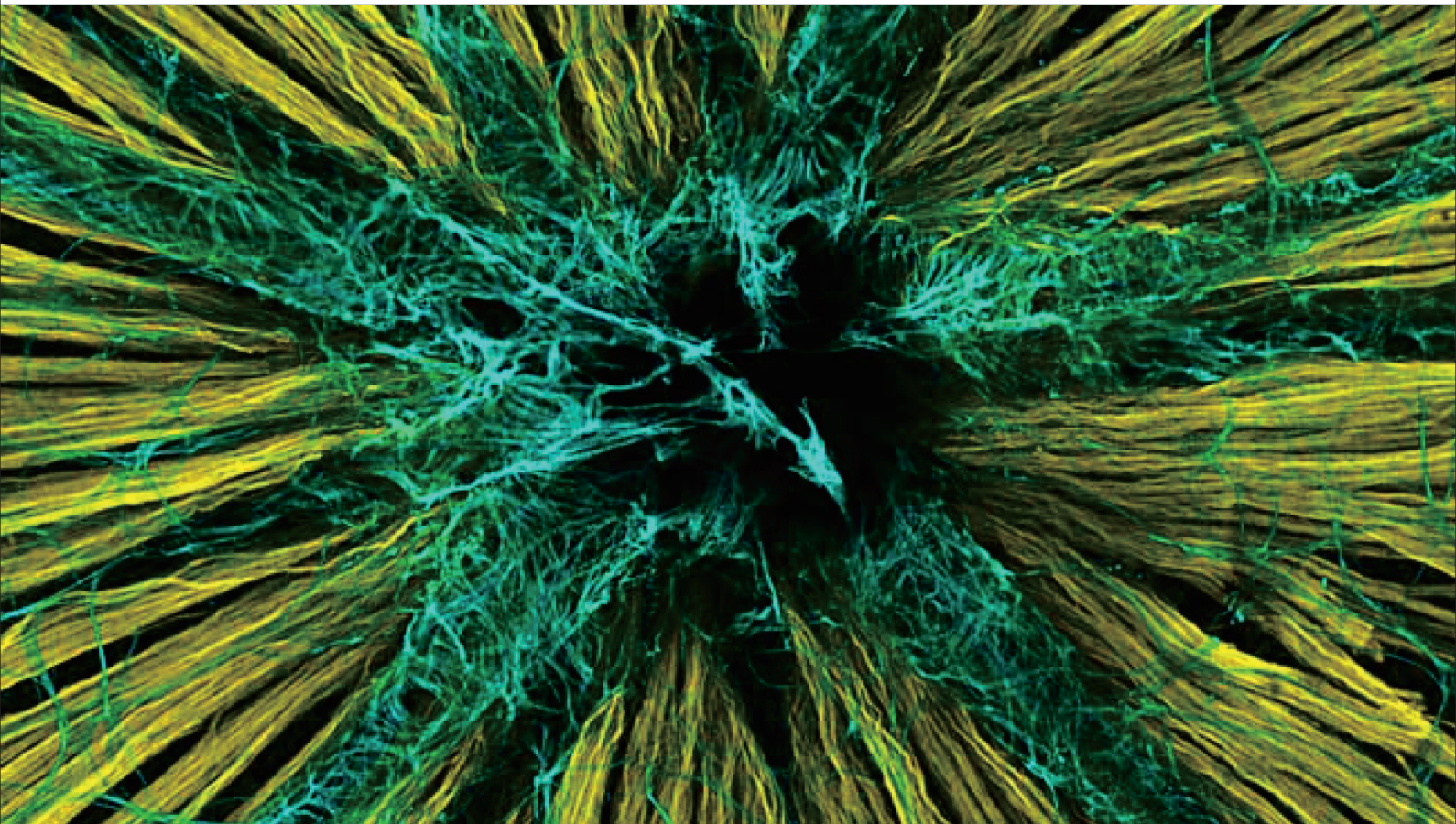
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PROLOGUE

NEURONA sebagai jurnal ilmiah resmi milik Perhimpunan Dokter Spesialis Neurologi Indonesia (PERDOSNI) yang telah terbit secara berkesinambungan sejak tahun 2007, kembali menghadirkan edisi suplemen sebagai bagian dari komitmen dalam mendukung pengembangan ilmu pengetahuan dan publikasi ilmiah di bidang neurologi. Bekerja sama dengan Pertemuan Ilmiah Nasional (PIN) PERDOSNI 2026, edisi suplemen ini memuat seluruh abstrak ilmiah yang dipresentasikan pada kegiatan tersebut.

Berbagai karya ilmiah yang tersaji dalam edisi suplemen ini mencerminkan perkembangan terkini di bidang neurologi, meliputi stroke, neurointervensi, neuroimaging, epilepsi, gangguan gerak, neuroinfeksi, neuroimunologi, neurootologi dan neurooftalmologi, neurorestorasi dan neuroengineering, neurologi perilaku dan kognitif, neurologi anak, neurologi komunitas, neuroepidemiologi, serta aspek etik dan hukum dalam praktik neurologi.

Kami berharap edisi suplemen ini dapat menjadi sarana diseminasi hasil penelitian, laporan kasus, dan inovasi ilmiah yang bermanfaat bagi para neurolog, peserta didik, peneliti, serta tenaga kesehatan lainnya. Selain itu, publikasi ini diharapkan dapat mendorong lahirnya kolaborasi penelitian dan pengembangan publikasi ilmiah yang lebih luas di masa mendatang.

Kerja sama antara NEURONA dan PIN PERDOSNI merupakan wujud sinergi yang penting dalam memperkuat budaya akademik dan meningkatkan kualitas publikasi ilmiah neurologi di Indonesia. Dukungan dan partisipasi seluruh pihak dalam kegiatan ilmiah maupun publikasi ini menjadi modal berharga bagi keberlanjutan dan kemajuan jurnal yang menjadi kebanggaan seluruh anggota PERDOSNI.

Atas kontribusi para penulis, reviewer, panitia PIN PERDOSNI 2026, serta seluruh pihak yang telah mendukung terbitnya edisi suplemen ini, kami menyampaikan penghargaan dan terima kasih yang sebesar-besarnya.

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EPILEPSI

MESIAL TEMPORAL SCLEROSIS IN EPILEPSY: A CASE REPORT

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Background: Mesial temporal sclerosis is a hippocampal disorder closely linked to temporal lobe epilepsy, in which early and prolonged seizures can cause structural damage, while the resulting medial temporal abnormalities further promote recurrent seizures forming a self-perpetuating cycle of neuronal injury and epileptogenesis.

Case Presentation: We report a 23-year-old woman (Ms. P) with epilepsy since age 10 without a clear precipitating factor. Her generalized tonic-clonic unprovoked seizures occurred 2–3 times daily, lasting approximately 30 seconds, without recovery of consciousness between episodes, particularly upon awakening. Seven years earlier, she had been hospitalized for status epilepticus. She remained free seizure for six years on antiepileptic therapy. Neurological examination was unremarkable, and electroencephalography (EEG) showed no epileptiform abnormalities. Cognitive screening using the Montreal Cognitive Assessment (MoCA) and the Mini-Mental State Examination (MMSE) demonstrated moderate cognitive impairment. Brain MRI (January 17th 2026) revealed left temporal lobe atrophy with mild ipsilateral temporal horn dilation, consistent with mesial temporal sclerosis, along with lacunar infarctions in the left perilingual region and right corona radiata. She was treated with oral carbamazepine 100 mg twice daily.

Discussion: Mesial temporal sclerosis is characterized by neuronal loss and gliosis within the medial temporal lobe, typically presenting as a unilateral lesion. Early-onset seizures and prolonged seizures, including status epilepticus, are major risk factors for neuronal injury mediated by glutamate-induced excitotoxicity. Persistent seizure activity triggers neuronal apoptosis in the CA1 and CA3 regions, the subiculum, and the dentate gyrus, followed by synaptic reorganization that enhances network hyperexcitability and sustains epileptogenesis.

Conclusion: This case illustrates that early-onset and prolonged seizures play a significant role in the pathogenesis of mesial temporal sclerosis. Adequate and well-controlled antiepileptic therapy is effective in suppressing seizure recurrence and may help prevent the progression of medial temporal lobe damage.

Keywords: mesial temporal sclerosis, epilepsy, pathophysiology, status epilepticus, lacunar infarction

PATTERNS OF ANTI-EPILEPSY DRUG USE AND PREVALENCE OF POLYOTHERAPY INPATIENT EPILEPSY CASES AT DR. SARDJITO GENERAL HOSPITAL, YOGYAKARTA

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Background: Epilepsy admissions in tertiary healthcare facilities are predominantly characterized by acute symptomatic seizures and status epilepticus with complications. These neurological emergencies present distinct therapeutic challenges, often necessitating aggressive pharmacotherapeutic strategies.

Objective: This study aimed to evaluate the prescribing patterns of antiseizure medications (ASMs), assess the prevalence of polytherapy, and review the treatment dynamics in patients with severe epilepsy.

Methods: An observational, registry-based descriptive study was conducted at Dr. Sardjito General Hospital, Yogyakarta, from October 2023 to February 2025. Data from 227 subjects (mean age 42.0 ± 17.8 years; 53.3% female) were extracted to analyze specific ASM regimens and inpatient therapeutic approaches.

Results: Upon admission, the most frequent clinical presentations were acute headache accompanied by neurological deficits (32.6%) and status epilepticus (15.0%). The predominant seizure semiologies were General Onset (38.3%) and Focal Onset (35.2%). Regarding medical management, polytherapy (≥2 ASMs) was applied more frequently (48.5%) than

monotherapy (44.1%). Levetiracetam was the most widely prescribed maintenance agent (50.2%), followed by Phenytoin (41.4%) and Valproic Acid (26.4%).

Conclusion: ASM prescribing patterns in this tertiary referral facility demonstrate a strong inclination toward polytherapy, reflecting the critical need for immediate medical intervention in epilepsy. Currently, Levetiracetam and Phenytoin hold a central role as the primary maintenance therapies. Consequently, a rational approach to combining ASMs is essential for managing these cases with complications.

Keywords: Antiseizure medications (ASMs), polytherapy, status epilepticus, levetiracetam, inpatient epilepsy

POSTICTAL RESPIRATORY DYSFUNCTION AS A KEY MECHANISM OF SUDEP: A SYSTEMATIC REVIEW

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Background: Sudden Unexpected Death in Epilepsy (SUDEP) is the leading cause of epilepsy-related mortality, occurring at 1.2–2.4 per 1,000 person-years in refractory epilepsy. Increasing evidence suggests that disturbances in respiratory regulation during the peri-ictal and postictal periods play a critical role in SUDEP pathophysiology.

Objective: To synthesize current evidence on the role of postictal respiratory dysfunction including hypoxemia, non-apneic hypoventilation, postictal generalized EEG suppression (PGES), and peri-ictal brain network alterations in SUDEP pathogenesis.

Methods: This systematic review was conducted according to the PRISMA. A comprehensive literature search was performed in PubMed, Scopus, and Web of Science to identify studies published between January 2021 and February 2026. Studies examining peri-ictal respiratory function, oxygen saturation, PGES, cardiorespiratory coupling, or neurophysiological biomarkers in epilepsy patients were included. Animal studies, reviews, editorials, and studies without respiratory outcomes were excluded. A total of 10 studies met eligibility criteria.

Results: Postictal central apnea (PCCA) occurred in 22.1% of generalized convulsive seizures (GCS), with SpO₂ nadir of 59.6% ± 14.1%, documented in near-SUDEP and confirmed SUDEP cases. EEG-based brain network analysis revealed significantly higher clustering coefficients and global efficiency in SUDEP versus non-SUDEP patients ($p < 0.0001$), indicating small-world network topology as a potential non-invasive biomarker. Postictal respiratory dysfunction was tightly coupled with bradycardia, supporting a hypoxia-driven rather than primary arrhythmia fatal cascade. Additional risk factors included nocturnal seizures, prone body position after seizures, and high seizure frequency.

Conclusion: Postictal respiratory dysfunction appears to be a key pathophysiological component of SUDEP. SUDEP pathogenesis involves a multifaceted postictal respiratory failure cascade extending beyond apnea to non-apneic hypoventilation and aberrant brain network dynamics. Multimodal peri-ictal monitoring integrating cardiorespiratory parameters, PGES, and EEG network topology is essential for high-risk patient identification and targeted prevention.

Keywords: SUDEP, Postictal apnea, Respiratory dysfunction, Epilepsy, Peri-ictal hypoxemia

THE ROLE OF VITAMIN D AS ADJUNCTIVE THERAPY IN PATIENTS WITH EPILEPSY: A SYSTEMATIC REVIEW

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Background: Epilepsy is a chronic neurological disorder with high prevalence and substantial clinical burden. Although antiseizure medications remain the mainstay of therapy, many patients continue to experience uncontrolled seizures. Vitamin D has attracted attention due to its roles in regulating neuronal excitability, modulating neuroinflammation, and providing neuroprotection. Patients with

epilepsy are at high risk of hypovitaminosis D, associated with the disease itself and long-term antiseizure medication use. However, evidence regarding vitamin D supplementation as an adjunctive therapy remains inconsistent.

Objective: To evaluate the effectiveness of vitamin D supplementation on vitamin D status and seizure control in patients with epilepsy.

Methods: This systematic literature review followed PRISMA guidelines. Literature searches were conducted in PubMed/MEDLINE, Scopus, ScienceDirect, and Google Scholar up to 2025. Interventional and observational studies assessing vitamin D status or the effect of supplementation on serum 25-hydroxyvitamin D levels and seizure outcomes were included. Study quality was assessed using the Cochrane Risk of Bias Tool and the Joanna Briggs Institute Critical Appraisal Checklist. Data were analyzed descriptively.

Results: Nine studies met the inclusion criteria (five interventional and four observational). All reported a high prevalence of hypovitaminosis D among epilepsy patients. Supplementation consistently increased serum 25(OH)D levels, but effects on seizure frequency and control were heterogeneous. Some studies showed seizure reduction, particularly in patients with severe deficiency and longer treatment duration, whereas randomized controlled trials in drug-resistant epilepsy found no significant difference compared with placebo.

Conclusion: Vitamin D supplementation improves vitamin D status in epilepsy patients, but its effect on seizure control varies. It may serve as a long-term adjunctive therapy in selected subgroups rather than a primary anticonvulsant treatment.

Keywords: Epilepsy, Vitamin D, Adjunctive therapy, Seizure control, Hypovitaminosis D

EPILEPSI, NEUROINTENSIF

APHASIC STATUS EPILEPTICUS AS A RARE MANIFESTATION OF CEFEPIME-INDUCED NEUROTOXICITY

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Background: Aphasic status epilepticus (ASE) is a rare subtype of non-convulsive status epilepticus (NCSE) which can arise from various etiologies. It should be differentiated from postictal aphasia and acute structural lesions such as stroke. Cefepime, a fourth-generation cephalosporin, may cause neurotoxicity by crossing the blood–brain barrier and exerting dose-dependent gamma-aminobutyric acid (GABA) antagonism, particularly in patients with renal dysfunction.

Case Resentation: We report two patients who developed ASE during cefepime therapy for bronchopneumonia. One patient had chronic kidney disease and was receiving hemodialysis. After three days of treatment, both patients developed acute aphasia accompanied by intermittent myoclonic jerks involving the jaw and extremities. Brain magnetic resonance imaging revealed no acute lesions. Electroencephalography (EEG) demonstrated abnormalities which persisted throughout 30-minute recordings. The first patient exhibited periodic lateralized epileptiform discharges over the frontal region, bilateral temporal sharp waves, and multiregional delta slowing. The second patient showed frequent sharp waves predominantly over the right temporoparietocentral region with multiregional delta slowing. Cefepime was discontinued, and intravenous levetiracetam (40 mg/kg loading dose followed by maintenance dose) was initiated. Both patients improved gradually, with complete resolution of aphasia and myoclonus within two days.

Discussion: Aphasia rarely presents as seizure or status epilepticus. ASE is an uncommon manifestation of NCSE and may present as isolated aphasia without impaired consciousness. Cefepime-induced neurotoxicity, although infrequent, is a serious adverse effect that typically occurs within 2–6 days of treatment initiation. Renal dysfunction is a major risk factor, but cases have also been reported in patients with

normal renal function. Symptoms generally resolve within 1–3 days after drug discontinuation.

Conclusion: NCSE should be considered in patients presenting with acute-onset aphasia. Cefepime-induced neurotoxicity is an important and potentially reversible cause. EEG is essential for accurate diagnosis in atypical presentations.

Keywords: Cefepime-induced neurotoxicity, aphasic status epilepticus (ASE), non-convulsive status epilepticus (NCSE), EEG

EPILEPSI, NEUROINTERVENSI

NEUROVASCULAR PHENOTYPES IN STRUCTURAL EPILEPSY: A MULTIMODAL IMAGING AND ANGIOGRAPHIC CASE SERIES

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Background: Structural epilepsy is defined by identifiable anatomical lesions such as mesial temporal sclerosis (MTS) and focal cortical dysplasia (FCD). Beyond neuronal injury, growing evidence suggests that epileptogenesis involves vascular and hemodynamic alterations reflecting disrupted neurovascular coupling. However, angiographic characterization of these vascular phenotypes in structural epilepsy without overt vascular malformation remains limited.

Case Presentation: We report two female patients with structural epilepsy who underwent standardized multimodal presurgical evaluation, including structural MRI, magnetic resonance spectroscopy, arterial spin labeling, diffusion tensor imaging, and digital subtraction angiography (DSA). The first patient, a 19-year-old with bilateral MTS (left-dominant), demonstrated reduced N-acetylaspartate ratios, bilateral hippocampal hypoperfusion, and white-matter tract disruption. DSA revealed diffuse cerebral hypervascularity without arteriovenous malformation or focal stenosis, suggesting a global arterial hemodynamic phenotype. The second patient, a 27-year-old with left temporo-occipital FCD and chronic infarction, showed hemispheric atrophy and altered cortical–subcortical connectivity. Angiographic evaluation confirmed prior left transverse sinus thrombosis, representing a venous hemodynamic phenotype associated with structural cortical injury.

Discussion: These cases illustrate distinct neurovascular phenotypes in structural epilepsy. In bilateral MTS, diffuse arterial hypervascularity may reflect chronic metabolic demand and network-level dysfunction. In FCD with venous sinus thrombosis, impaired venous outflow and prior infarction may sustain epileptogenicity through cortical irritation and microvascular remodeling. The integration of perfusion imaging, diffusion-based connectivity analysis, and selective angiography extends characterization beyond conventional structural MRI and supports a neurovascular-network model of epilepsy.

Conclusion: Multimodal imaging, including selective angiography when clinically indicated, enhances identification of vascular phenotypes in structural epilepsy and may refine presurgical assessment in complex cases.

Keywords: Structural epilepsy, Mesial temporal sclerosis, Focal cortical dysplasia, Neurovascular coupling, Cerebral angiography

EPILEPSI, NEUROLOGI ANAK

BREAKING THE BURST: GLUT1 DEFICIENCY PRESENTING AS EARLY INFANTILE DEVELOPMENTAL EPILEPTIC ENCEPHALOPATHY SYNDROME - A CASE REPORT

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Background: Early infantile developmental epileptic encephalopathy syndrome (EIDEE) is a rare form of neonatal epilepsy occurring in 10 of 100,000 live births. Characterized by frequent tonic spasms with

suppression-burst (S-B) pattern in electroencephalography (EEG). Glucose transporter type 1 (GLUT1) deficiency should be considered as an etiology.

Case Report: A 10 months old female infant presented with more than 40 recurring seizure episodes within 2 hours, each lasting less than one minute. Pre ictal was screaming, ictal spasms involving four extremities and upward deviation of both eyes. Patient remained unconscious between seizures and asleep during the post ictal. Patient experienced similar episodes 3 months prior and was receiving valproic acid, phenobarbital, and diazepam. Maternal history of epilepsy was noticed. Vital signs were stable, Glasgow coma scale (GCS) was E4M6V5 without focal neurological deficits. EEG demonstrated a classical suppression-burst pattern (S-B pattern), with multifocal polymorphic interictal epileptiform discharges, capturing multiple epileptic spasms and focal tonic seizures. Brain magnetic resonance imaging (MRI) revealed no structural abnormalities. Soy-based formula were discontinued and ketogenic diet was initiated. GLUT1 deficiency was considered based on significant clinical improvement to ketogenic diet. Seizure is well controlled. Follow up EEG at 13 months old is no longer showed S-B pattern.

Discussion: This case highlights the clinical significance of the S-B EEG pattern in EIDEE. Normal neuroimaging suggests possible genetic etiologies. GLUT1 deficiency is an important differential diagnosis. Further workup should including CSF glucose and CSF : blood glucose ratio. Ketogenic diet provide ketone bodies as an alternative energy substrate. Significant reduction of S-B pattern on EEG observed after initiation of the ketogenic diet.

Conclusion: EIDEE remains a challenging epileptic encephalopathy that demonstrates a favorable response to ketogenic diet. Early recognition of GLUT1 deficiency is essential to optimize the clinical outcomes.

Keywords: EIDEE, GLUT1 deficiency, Suppression burst pattern

NEURODEGENERATIF, DEMENTIA, KOGNITIF

INVESTIGATING THE IMPACT OF LANGUAGE PROFICIENCY ON COGNITIVE FUNCTION IN OLDER ADULTS: A GROUND BREAKING STUDY FROM INDONESIA'S LINGUISTICALLY DIVERSE POPULATION

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Background: Population aging presents increasing neurological and public health challenges, particularly cognitive decline. The hypothesis suggests that sustained cognitive engagement, such as multilingual language use, may enhance neuroplasticity and delay cognitive deterioration. While multilingualism has been linked to better cognitive outcomes, evidence from linguistically diverse populations remains limited. This study represents one of the first attempts to explore the impact of multilingualism on cognitive function in older adults within Indonesia's linguistically diverse population, a gap in current global research. Indonesia, with over 700 spoken languages, offers a unique setting for this research.

Objective: To examine the association between language proficiency and cognitive function in older adults in Indonesia.

Methods: A cross-sectional study was conducted from March to August 2025 at Adam Malik Hospital and Prof. Dr. Chairuddin P. Lubis Universitas Sumatera Utara Hospital. A total of 114 participants aged ≥ 60 years were categorized as monolingual, bilingual, or multilingual. The assessment consisted of the Language Experience and Proficiency Questionnaire (LEAP-Q) Indonesian Version for language proficiency, the Montreal Cognitive Assessment in its Indonesian version (MoCA-INA), the Brief Cognitive Screening Battery (BCSB-INA) for cognitive function, and the Tes Afasia untuk Diagnosis Informasi Rehabilitasi (TADIR) for language. Data were analyzed using the Chi-Square and Kruskal-Wallis tests, with $p < 0.05$ considered statistically significant.

Results: Significant differences in cognitive performance were observed across language groups based on MoCA-INA scores ($p < 0.001$). Multilingual participants showed superior cognitive performance compared to bilingual and monolingual individuals. Domain-specific analysis with BCSB-INA revealed significantly better memory performance in multilingual participants (all $p < 0.001$). In the TADIR assessment, multilingual participants also exhibited better verbal fluency, comprehension, and writing skills ($p < 0.05$).

Conclusions: Multilingualism is associated with better cognitive function in older adults. These findings highlight the potential of multilingualism to enhance cognitive performance in linguistically diverse populations.

Keywords: monolingual, bilingual, multilingual, cognitive function, older adults

NEUROINFEKSI

ALTERNATIVE ANTIMICROBIAL THERAPY IN CEREBRAL TOXOPLASMOSIS WITH NEUROLOGICAL DETERIORATION IN AN HIV-POSITIVE PATIENT: A CASE REPORT

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Background: Cerebral toxoplasmosis is a latent opportunistic infection that can manifest as a severe neurological crisis in HIV patients with low CD4 counts. Decreased cellular immune response, particularly the Th1 pathway and interferon- γ production, leads to tachyzoite proliferation and triggering focal necrotic encephalitis. First-line therapy consists of a combination of pyrimethamine and sulfadiazine, but limited availability and side effects can be obstacles in clinical practice.

Case Presentation: A 38-year-old man with a history of HIV and discontinuation of antiretroviral therapy (ART) presented with weakness of his right limbs and difficulty speaking for one week. Neurological examination revealed right upper motor neuron type VII nerve paresis, right central XII nerve paresis, right spastic hemiparesis with MRC muscle strength 3/5, and positive right Babinski reflex. A contrast-enhanced head CT scan showed a ring-enhancing lesion accompanied by vasogenic oedema and mass effect in the left hemisphere. Toxoplasma gondii IgG serology was positive. The patient received cotrimoxazole combined with clindamycin, methylprednisolone for cerebral oedema, and antiretroviral therapy.

Discussion: Discontinuation of ARV causes a rapid decline in CD4 count, triggering reactivation of latent infection. Focal neurological deficits arise due to brain tissue destruction, inflammatory response, and oedema causing mass effect. The lesion pattern is typically ring-enhancing, but differential diagnoses such as primary CNS lymphoma still need to be considered. The first-line treatment for cerebral toxoplasmosis is a combination of pyrimethamine and sulfadiazine. Cotrimoxazole has good CNS penetration and comparable efficacy as an alternative therapy. Several case studies have shown that cotrimoxazole is effective for the treatment of cerebral toxoplasmosis and may be administered when pyrimethamine is unavailable.

Conclusion: Cerebral toxoplasmosis should be suspected in HIV patients with focal neurological deficits and a history of ARV non-compliance. Early diagnosis and appropriate therapy, including the use of alternative regimens when necessary. In this case, the patient showed improvement after being given alternative therapy.

Keywords: Toxoplasmosis Cerebral, HIV, Cotrimoxazole, Case Report

CEREBRAL TOXOPLASMOSIS PRESENTING AS ALTERNATING BRAINSTEM STROKE MIMIC IN HIV: A CASE REPORT

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Background: Stroke mimics account for a substantial proportion of suspected acute cerebrovascular events. One condition that can be encountered is cerebral toxoplasmosis, which can be quite difficult to

distinguish in certain cases and is associated with cerebral infarction. One study reported that 10 out of 22 patients with cerebral toxoplasmosis also had cerebral infarction. Cerebral toxoplasmosis typically presents with supratentorial ring-enhancing lesions in patients with advanced immunosuppression and rarely manifests as a focal brainstem syndrome. When strategically located, however, infectious lesions may closely resemble classical vascular presentations.

Case Presentation: A 40-year-old man consulted from internal medicine with sudden-onset left facial weakness followed by right-sided hemiparesis, binocular diplopia, dysphagia and fever. Neurological examination revealed left abducens, peripheral-type facial palsy. Given the presence of HIV infection on antiretroviral therapy for 6 years, hypertension, ischemic pontine infarction was initially suspected. Contrast-enhanced brain computed tomography demonstrated multifocal lesions involving supratentorial regions and the pons. Laboratory evaluation revealed a CD4 count of 286 cells/mm³ and high-titer anti-Toxoplasma gondii IgG with negative IgM. Empiric anti-toxoplasma therapy was initiated, resulting in gradual neurological improvement.

Discussion: Alternating hemiparesis is often associated with vascular disorders; however, in certain conditions, especially in HIV-positive individuals, infectious etiology should be considered by assessing clinical progression, systemic manifestations, and multifocal imaging findings, as both are closely related and may be found simultaneously. Cerebral toxoplasmosis is usually accompanied by supratentorial lesions simultaneously, not occurring in isolation. Additionally, cerebral toxoplasmosis can occur in locations other than its typical predilection sites, particularly in HIV-positive patients with brainstem syndrome.

Conclusion: In individuals living with HIV, focal neurological deficits localized to the brainstem should not be presumed vascular without careful integration of clinical evolution, immunological status, and neuroimaging patterns.

Keywords: Cerebral toxoplasmosis, Stroke mimic, Alternating brainstem syndrome, HIV, Pontine lesion

CHRONIC HEADACHE REVEALING INTRACEREBRAL HEMORRHAGES FROM GIANT FUSIFORM DOLICHOECTATIC ANEURYSMS IN BILATERAL PYELONEPHRITIS CHRONIC

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Background: Chronic headache is commonly attributed to primary disorders but may represent a red flag for underlying cerebrovascular pathology. Factors such as systemic hypertension, chronic inflammation, and oxidative stress contribute to vascular degeneration. This report highlights chronic headache as the initial manifestation of intracerebral hemorrhages arising from giant dolichoectatic aneurysms in a patient with bilateral chronic pyelonephritis.

Case Presentation: We present the case of a 39-year-old man who experienced chronic headache. The patient had a history of chronic pyelonephritis and was in stage 5 chronic kidney disease, requiring regular hemodialysis. Neurological examination found left central facial paresis and mild left hemiparesis. By imaging, patient was intracerebral hemorrhage (ICH) due to vertebrobasilar dolichoectasia and a fusiform aneurysm. A comprehensive treatment approach was implemented, focusing on controlled hypertension, dialysis management, and conservative treatment of the vascular damage.

Discussion: Dolichoectasia of intracranial arteries is rare arteriopathy characterized by elongation, widening and tortuosity of the arteries. Most of the patients (40%) are asymptomatic at the time of diagnosis, clinical presentations can be related to compression of the brainstem or cranial nerves. VBD can manifest with chronic headache, hemiparesis, sensory disturbances, and compression of the brainstem or cranial nerves. The coexistence of VBD, fusiform aneurysm, hypertension, and pyelonephritis likely created a synergistic effect, increasing vascular wall fragility and the risk of hemorrhagic events. Early imaging and a multidisciplinary approach are crucial for achieving optimal outcomes.

Conclusion: Chronic headache may serve as a warning sign of serious underlying cerebrovascular disease. Comprehensive neuroimaging

evaluation and strict control of vascular risk factors are essential to reduce morbidity. This case underscores the need for heightened clinical vigilance in patients presenting with chronic headache and systemic comorbidities, as it may represent an early manifestation of rare but potentially fatal intracranial vascular abnormalities.

Keywords: chronic headache, intracerebral hemorrhages, dolichoectasia, fusiform aneurysms, chronic pyelonephritis

DIAGNOSTIC PERFORMANCE OF URINE LIPOARABINOMANNAN ASSAY IN HIV-ASSOCIATED SUSPECTED CENTRAL NERVOUS SYSTEM INFECTIONS

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Background: Tuberculosis is highly frequently in people living with HIV (PLHIV). The urine lateral-flow lipoarabinomannan assay for tuberculosis (LAM-TB) demonstrates variable sensitivity depending on CD4 cell count but consistently high specificity.

Objectives: We aimed to evaluate the diagnostic performance of urine LAM-TB among PLHIV with suspected Central Nervous System (CNS) infection.

Methods: This retrospective cohort study analyzed data from the Indonesia Brain Infection Study (IBIS) conducted at Cipto Mangunkusumo National Hospital, Jakarta. From January 1, 2021, through June 2024. All recruited subject in the cohort were performed LAM-TB regardless of the CNS infection etiology. Positive GeneXpert MTB/RIF, sputum acid-fast bacilli smear, or culture were used as reference standard of TB diagnosis.

Results: 764 patients with suspected CNS infections were enrolled; 265 were HIV-positive, and 94 underwent urine LAM-TB (Alere) testing and were included in the analysis. The mean age was 35.8 years (SD, 8.9), and the mean CD4 count was 74 cells/mm³ (SD, 57). Tuberculosis was diagnosed in 45/94 patients (48%), including 21/94 (22%) with bacteriological confirmation. Definite TBM was identified in 7 (7%), probable TBM in 6 (6%), and possible TBM in 23 (25%) patients. Patient with other than CNS TB was identified in 9 (9%) patients. TB Urine LAM was positive in 25/94 patients (27%). For microbiologically confirmed tuberculosis, LAM-TB demonstrated a sensitivity of 57% and specificity of 82%, with a positive predictive value of 48%, negative predictive value of 87%, and overall accuracy of 77%. The area under the receiver-operating-characteristic curve was 0.697 (95% confidence interval [CI], 0.559–0.834; p=0.006). LAM positivity was not significantly associated with in-hospital mortality.

Conclusion: In this cohort of PLHIV with suspected central nervous system infection, urine LAM demonstrated low sensitivity but moderate specificity compared to microbiology test of TB.

Keywords: HIV, Tuberculous meningitis, Central nervous system infection, Lipoarabinomannan

DYSPHAGIA AND DYSPHONIA DUE TO PONTINE INFARCTION AND PHARYNGEAL ABCESS

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Background: Dysphagia and dysphonia are neurological symptoms that can be caused by either central or peripheral lesions. Brainstem infarction, particularly in the pons, can disrupt the corticobulbar pathways and cranial nerve nuclei involved in swallowing and phonation. On the other hand, a pharyngeal abscess can also lead to mechanical obstruction and inflammatory processes that exacerbate similar symptoms.

Case Report: We report a case of a 63-year-old man presenting with acute onset dysphagia and hoarseness. Neurological examination revealed central-type paresis of the left cranial nerves VII and XII. Non-contrast head Computed Tomography (CT) demonstrated a pontine infarction, thickening of the nasopharyngeal area predominantly on the right side suggestive of a mass, bilateral maxillary sinusitis, and bilateral otomastoiditis. Brain Magnetic Resonance Imaging (MRI) revealed a

lacunar infarction in the left frontal lobe and bilateral otomastoiditis. During hospitalization, the patient experienced worsening dysphagia and dysphonia. Further otolaryngological evaluation using Fiber Optic Laryngoscopy (FOL) revealed left vocal cord paresis, suggesting an additional contribution from a pharyngeal infectious process.

Discussion: In this case, these symptoms were likely influenced by two different pathophysiological mechanisms. The simultaneous presence of pontine infarction and a pharyngeal abscess may produce a synergistic effect that exacerbates the clinical symptoms. Imaging modalities such as brain MRI are essential for identifying infarct lesions in the brainstem, whereas CT scanning or endoscopic examination can help detect abscess formation within the pharyngeal space.

Conclusion: The combination of pontine infarction and pharyngeal abscess in this case aggravated dysphagia and dysphonia through both neurogenic and obstructive-inflammatory mechanism. A multidisciplinary approach is essential to establish a comprehensive diagnosis and determine optimal management. This case highlights the importance of considering dual etiologies in patients presenting with swallowing and voice disturbances following brainstem stroke.

Keywords: dysphagia, dysphonia, pontine infarction, pharyngeal abscess, brainstem stroke, case report

EFFICACY OF SECOND-LINE THERAPY ON SUCCESSFUL CLINICAL OUTCOMES IN CEREBRAL TOXOPLASMOSIS WITH SEVERE IMMUNOSUPPRESSION

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Background: Cerebral toxoplasmosis is the most common opportunistic infection of the central nervous system in patients with HIV/AIDS, caused by the reactivation of *Toxoplasma gondii* cysts. This infection typically occurs when CD4 counts drop below 200 cells/ μ L and can lead to severe focal neurological deficits or death. Early diagnosis is crucial as clinical symptoms often mimic cerebral malaria or other forms of meningitis.

Case Description: A 23-year-old male presented with a one-week history of progressive headache, accompanied by left-sided weakness and a history of two seizures prior to admission. The patient had previously been diagnosed with cerebral malaria at a different hospital. Physical examination revealed somnolence (GCS E3M6V5) and left hemiparesis (motor strength 5/4+). Laboratory results confirmed reactive HIV status with an extremely low CD4 count (21 cells/ μ L) and reactive *Toxoplasma* IgG (titer 43.9). A non-contrast head CT scan showed multiple hypodense lesions in the bilateral basal ganglia, right thalamus, and bilateral corona radiata.

Discussion: The diagnosis of cerebral toxoplasmosis was established based on clinical syndrome, severe immunocompromised state (CD4 <200 cells/ μ L), positive IgG serology, and characteristic radiological findings. Due to the unavailability of first-line drugs (pyrimethamine-sulfadiazine), the patient was treated with a second-line regimen of cotrimoxazole 960 mg every 24 hours, along with intravenous dexamethasone to manage the mass effect of the lesions. Over 13 days of hospitalization, the patient showed remarkable recovery, with resolution of the headache and restoration of normal motor strength (5/5).

Conclusion: Cerebral toxoplasmosis should be considered a primary diagnosis in HIV patients presenting with focal neurological deficits. Rapid diagnosis and appropriate empirical therapy, including the use of cotrimoxazole in resource-limited settings, can lead to excellent clinical outcomes.

Keywords: Cerebral Toxoplasmosis, HIV/AIDS, CD4, Cotrimoxazole, Hemiparesis

RARE CASES OF CNS INFECTION IN HIV PATIENTS: A CASE REPORT

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Background: Vacuolar myelopathy and progressive multifocal leukoencephalopathy (PML) are examples of uncommon opportunistic central nervous system (CNS) infections in HIV patients that frequently

manifest in advanced stages with low CD4 counts. In order to raise awareness of early diagnostics, this report highlights dual clinical presentations in two HIV patients.

Case Presentation: Case 1: Vacuolar myelopathy; A male HIV patient on ARV (TLD) presented with HIV-related vacuolar myelopathy, L4-L5 discitis, post-VP shunt hydrocephalus, and latent syphilis. His symptoms included headache and lower limb weakness. Management included the administration of ARV, gabapentin, and ceftriaxone. Case 2: Progressive Multifocal Leukoencephalopathy; A male patient with stage IV HIV, probable TB meningitis with CN VI arteritis, PML, pulmonary TB on OAT, and pancytopenia; manifestations included encephalopathy, hyponatremia, and pathological reflexes.

Discussion: The diagnosis was based on clinical history and imaging, and both cases show co-occurring opportunistic CNS infections in advanced HIV, with TB meningitis/PML opportunistic and vacuolar myelopathy from direct HIV effect. This finding is highly relevant to the epidemiological situation in Indonesia, where the burden of opportunistic infections in HIV patients remains high due to the significant proportion of individuals presenting with advanced disease and low CD4 counts.

Conclusion: In people with HIV, infections that affect the central nervous system need to be screened and checked regularly and treated accordingly along with the antiretroviral drugs to get the best results; this case study shows a rare situation where a person had concomitant infections in Indonesia.

Keywords: HIV, CNS infection, vacuolar myelopathy, TB meningitis, PML

STROKE MIMIC IN HIV INFECTION: ACUTE HEMIPARESIS AND FOCAL SEIZURE REVEALING CEREBRAL TOXOPLASMOSIS

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Background: Acute hemiparesis is often attributed to cerebrovascular events. However, in patients with Human Immunodeficiency Virus (HIV), opportunistic central nervous system infections must be considered as important differentials. Cerebral toxoplasmosis is the most common cause of focal intracranial lesions in advanced HIV infection and can present with focal neurological deficits or seizures that closely mimic acute stroke. Early recognition is essential to avoid misdiagnosis and delayed treatment.

Case Presentation: A 36-year-old male with known HIV on antiretroviral therapy presented with a sudden, brief focal seizure involving the left side of the lips lasting approximately one minute. The patient described the movement as involuntary and uncontrollable. Later, he developed a left-sided facial weakness, slurred speech, and progressive left-sided weakness. Neurological examination revealed compos mentis, left hemiparesis flaccid grade 3, and supranuclear palsy of cranial nerves VII and XII on the left side. Laboratory results were largely within normal limits, with mild hyponatremia. Non-contrast head CT revealed a hypodense lesion in the right external capsule with extensive vasogenic edema in the right frontotemporal region, compressing the right lateral ventricle and causing a midline shift of 0.6 cm. Findings suggested an infectious space-occupying lesion rather than a primary vascular event.

Discussion: Cerebral toxoplasmosis arises from reactivation of latent *Toxoplasma gondii* in immunocompromised hosts. Lesions commonly involve deep structures, including the basal ganglia and internal capsule, explaining contralateral hemiparesis, facial palsy, and dysarthria. Cortical irritation may provoke focal seizures, as seen with isolated lip movements. Stroke-like presentation creates diagnostic challenges, requiring differentiation from opportunistic infections in HIV patients.

Conclusion: Acute focal neurological deficits in HIV patients should not always be attributed to cerebrovascular disease. This case underscores the importance of considering opportunistic infections, including cerebral toxoplasmosis, as a potential cause, in patients with advanced immunosuppression to prevent delays in diagnosis and improve clinical outcomes.

Keywords: Cerebral toxoplasmosis, human immunodeficiency virus, stroke mimic, hemiparesis, focal seizure

NEUROINFEKSI, NEUROIMUNOLOGI, MOVEMENT DISORDERS

HEMICHOREA ASSOCIATED WITH VASCULITIS IN NEUROPSYCHIATRIC SYSTEMIC LUPUS ERYTHEMATOSUS: A RARE CASE REPORT

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Background: Vasculitis is frequently reported in Neuropsychiatric Systemic Lupus Erythematosus (NPSLE). The phenomenology of Chorea typically reflects dysfunction of the Basal Ganglia, which play a central role in motor control. We report a case of Hemichorea associated with NPSLE without structural abnormalities of the basal ganglia on neuroimaging.

Case Presentation: A 22-year-old woman with a history of SLE presented with involuntary movements of the right extremities. The movements were irregular, dance-like, and flowed from distal to proximal, could not be voluntarily suppressed, and disappeared during sleep. Neurological examination revealed no motor or sensory deficits. The Systemic Lupus Erythematosus Disease Activity Index 2000 (SLEDAI-2K) score was 0. Brain Magnetic Resonance Imaging (MRI) was unremarkable. Magnetic Resonance Angiography demonstrated vasculitic changes in the distal segments of the bilateral middle cerebral arteries (M3-M4), more prominent on the left, without large vessel occlusion. Laboratory evaluation revealed positive lupus anticoagulants. The patient showed clinical improvement following treatment with corticosteroids.

Discussion: Chorea is an uncommon manifestation of NPSLE, and unilateral presentations such as hemichorea are rare, as systemic diseases typically produce diffuse neurological involvement. Neurological manifestations in NPSLE are usually caused by vasculitis primarily affecting small vessels. The basal ganglia are supplied by small penetrating arteries, making them vulnerable to microvascular dysfunction. Endothelial activation, impaired microvascular perfusion, and antibody-mediated neuronal interactions may disrupt basal ganglia motor circuits and contribute to dopaminergic imbalance, resulting in hyperkinetic movements. The absence of structural abnormalities in the basal ganglia on neuroimaging, along with the presence of lupus anticoagulant and clinical improvement following corticosteroid therapy, supports an immune-mediated mechanism in this case.

Conclusion: Hemichorea may serve as an important clinical clue to basal ganglia involvement in patients with NPSLE. The discrepancy between clinical manifestations and neuroimaging findings suggests immune-mediated microvascular dysfunction that may not be detectable on conventional MRI.

Keywords: systemic lupus erythematosus, neuropsychiatric lupus, hemichorea, basal ganglia, vasculitis

GUT MICROBIOTA AND OUTCOMES IN CNS INFECTION: QUANTITATIVE ASSESSMENT OF LACTOBACILLUS spp. AND BIFIDOBACTERIUM spp.

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Background: The microbiota–gut–brain axis (MGBA) describes bidirectional communication between the gastrointestinal tract and the brain through neural, immune, and metabolic pathways mediated by the gut microbiota. Beneficial bacterial genera such as *Lactobacillus* spp. and *Bifidobacterium* spp. play an important role in maintaining this axis. Disruption of gut microbiota balance, known as dysbiosis, may impair

these interactions and protective mechanisms, resulting in increased inflammatory responses and altered gut–brain communication. Although dysbiosis has been associated with several neurological disorders, its clinical relevance in central nervous system (CNS) infections remains insufficiently characterized. Understanding this relationship may provide insights into the prognostic significance of gut microbiota alterations in CNS infections.

Objectives: To assess the correlation between colony counts of *Lactobacillus* spp. and *Bifidobacterium* spp. and neurological outcomes measured by the Glasgow Outcome Scale (GOS) in patients with CNS infections.

Methods: This analytic cross-sectional study was conducted at Adam Malik General Hospital, Medan, from March to October and included 30 consecutive patients with CNS infections who met predefined inclusion and exclusion criteria. Fecal samples were collected during hospitalization, and colony counts of *Lactobacillus* spp. and *Bifidobacterium* spp. were quantified using culture-based methods and expressed as colony-forming units (CFU). Neurological outcomes were assessed at discharge using the GOS. Spearman correlation analysis was performed with $p < 0.05$ considered statistically significant.

Results: A moderate, statistically significant positive correlation was found between *Bifidobacterium* spp. colony counts and GOS scores ($r = 0.457$; $p = 0.011$). In contrast, *Lactobacillus* spp. colony counts showed a weak, non-significant correlation with GOS scores ($r = 0.267$; $p = 0.154$).

Conclusion: Higher *Bifidobacterium* spp. abundance was associated with more favorable clinical outcomes in CNS infections, whereas *Lactobacillus* spp. showed no significant association. These findings suggest a genus-specific role of gut microbiota within the MGBA in influencing neurological outcomes.

Keywords: CNS infections, Glasgow Outcome Scale, microbiota–gut–brain axis

MICROBIOLOGICAL ETIOLOGY OF BRAIN ABSCESS

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Background: Brain abscess is a life-threatening intracranial infection associated with substantial morbidity and mortality despite advances in antimicrobial therapy and neurosurgical management. Identifying clinical and microbiological predictors of radiological outcomes is important to optimize treatment and improve prognosis.

Objectives: To evaluate the clinical characteristics, microbiological profiles, treatment patterns, and predictors of radiological outcomes in patients with brain abscess at a national referral hospital.

Methods: A retrospective observational study was conducted at Dr. Cipto Mangunkusumo Hospital, Jakarta, between January 2023 and August 2025. During the study period, 435 patients were admitted with intracranial infections. Among them, 36 were initially diagnosed with brain abscess. Eleven patients were excluded due to absence of microbiological culture data or unconfirmed diagnosis, leaving 25 patients for final analysis. Radiological outcomes were classified as favorable (complete resolution or residual single lesion) or unfavorable (residual multiple lesions or death) based on follow-up neuroimaging. Bivariate analysis was performed to identify potential predictors of unfavorable outcomes, and variables with potential associations were included in multivariate logistic regression analysis.

Results: Twenty-five patients were included, with a median age of 41 years (range 19–75), and 60% were male. Headache (96%) and focal neurological deficit (80%) were the most common presenting symptoms. Solitary abscesses occurred in 52% of patients, while 48% had multiple abscesses, with a median diameter of 3.8 cm. Microbiological cultures were positive in 88% of cases, predominantly Gram-negative organisms, particularly *Pseudomonas aeruginosa*, followed by *Proteus mirabilis*, *Enterobacter cloacae*, and *Klebsiella pneumoniae*. Most patients received empirical third-generation cephalosporin combined with metronidazole, and more than half underwent direct intracranial surgical intervention. Unfavorable radiological outcomes were observed in 44% of patients. Overall mortality was 20%. Multivariate analysis identified delayed initiation of antibiotic therapy as an independent predictor of

unfavorable radiological outcome (OR 0.125; 95% CI 0.016–0.986; $p=0.048$). Sepsis and decreased level of consciousness were associated with an increased risk of unfavorable outcome, although these associations did not reach statistical significance.

Conclusion: Brain abscess remains associated with considerable morbidity and mortality. Gram-negative bacteria were the predominant pathogens in this cohort. Delayed initiation of antibiotic therapy was independently associated with unfavorable radiological outcomes, highlighting the importance of early diagnosis and prompt antimicrobial treatment. The small sample size and single-center retrospective design limit the generalizability of these findings, and larger multicenter studies are needed to better define prognostic factors in brain abscess.

Keywords: Brain abscess, microbiological profile, radiological outcome, predictors, intracranial infection

NEUROSINTENSIF

PROGNOSTIC VALUE OF SERUM SODIUM NADIR AND 24-HOUR CORRECTION FOR IN-HOSPITAL MORTALITY IN NEUROCRITICAL CARE

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Background: Severe hyponatremia in neurocritical patients is associated with poor outcomes, but clinically useful thresholds and the impact of sodium correction patterns remain uncertain. This study assessed the prognostic value of sodium nadir and correction within 24 hours for in-hospital mortality.

Objectives: To evaluate the discriminatory ability of sodium nadir for in-hospital mortality and to assess the independent association of sodium nadir and 24-hour rapid correction with mortality.

Methods: A retrospective observational study was conducted in 300 neurocritical care patients using data extracted from electronic medical records. The primary outcome was in-hospital mortality. Receiver operating characteristic (ROC) analysis assessed the performance of sodium nadir (lower values indicating higher mortality risk). Multivariable logistic regression adjusted for sodium nadir category, rapid correction, admission neurological status, and other relevant clinical and demographic variables.

Results: In-hospital mortality occurred in 48.7% (146/300). Sodium nadir demonstrated moderate discrimination for mortality (AUC 0.677; 95% CI 0.616–0.737; $p<0.001$). The optimal cutoff based on the Youden index was ≤ 125.5 mmol/L (Sensitivity 71.9%; Specificity 56.5%). Severe sodium nadir (<125 mmol/L) was significantly associated with mortality in univariable analysis (OR 3.38; 95% CI 2.09–5.45; $p<0.001$) and remained independently associated in multivariable analysis (adjusted OR 4.59; 95% CI 2.58–8.15; $p<0.001$). Admission GCS ≤ 12 was also independently associated with mortality (aOR 1.96; 95% CI 1.11–3.48; $p=0.021$). Rapid correction within 24 hours was not independently associated with mortality ($p=0.633$).

Conclusion: Sodium nadir provides moderate prognostic discrimination, and severe hyponatremia (<125 mmol/L) independently predicts in-hospital mortality in neurocritical patients.

Keywords: Hyponatremia, Sodium nadir, Rapid correction, Mortality, Neurocritical care

NEUROSINTENSIF, NEUROVASKULER

SUBARACHNOID HEMORRHAGE IN SEVERE HEMOPHILIA A: AN UNCOMMON ADULT PRESENTATION AND ITS THERAPEUTIC APPROACH

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Background: Patients with severe hemophilia A have a high risk of intracranial bleeding. The most common manifestations are intracerebral hemorrhage (ICH) and subdural hematoma (SDH), accounting for 3–10% of all bleeding episodes. Subarachnoid hemorrhage (SAH) is rare, particularly in adults without a prior history of major bleeding, comprising about 6% of intracranial hemorrhage cases. Administration of factor VIII is crucial; however, access to this treatment remains limited.

Case Presentation: A 26-year-old man with severe hemophilia A (factor VIII $<1\%$) presented with 10-days progressive headache, nausea and vomiting without trauma. He was alert with mild right-sided weakness. Laboratory tests showed isolated prolonged Activated Partial Thromboplastin Time (APTT) with normal Prothrombin Time (PT) and platelet count. Non-contrast head CT demonstrated SAH involving the posterior interhemispheric fissure and tentorium cerebelli with communicating hydrocephalus. CT angiography (CTA) excluded aneurysm and vascular malformation. Recombinant factor VIII was administered immediately with 14-day maintenance, leading to clinical improvement with an excellent hemostatic response.

Discussion: Intracranial hemorrhage remains a serious complication of severe hemophilia A. In this case, the absence of trauma and the exclusion of aneurysm or vascular malformation on CTA suggest a coagulopathy-related SAH. The diagnosis was taken from prolonged APTT with normal PT and platelet count, was consistent with isolated factor VIII deficiency. Prompt recombinant factor VIII replacement led to rapid clinical improvement, underscoring the importance of early hemostatic correction to prevent neurological deterioration. This case showed that severe hemophilia A can rarely present with non-aneurysmal SAH and highlights the importance of timely factor replacement therapy to optimize outcomes.

Conclusion: Spontaneous SAH is a rare but life-threatening complication of severe hemophilia A. Early recognition and prompt factor VIII replacement are essential to achieve effective hemostasis and prevent neurological deterioration, reinforcing the need for a high index of suspicion in hemophilia patients presenting with acute headache.

Keywords: Subarachnoid hemorrhage, Intracranial hemorrhage, Hemophilia A, Factor VIII replacement, Case report

NEUROSINTENSIF

WHEN VERTEBRAL ARTERY OCCLUSION IS SAFE: ROLE OF PICA DUPLICATION IN RUPTURED DISSECTION

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Background: Ruptured vertebral artery dissection (VAD) with associated pseudoaneurysm is an important cause of subarachnoid hemorrhage (SAH) in younger patients and carries a high risk of early rebleeding. Endovascular management is currently the preferred treatment strategy. However, the choice between reconstructive techniques and parent artery occlusion depends largely on the vascular anatomy, particularly the relationship of the lesion to the posterior inferior cerebellar artery (PICA). In certain anatomical variants, vertebral artery sacrifice may be performed safely without compromising cerebellar perfusion.

Case Presentation: We report a 43-year-old man who presented with sudden severe headache and progressive quadriplegia. Cranial computed tomography revealed subarachnoid hemorrhage involving the posterior fossa and intraventricular bleeding in the fourth ventricle. Digital subtraction angiography demonstrated a dissecting lesion of the right vertebral artery at the V4 segment with an associated pseudoaneurysm. Notably, angiography revealed duplication of the posterior inferior cerebellar artery with both origins located distal to the dissected segment. Considering the favorable vascular anatomy and adequate

collateral flow from the contralateral vertebral artery, endovascular internal trapping of the affected vertebral artery segment was performed. Post-procedural angiography confirmed complete occlusion of the dissected segment while preserving perfusion to the PICA territory.

Discussion: Anatomical variations of the PICA can significantly influence therapeutic strategy in vertebral artery dissection. Duplication of the PICA may provide protective collateral circulation, allowing safe parent artery occlusion in selected patients.

Conclusion: Careful evaluation of vertebrobasilar anatomy, particularly PICA configuration, is essential when determining the safety of vertebral artery sacrifice in ruptured VAD.

Keywords: vertebral artery dissection, subarachnoid hemorrhage, posterior inferior cerebellar artery, anatomical variation, endovascular treatment

NEUROINTERVENSI, NEUROVASKULER

NEUROINTENSIVE CARE IN SEVERE VASOSPASM AFTER SAH CLIPPING: POST ANESTHETIC BRAINSTEM DEPRESSION MIMICKING BRAIN DEATH

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Background: Aneurysmal subarachnoid hemorrhage (aSAH) is a neurocritical emergency that often complicates into delayed cerebral ischemia (DCI) due to vasospasm. During ICU care, anesthetic/sedative drugs can be confounding factors in the interpretation of neurological examinations, leading to a condition known as “brain death mimic.” Therefore, the diagnosis of brain death/death by neurologic criteria (BD/DNC) must rule out reversible causes (drugs, hypothermia, metabolic disorders, etc.).

Case Report: We report the case of a 50-year-old man with complaints of sudden severe headache and a history of uncontrolled hypertension. Neurological examination revealed neck stiffness, and a non-contrast CT scan of the head showed intracerebral hemorrhage and subarachnoid hemorrhage in the right frontal lobe. The patient underwent diagnostic angiography, which revealed severe cerebral vasospasm due to subarachnoid hemorrhage (SAH), followed by aneurysm clipping. After exposure to anesthesia/sedatives, the patient showed decreased consciousness to brainstem areflexia resembling brain death. In this case, the patient received Atracurium as a neuromuscular blocking agent (NMBA), which can cause total paralysis, appearing as “no motor response and no spontaneous breathing,” which may mislead the examiner if residual anesthetic drugs are not eliminated. Neurointensive evaluation was performed, with correction of several confounding factors that may arise have arisen.

Discussion: This case highlights two critical conditions in aSAH patients, namely post-clipping complications of severe vasospasm/DCI, which can cause depressed consciousness and severe neurological deficits, and post-anesthetic brainstem depression, which presents as brainstem death. Determining brain death emphasizes the importance of eliminating confounding factors such as sedatives, analgesics, neuromuscular blockade, and hypothermia before performing the apnea test. Consider supportive examinations if confounding factors cannot be definitively eliminated. In aSAH, clinical interpretation must also anticipate the onset of DCI, which peaks in the early to middle phases of intensive care.

Conclusion: Post-anesthesia brainstem depression can resemble brain death in patients with aSAH, especially when accompanied by complications of vasospasm and extensive infarction. Therefore, evaluation must be carried out systematically, including Neurointensive Care, to rule out several confounding factors.

Keywords: Subarachnoid Hemorrhage, Brain Death Mimic

NEUROREHABILITASI

TRANSVERSE MYELITIS INITIALLY SUSPECTED AS GUILLAIN-BARRE SYNDROME: A DIAGNOSTIC CHALLENGE-CASE REPORT

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Background: Transverse Myelitis (TM) is an inflammatory disorder of the spinal cord characterized by motor, sensory, and autonomic dysfunction, resulting from heterogeneous etiologies including autoimmune conditions, infections, or demyelinating diseases. In the early phase, flaccid paralysis and hyporeflexia may resemble Guillain-Barré Syndrome (GBS), leading to diagnostic challenges and potential delays in recognizing spinal cord involvement.

Case: A 48 year old woman presented with progressive bilateral lower limb weakness for three months, accompanied by numbness in both legs. She was initially referred with suspected GBS. Neurological examination revealed severe paraparesis (1111/1111), a clearly defined sensory level at Th6-7 with hypoaesthesia below this level, impaired proprioception diminished deep tendon reflexes (+1/+1), and bilateral Babinski signs. Somatosensory Evoked Potentials (SSEP) demonstrated dorsal column dysfunction, suggesting bilateral lesions between C5 and T12. Contrast-enhanced Magnetic Resonance Imaging (MRI) of the spinal cord showed an intramedullary enhancing lesion with mild cord expansion at T11-T12 and extensive T2 hyperintensity extending cranially to T5-6 and caudally to the conus medullaris.

Discussion: The key distinction between TM and GBS lies in the anatomical location of the lesion and associated neurological signs. GBS presents with symmetric ascending weakness, hypotonia, and areflexia, whereas TM causes weakness below a defined spinal level. Although early TM may present with flaccidity, it often progresses to upper motor neuron signs, including hyperreflexia and Babinski positivity. A distinct sensory level and early sphincter dysfunction favor TM, while cranial nerve involvement and autonomic instability are more typical of GBS.

Conclusion: This case highlights that transverse myelitis may initially resemble GBS. Recognition of a sensory level, upper motor neuron signs, and confirmatory spinal MRI is crucial for timely diagnosis and prevention of permanent neurological sequelae.

Keywords: Transverse myelitis, Guillain-Barré syndrome, Inflammation, Paraparesis

NEUROREHABILITASI, NEUORESTORASI

TMS AND BAWE THERAPY FOR MULTIDOMAIN DEFICITS IN POST- ISCHEMIC STROKE YOUNG ADULTS: CASE SERIES

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Background: Ischemic stroke in young adults often results in complex multidomain neurological deficits, requiring innovative rehabilitation approaches. Conventional modalities are frequently insufficient to address combined motor, sensory, coordination, and language impairments. This case series aims to describe the clinical outcomes of combined Transcranial Magnetic Stimulation (TMS) and Brain Auditory Wave Entrainment (BAWE) therapy in young adult stroke patients.

Case Report: Two male patients aged 23 and 27 years with acute ischemic stroke and multidomain deficits underwent combined TMS and BAWE therapy after achieving clinical stability. The first case, involving bilateral thalamic and mesencephalic infarction, demonstrated significant clinical improvement after two therapy cycles. The second case, presenting with a large left hemispheric infarction accompanied by motor aphasia, showed similar improvement after three therapy cycles.

Clinical outcomes were objectively assessed using the Modified Rankin Scale (mRS) and the National Institutes of Health Stroke Scale (NIHSS). In the case with ataxia, additional evaluation was performed using the Scale for the Assessment and Rating of Ataxia (SARA), while in the aphasia case, the Tes Afasia untuk Diagnosis Informasi Rehabilitasi (TADIR) was applied.

Discussion: The combination of TMS and BAWA is presumed to exert synergistic effects. TMS selectively modulates cortical excitability to facilitate neural reorganization, whereas BAWA delivers rhythmic auditory stimulation to optimize global brainwave activity through entrainment mechanisms, thereby supporting neuroplasticity. This multimodal approach demonstrated measurable clinical improvement and was well tolerated without significant adverse effects.

Conclusion: Combined TMS and BAWA therapy shows potential as a neurorestorative modality for multidomain deficits following ischemic stroke in young adults. Further studies with randomized controlled trial designs and larger sample sizes are needed to validate these preliminary findings.

Keywords: ischemic stroke, young adults, TMS, BAWA, neurorestoration

NEUROONKOLOGI

ASSOCIATION BETWEEN PAIN INTENSITY AND PAIN CATASTROPHIZING SCALE IN PATIENTS WITH HEAD AND NECK CANCER PAIN AND THE CONTRIBUTING FACTORS

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Background: Head and neck cancer represents the seventh most common malignancy worldwide. Squamous cell carcinoma constitutes the predominant histopathological subtype, characterized by its invasive biological behavior and capacity for extensive tissue infiltration. Cancer pain is the most prominent clinical manifestation, which can occur throughout the course of the disease and has the potential to progress into chronic pain. This condition exerts emotional and cognitive impacts on patients, exacerbating pain perception a phenomenon known as pain catastrophizing.

Objective: The study aimed to explore the association between pain intensity, measured by the Numeric Rating Scale (NRS), and pain catastrophizing, measured by the Pain Catastrophizing Scale (PCS), in patients with head and neck cancer, and to analyze clinical factors influencing pain outcomes.

Methods: A prospective cross-sectional study was conducted at Dr. Cipto Mangunkusumo National General Hospital (RSCM), including patients with histopathologically confirmed head and neck cancer who received treatment in the otorhinolaryngology and neurology outpatient clinics and wards between July and August 2025. Demographic and clinical characteristics were recorded, and correlations were assessed between clinical factors, pain intensity, and clinically relevant PCS scores.

Results: A total of 81 patients were enrolled, predominantly male (53.1%), with a mean age of 50.9 ± 32 years. Most tumors were located in the nasopharynx (58%), at advanced stage disease (76.6%), and were histologically squamous cell carcinoma (77.8%). The majority of patients had undergone definitive therapy (70.4%), most commonly chemoradiation (37%). More than half reported moderate-to-severe pain intensity (54.3%), with a median NRS score of 4 and pain duration exceeding six months in 64.2% of cases. Among those with moderate-to-severe pain, 80% received opioid therapy, and the median PCS score was 29. In bivariate analysis, stage IV disease and opioid use were significantly associated with higher mean pain intensity and clinically relevant PCS values. Patients with moderate-to-severe pain demonstrated a significant association with PCS >30. In multivariate analysis, stage IV disease was independently associated with higher odds of experiencing moderate-to-

severe pain and moderate-to-severe pain was strongly associated with clinically relevant PCS scores.

Conclusions: Stage IV head and neck cancer is significantly associated with more severe pain intensity. Pain intensity emerged as a key determinant of clinically relevant pain catastrophizing. The helplessness was the most dominant component, highlighting feelings of loss of control and powerlessness represent the main cognitive-affective aspects influencing catastrophic pain in cancer patients.

Keywords: head and neck cancer, cancer pain, pain catastrophizing scale

NEUROTRAUMA

CASE REPORT: ACUTE TETRAPLEGIA AFTER TRAUMA: UNMASKING HIDDEN CERVICAL SYRINGOMYELIA IN A PRIMARY CARE SETTING

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Acute tetraplegia after trauma is commonly associated with spinal cord injury. However, in some cases, trauma can exacerbate or reveal pre-existing chronic myelopathy. We report a case of a 73-year-old male who presented to the emergency department with sudden weakness in all four limbs following a fall from approximately three meters. The patient had no loss of consciousness or head injury. Neurological examination revealed tetraplegia with muscle strength of 1/5 in all extremities and hypoesthesia up to the T4 dermatome. Prior to the trauma, the patient experienced intermittent cramps in the arms and legs, along with gastrointestinal complaints including bloating and incomplete defecation. The patient's prior neurological history raised suspicion of underlying chronic myelopathy. Initially, he was diagnosed with post-traumatic spinal cord injury and referred to a tertiary care facility for further evaluation. Cervical MRI demonstrated an intradural intramedullary lesion at the C3–C4 vertebral level measuring 2.4 × 0.45 cm, hyperintense on T2 and FLAIR sequences, and hypointense on T1-weighted imaging, suggestive of syringomyelia. This case highlights that acute tetraplegia following minor trauma in elderly patients can uncover previously undiagnosed cervical spinal cord abnormalities. Early stabilization and advanced imaging are crucial for accurate diagnosis and management planning.

Keywords: Acute tetraplegia, spinal cord injury, syringomyelia, cervical myelopathy, minor trauma, MRI, elderly patient

CONCURRENT EPIDURAL AND SUBDURAL HEMATOMAS WITH NEUROLOGICAL RECOVERY AFTER BURR HOLE EVACUATION

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Background: Epidural hematoma (EDH) and subdural hematoma (SDH) are extra-axial intracranial hemorrhages that occur following traumatic brain injury. EDH usually results from arterial bleeding caused by direct impact, whereas SDH commonly arises from rupture of bridging veins due to acceleration-deceleration forces. The simultaneous occurrence of EDH and SDH is uncommon and reflects complex biomechanical injury involving combined coup-contrecoup mechanisms. These cases are clinically significant because they may lead to delayed neurological deterioration, particularly in elderly patients with predisposing factors such as cerebral atrophy and vascular comorbidities. This report describes a rare coexistence of EDH and SDH and discusses its clinical implications.

Case Presentation: A 70-year-old man presented with progressive decline in consciousness six days prior to admission, preceded by headache and dizziness. One month earlier, he had sustained head trauma from a road traffic accident with brief loss of consciousness but without initial neurosurgical evaluation. His medical history included poorly controlled hypertension, dyslipidemia, chronic alcohol use, and previous stroke with residual right-sided weakness. Neurological

examination revealed decreased consciousness and right-sided pyramidal signs. Non-contrast head computed tomography demonstrated a left parieto-occipital acute subdural hematoma and a contralateral right parieto-occipital epidural hematoma with significant midline shift and cerebral edema. Emergent bilateral burr hole drainage was performed, resulting in gradual postoperative neurological improvement.

Discussion: The coexistence of EDH and SDH likely reflects combined coup–contrecoup injury mechanisms. Advanced age, cerebral atrophy, and vascular comorbidities may contribute to delayed clinical presentation and increased vulnerability to multiple hemorrhagic lesions. In this case, bilateral burr hole drainage served as an effective and less invasive approach to evacuate the hematomas by facilitating rapid intracranial pressure reduction.

Conclusion: The coexistence of EDH and SDH represents a complex traumatic brain injury pattern that may present with delayed deterioration in elderly individuals. Early radiological evaluation and timely neurosurgical intervention are essential to prevent secondary brain injury and improve neurological outcomes.

Keywords: coup–contrecoup injury, delayed neurological deterioration, elderly, epidural hematoma, subdural hematoma

DEVELOPMENT OF A MACHINE LEARNING MODEL TO PREDICT HEAD CT ABNORMALITIES IN MILD TRAUMATIC BRAIN INJURY

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Background: The decision to perform head CT in patients with mild traumatic brain injury (mTBI) remains challenging due to the need to balance the detection of clinically significant intracranial injury against resource utilization, radiation exposure, and prolonged emergency department stay.

Objective: To develop a data-driven model to assist clinicians in identifying high-risk mTBI patients who require head CT while reducing unnecessary imaging.

Methods: This retrospective study included adult patients (≥18 years) with mTBI who presented to a hospital between January 2022 and December 2025. Patients with signs of skull or basilar fractures were excluded. Collected variables included demographic characteristics and clinical features such as loss of consciousness, headache, and dangerous mechanism of injury. Data underwent preprocessing and stratified splitting into training and testing sets (80:20). Five machine learning algorithms (logistic regression, support vector machine, decision tree, random forest, and XGBoost) were trained and evaluated for predicting CT abnormalities.

Results: A total of 256 patients were included, with CT abnormalities detected in 54 cases (21.1%). The Random Forest model demonstrated the best performance with sensitivity of 100%, specificity of 95.35%, accuracy of 96%, and ROC-AUC of 0.90, outperforming other models.

Conclusions: Machine learning models show promise as clinical decision support tools for triaging patients with mTBI to determine the necessity of head CT, potentially reducing unnecessary imaging while maintaining patient safety.

Keywords: mild traumatic brain injury, head CT, machine learning

EARLY POST-TRAUMATIC SEIZURE IN INTERHEMISPHERIC AND TENTORIAL SUBDURAL HEMORRHAGE: A CASE REPORT

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Background: Most subdural hemorrhages (SDH) are located over the cerebral convexities. SDH along the falx cerebri (interhemispheric) and tentorium cerebelli is relatively rare and may be overlooked. Clinical manifestations can be atypical; early post-traumatic seizures may be the predominant symptom despite a normal initial neurological examination.

Therefore, early recognition of non-convexity SDH patterns and their clinical correlation with early post-traumatic seizures is important to prevent diagnostic delay and guide optimal management.

Case Presentation: A 57-year-old woman developed a seizure consisting of four episodes of generalized tonic-clonic seizures lasting less than 5 minutes, each followed by postictal confusion for approximately 15 minutes, after a slip- and-fall with occipital head impact. Neurological examination was within normal limits. Non-contrast head CT demonstrated SDH along the falx cerebri and the left tentorium cerebelli. The patient was managed conservatively with close neurological observation, osmotherapy, and antiepileptic therapy; she remained seizure-free from hospital day 2 and had no recurrence until discharge.

Discussion: Interhemispheric and tentorial SDH is an uncommon non-convexity pattern and can be easily missed, particularly when the initial neurological examination is normal. In this case, an early post-traumatic seizure was the main manifestation, underscoring that seizures occurring shortly after head injury should be considered a red flag for intracranial injury and warrant early neuroimaging even in the absence of focal deficits. Conservative management may be appropriate in clinically stable patients without significant mass effect, provided that close neurological monitoring, risk factor control, and adequate antiseizure therapy are ensured. The favorable clinical course in this patient supports a targeted conservative approach in selected cases while maintaining vigilance for possible early hematoma progression.

Conclusion: Interhemispheric and tentorial SDH may present as early post-traumatic seizures; therefore, early neuroimaging and close monitoring are essential, and conservative management can be considered in the absence of mass effect or neurological deterioration.

Keywords: subdural hemorrhage, interhemispheric, tentorium cerebelli, early post-traumatic seizure, conservative management

EFFICACY AND SAFETY OF MESENCHYMAL STEM CELLS IN SEVERE TRAUMATIC BRAIN INJURY: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Severe traumatic brain injury remains a major cause of mortality and long-term disability with limited options for neurological recovery. Mesenchymal stem cells have shown potential as a regenerative therapy through neuroprotective, anti-inflammatory, and immunomodulatory mechanisms.

Objective: This study aimed to evaluate the efficacy and safety of mesenchymal stem cell therapy in improving neurological and functional outcomes in patients with severe traumatic brain injury.

Methods: A systematic review and meta-analysis were conducted following PRISMA guidelines. Seven studies published between 2013 and 2024 were included. Four controlled studies provided quantitative data for meta-analysis. DerSimonian-Laird random-effects models were applied to pool continuous outcomes as mean differences and dichotomous outcomes as risk ratios with 95% confidence intervals.

Results: Pooled continuous outcomes across 10 comparisons (n = 101) demonstrated a mean difference of 1.72 (95% CI 1.10 to 2.33, P < 0.0001, I² = 86%) favoring MSC therapy. Pooled dichotomous outcomes yielded a risk ratio of 2.15 (95% CI 1.45 to 3.19, P < 0.001, I² = 0%). Fugl-Meyer Assessment subgroup analysis showed a mean difference of 1.95 (95% CI 0.97 to 2.93, P < 0.0001). Functional Independence Measure subgroup analysis showed a mean difference of 1.30 (95% CI 0.53 to 2.07, P < 0.001). Two single-arm phase I studies reported neurological improvement in 70% to 100% of patients. No serious adverse events were attributed to MSC therapy across all studies.

Conclusions: MSC therapy demonstrated statistically significant improvements in motor function and functional independence in severe TBI patients with an acceptable safety profile. Limited controlled trials,

high heterogeneity, and small sample sizes warrant large-scale randomized studies.

Keywords: cell therapy, mesenchymalstemcells, meta-analysis, neuroregeneration, traumaticbrain injury

NEUROTRAUMA, NEUROINTERVENSI, NEUROVASKULER

MIDDLE MENINGEAL ARTERY EMBOLIZATION AS MINIMALLY INVASIVE THERAPY FOR TRAUMATIC SUBACUTE SUBDURAL HEMATOMA

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Background: Subacute subdural hematoma (sSDH) represents a significant clinical challenge in patients with intracranial trauma, particularly when accompanied by impaired consciousness due to mass effect. Although surgical evacuation remains the standard therapy, recurrence rates remain high (10–20%). Middle Meningeal Artery (MMA) embolization has emerged as a promising neurointerventional modality by targeting fragile neovascular membranes to prevent recurrent microbleeding and facilitate physiological hematoma resorption.

Case Presentation: A 64-year-old male presented with decreased consciousness (apathetic, GCS E3V4M6) for one week prior to hospital admission. The patient had a history of chronic headache and right-sided hemiparesis following trauma 1.5 months earlier. Non-contrast head CT revealed left frontotemporo-parietal-occipital and right frontoparietal sSDH causing compression of the left lateral ventricle, accompanied by a 1.1 cm rightward midline shift and left cerebral hemisphere edema. Based on the clinical profile, left-sided MMA embolization was performed. Post-procedure, the patient exhibited significant clinical improvement, with consciousness restored to GCS 15 (E4V5M6), headache resolution, and improved motor strength. Radiological evaluation demonstrated gradual hematoma volume reduction and resolution of mass effect without the need for craniotomy or burr-hole drainage.

Discussion: Decreased consciousness in sSDH indicates failure of intracranial compensatory mechanisms. The pathophysiology of sSDH involves a cycle of chronic inflammation and angiogenesis within the outer hematoma membrane. MMA embolization functions by occluding arterial supply to fragile vessels, thereby halting microbleeding sources and optimizing endogenous resorption. This case underscores that in patients with overt neurological deficits, MMA embolization provides adequate non-invasive decompression while avoiding the morbidity associated with open surgical intervention, especially in elderly patients.

Conclusion: MMA embolization is an effective and safe modality for achieving clinical and radiological improvement in sSDH patients with impaired consciousness. This approach offers a compelling alternative or adjunct in modern management strategies aimed at reducing recurrence rates and optimizing patient outcomes.

Keywords: Subacute Subdural Hematoma, MMA Embolization, Neurointervention, Decreased Consciousness

NYERI

ASSOCIATION BETWEEN LUMBAR LORDOSIS ANGLE AND FUNCTIONAL DISABILITY IN CHRONIC LOW BACK PAIN

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Background: Chronic low back pain is a leading cause of disability and reduced quality of life. Lumbar lordosis plays a key biomechanical role in postural stability and axial load distribution. Deviations in Lumbar Lordosis Angle (LLA), either hypolordosis or hyperlordosis, may increase mechanical stress on lumbosacral structures, potentially aggravating pain and functional limitation. The Oswestry Disability Index (ODI) is a widely validated instrument for assessing disability related to low back

pain. However, evidence regarding the association between LLA and ODI remains inconsistent, particularly in the Indonesian population.

Objective: To determine the association between lumbar lordosis angle and functional disability in patients with chronic low back pain.

Methods: This was an analytical observational study with a cross-sectional design conducted at RSUP Wahidin Sudirohusodo Makassar from October to December 2025. A total of 30 patients with chronic low back pain who met the inclusion criteria were included in the analysis. LLA was measured using standard lateral lumbosacral radiography, while functional disability was assessed using the validated Indonesian version of the ODI. Statistical analysis was performed to evaluate the relationship between LLA and ODI with a significance level of $p < 0.05$.

Results: Most participants were female (56.7%) with a mean age in the productive-middle age group. The majority had normal lordosis (53.3%), followed by hyperlordosis (40.0%) and hypolordosis (6.7%). The mean ODI score indicated moderate disability. A statistically significant moderate positive correlation was found between LLA and ODI ($r_s = 0.412$; $p = 0.024$).

Conclusions: Lumbar lordosis angle is significantly associated with functional disability in patients with CLBP. LLA may serve as a clinically relevant radiological parameter in evaluating functional impairment risk.

Keywords: chronic low back pain, Lumbar Lordosis Angle, Oswestry Disability Index, functional disability

PULSED RADIOFREQUENCY DORSAL ROOT GANGLION AND FACET FOR FACETOGENIC AND LUMBAR DISC HERNIATION: A CASE SERIES

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Background: Low back pain (LBP) is a common disorder that can affect people of all ages, can lead to disability, and reduce quality of life. Mechanical conditions are the most common cause of LBP. Chronic facetogenic LBP affects approximately 15 to 40% of patients, while herniated discs occur between the fourth and fifth decades of life (average age 37 years). An estimated 2 to 3% of the population is affected, with a prevalence of 4.8% in men over 35 years of age and 2.5% in women over this age. With advances in research, many treatment methods have emerged, one of which is radiofrequency.

Case Presentation: MRI examinations of ten patients who underwent the procedure, it was found that five patients with disc herniation at two levels (L4-L5, L5-S1), three patients with disc herniation at three levels (L3-L4, L4-L5, L5-S1), and two patients with disc herniation at four levels (L2-L3, L3-L4, L4-L5, L5-S1). One patient had L3-L4 facet degeneration, seven patients had L4-L5 facet degeneration, and two patients had L4-L5, L5-S1 facet degeneration. All patients had previously undergone conservative therapy with medication and physiotherapy but did not show satisfactory improvement. All patients underwent PRF DRG and facet. Further assessment was performed using the Numeric Pain Rating Scale (NPRS) and the Oswestry Disability Index (ODI) score. The average NPRS score improved by 68%, from 8.7 at baseline or before the procedure to 3.2 in the fourth week (during the follow-up at 4 week). The ODI score also improved from before the procedure to the final follow-up, improving by 74% from 32.4 to 7.3.

Conclusion: Patients with chronic low back pain, in addition to disc herniation, often also experience facet joint degeneration. Therefore, PRF pulse therapy is recommended for the dorsal root ganglion and lumbar facet joints, providing beneficial benefits for patients experiencing chronic low back pain and radicular pain.

Keywords: Facet joint, lumbar disc herniation, radiofrequency, DRG, NPRS, ODI

NYERI KEPALA

COMPARATIVE EFFECTIVENESS OF NUTRACEUTICALS (MAGNESIUM, RIBOFLAVIN, AND COENZYME Q10) FOR MIGRAINE PROPHYLAXIS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Migraine is a chronic neurological disorder affecting 10–15% of the global population and is a leading cause of disability. Preventive therapy is recommended for patients with frequent migraine attacks. Studies have shown decreased levels of micronutrients such as magnesium, riboflavin, and coenzyme Q10 in patients with migraine, which may contribute to mitochondrial dysfunction and neuronal hyperexcitability but the comparative effectiveness for migraine prophylaxis remains unclear.

Methods: A systematic review and meta-analysis were conducted following PRISMA 2020. Searches were performed in PubMed, ScienceDirect, Europe PMC, and Cochrane Library (2000–2025). Eligible studies included people who are diagnosed with Migraine. Primary outcome was reduction in migraine frequency. Random-effects models will be used to calculate pooled mean differences (MD) or standardized mean differences (SMD) with 95% confidence intervals (CI) for continuous outcomes such as migraine frequency.

Results: Nine studies were included in this meta-analysis that met inclusion criteria. Using the random-effects model, magnesium did not demonstrate a significant effect in migraine prophylaxis (SMD = 0.414; 95% CI: -1.798 to 2.626; $p = 0.714$) with very high heterogeneity ($I^2 = 98\%$). Riboflavin also showed no significant reduction in migraine outcomes (SMD = -0.493; 95% CI: -1.623 to 0.638; $p = 0.393$) and substantial heterogeneity ($I^2 = 93\%$). In contrast, coenzyme Q10 demonstrated a significant beneficial effect (SMD = -0.522; 95% CI: -0.914 to -0.131; $p = 0.009$) with moderate heterogeneity ($I^2 = 41\%$). Egger's regression test indicated no significant publication bias across the included studies ($p > 0.05$).

Conclusions: Coenzyme Q10 shows the most consistent and statistically significant effect in migraine prophylaxis, compared to magnesium and riboflavin that did not show significant benefits under the random-effects model.

Keywords: Coenzyme Q10, Magnesium, Migraine, Riboflavin

THE CORRELATION BETWEEN ACADEMIC STRESS LEVELS AND MIGRAINE INCIDENCE IN MEDICAL STUDENTS AT HALU OLEO UNIVERSITY

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Background: Migraine is one of the most common types of primary headaches in the community. One of the most frequent risk factors for migraines is stress. Medical students often experience academic stress due to a heavier academic workload compared to other faculties, which may increase the risk of developing migraines. This study aims to analyze the relationship between the level of academic stress and the incidence of migraines among medical students at Halu Oleo University.

Methods: This research is an observational study with a cross-sectional design conducted on 93 medical students (24 males and 69 females) from Halu Oleo University, Class of 2024, selected using a random sampling technique. The Medical Student Stressor Questionnaire (MSSQ) was used to assess academic stress levels, while the Headache Screening Questionnaire (HSQ) was used to determine the occurrence of migraines. Data were analyzed statistically using the Spearman Rank correlation test with a significance level of $p\text{-value} \leq 0.05$.

Results: The results showed that out of 93 respondents, 9 (9.6%) experienced mild stress, 21 (22.5%) experienced moderate stress, 48 (51.6%) experienced severe stress, and 15 (16.1%) experienced very

severe stress. A total of 85 respondents (91.3%) had migraines, while 8 respondents (8.6%) did not. The Spearman Rank test showed a $p\text{-value}$ of 0.004, indicating a significant relationship between academic stress levels and migraine occurrence.

Conclusions: There is a significant relationship between academic stress levels and the incidence of migraines among medical students at Halu Oleo University.

Keywords: Headache, Academic Stress, Migraine

NYERI, NEUROPATI

ANALGESIC EFFICACY OF MOTOR CORTEX REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION IN CENTRAL POST-STROKE PAIN

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Background: Central post-stroke pain (CPSP) is a disabling neuropathic complication of stroke that significantly impairs quality of life and remains difficult to manage. Repetitive transcranial magnetic stimulation (rTMS) targeting the primary motor cortex (M1) has emerged as a promising non-invasive neuromodulatory therapy. This study aims to evaluate the analgesic efficacy of motor cortex rTMS in patients with CPSP.

Objective: To systemically evaluate the effectiveness of rTMS targeting the primary motor cortex in reducing pain intensity in patients with central post-stroke pain.

Methods: This systematic review followed the PRISMA guidelines. Literature searches were conducted in PubMed, Cochrane Library, IEEE Xplore, and Google Scholar. Study selection was based on predefined PICO criteria using relevant keywords and MeSH terms. Risk of bias was assessed using the Cochrane Risk of Bias 2 (RoB 2) tool for randomized controlled trials and the Risk Of Bias In Non-randomized Studies (ROBINS-I) tool for non-randomized studies.

Results: We identified a total of 344 publications, of which 5 studies were included in the final synthesis. Most studies demonstrated significant analgesic effects of high-frequency 10 Hz rTMS over the primary motor cortex (M1). The greatest reduction in pain intensity reached 20.3%, with NRS scores decreasing from 5.26 ± 0.99 to 4.10 ± 0.66 ($p = 0.001$). Greater mean pain reduction was also observed compared with standard therapy (6.67 vs 4.67; $p = 0.002$). Overall, rTMS consistently produced clinically meaningful and statistically significant reductions in pain intensity.

Conclusions: Primary motor cortex repetitive transcranial magnetic stimulation (rTMS) demonstrates promising clinical benefits in patients with central post-stroke pain, with consistent reductions in pain intensity reported across included studies.

Keywords: Central post-stroke pain, Repetitive transcranial magnetic stimulation, Primary motor cortex, Neuropathic pain, Pain intensity

ASSOCIATION BETWEEN HBA1C LEVEL AND DIABETIC PERIPHERAL NEUROPATHY IN PATIENTS WITH TYPE 2 DIABETES MELLITUS IN CICALENGKA REGIONAL GENERAL HOSPITAL

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Background: Diabetic peripheral neuropathy (DPN) is one of the most common and debilitating chronic complications of type 2 diabetes mellitus (T2DM). This condition is characterized by peripheral nerve damage resulting from prolonged chronic hyperglycemia, leading to symptoms such as pain, tingling, numbness, and reduced protective sensation in the lower extremities. DPN not only decreases patients' quality of life but also increases the risk of diabetic foot ulcers, infection, and even amputation. Poor glycemic control, commonly assessed by HbA1c levels, is a major risk factor involved in the pathogenesis of DPN. Therefore, optimal glycemic control and early identification of high-risk patients are essential to prevent the progression of this complication.

Objective: This study aimed to evaluate the association between HbA1c levels and the occurrence of DPN in patients with T2DM at Cicalengka General Hospital.

Methods: A case-control study was conducted using medical record data. The case group consisted of patients with T2DM and a diagnosis of DPN, while the control group included patients with T2DM without DPN. Cases and controls were matched by age, sex, index year, and duration since the first recorded diagnosis of T2DM.

Results: A total of 108 participants were included, comprising 66 patients with DPN and 42 patients with T2DM without DPN. The mean HbA1c level was higher in the DPN group than in the non-DPN group ($11.4 \pm 2.1\%$ vs. $9.5 \pm 1.8\%$). Multivariable logistic regression analysis showed that higher HbA1c levels were significantly associated with the occurrence of DPN (OR 1.80; 95% CI 1.17–2.75). Longer duration of diabetes was also significantly associated with DPN (OR 2.08; 95% CI 1.42–3.04), whereas age was not significantly associated after adjustment (OR 1.02; 95% CI 0.93–1.12).

Conclusion: Higher HbA1c levels and longer duration of T2DM are significantly associated with the occurrence of diabetic peripheral neuropathy.

Keywords: Diabetes Mellitus, Diabetic Peripheral Neuropathy, Neuropathy

CHARACTERISTICS OF CHRONIC PAIN AND ASSOCIATED FACTORS AMONG MILITARY PERSONNEL AT THE NEUROLOGY CLINIC OF GATOT SOEBROTO ARMY CENTRAL HOSPITAL

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Background: Chronic pain is a significant health problem in military populations, as it affects functional capacity, operational readiness, and quality of life. However, data regarding the characteristics and associated factors of chronic pain among Indonesian military personnel remain limited.

Objective: This study aimed to describe the characteristics of chronic pain among military personnel and to identify associated factors in the Neurology Clinic of Gatot Soebroto Army Central Hospital, as top referral army hospital.

Methods: This retrospective observational study included 102 soldiers with chronic pain at a military healthcare facility. Data were extracted from medical records, including demographics, pain characteristics, comorbidities, injury history, and treatments. Bivariate analyses were performed using Chi-square, Fisher's exact, or likelihood ratio tests as appropriate. Multivariate analysis was conducted using logistic regression with gender as the main independent variable.

Results: The median age was 46 years (range 21–73); most patients were male (79.4%) and served in non-combat roles (75.5%). Neuropathic pain (67.6%), moderate intensity (81.4%), and duration >6 months (83.3%) predominated, mainly affecting the trunk and extremities. NSAIDs were the most common abortive therapy (59.8%); 53.9% received preventive therapy and 35.3% underwent physiotherapy. Gender was significantly associated with pain intensity, comorbidities, and injury history ($p < 0.05$). In multivariate analysis, sex independently predicted comorbidities and injury history: women had higher odds of comorbidities but lower odds of prior injury than men.

Conclusions: In military population, chronic pain was predominantly neuropathic, moderate intensity, and long duration. Gender as an important factor related to pain intensity, comorbidities, and history of injury, and should be taken into account when designing comprehensive, gender-sensitive chronic pain management programs in military settings.

Keywords: chronic pain, military, gender, comorbidity, history of injury

CHALLENGES IN DIAGNOSING SHORT-LASTING UNILATERAL NEURALGIFORM HEADACHE: A RARE CASE REPORT

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Background: Trigeminal autonomic cephalalgias (TACs) are rare primary headache disorders characterized by unilateral trigeminal pain with cranial autonomic symptoms. Although they share overlapping features, TAC subtypes differ in attack duration, frequency, and treatment response. Misdiagnosis is common, leading to ineffective or invasive interventions.

Case Presentation: 27-year-old male presented with one month history of severe right sided headache, described as pressing, burning, and electric shock like pain with tingling over the forehead, eyebrow, and eye, accompanied by ipsilateral lacrimation. Attacks occurred five times per day, lasted 5 minutes, and were triggered by straining, positional changes, and coughing. The patient had a history of HIV, prior sinus surgery, and 6 months analgesic use without relief. Examination revealed allodynia over the right V1 distribution without neurological deficits. CT scan showed dilation of the right cavernous internal carotid artery. Initial oxygenation and oral therapy with topiramate, amitriptyline, tramadol, and ketorolac was insufficient, escalation therapy dosage and addition of gabapentin led to clinical improvement.

Discussion: SUNA is very rare subtype of TAC (2.3–6.6 per 100,000) that is frequently challenging to recognize because of its similarity to cluster headache. Oxygen therapy usually offers minimal benefit, and misdiagnosis as migraine, sinusitis, or dental and temporomandibular disorders often leads to inappropriate treatment. The underlying mechanism is believed to involve trigeminal system activation, ipsilateral cranial vasodilation, cavernous sinus inflammation, and hypothalamic-mediated autonomic dysfunction. Despite its typically refractory nature, gradual clinical response may be achieved with carefully titrated gabapentin and topiramate.

Conclusion: SUNA a rare and often treatment refractory subtype of TAC often poses diagnostic and therapeutic challenges. Early identification and tailored therapy can improve patient quality of life, while increasing clinician awareness may reduce diagnostic delays and unnecessary interventions.

Keywords: Headache, Trigeminal Autonomic Cephalgia, SUNA

CLINICAL PROFILE AND PHENOTYPIC SPECTRUM OF POST-CONCUSSION HEADACHE IN PATIENTS AT DR. HASAN SADIKIN GENERAL HOSPITAL, BANDUNG

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Background: Post-concussion syndrome (PCS) is a common clinical condition following mild traumatic brain injury (mTBI), with headache representing its most prevalent and functionally disabling manifestation. Post-traumatic headache demonstrates considerable phenotypic variability and may substantially impair daily functioning and quality of life.

Objective: To characterize the clinical features of headache in patients with post-concussion syndrome treated at Dr. Hasan Sadikin General Hospital, Bandung.

Methods: A retrospective descriptive study was conducted involving 30 patients with mild head injury (Glasgow Coma Scale score of 15) diagnosed with PCS between June and December 2025. Clinical and demographic data were obtained from inpatient and outpatient medical records. Variables included age, sex, mechanism of injury, loss of consciousness, neuroimaging findings, headache onset, quality, location, frequency, pattern, aggravating and relieving factors, associated symptoms, and pain intensity scores. Descriptive statistical analysis was performed.

Results: The median age was 24.5 years (IQR 19.7–33), with male predominance (76.7%). Traffic-related injuries accounted for 73.3% of cases. Headache occurred immediately after trauma in 86.7% of patients, and 73.3% developed symptoms within seven days. Headache was predominantly pulsating (66.7%) and unilateral (73.3%), consistent with migraine-like features. All patients reported an intermittent pattern, most

commonly 3–5 times per week (36.7%). Vertigo was the most frequent associated symptom (53.3%). The mean worst pain score was 4.5 (SD 1.86), while the median average pain score was 3 (IQR 2–4), indicating overall mild-to-moderate intensity. Persistent headache beyond three months was observed in 26.7% of patients.

Conclusion: Headache in PCS following mTBI is predominantly early in onset, intermittent in pattern, and migraine-like in presentation. Although pain intensity is generally mild to moderate, a substantial proportion of patients develop persistent symptoms. These findings highlight the importance of systematic phenotypic assessment to improve diagnostic accuracy and guide individualized management strategies.

Keywords: mTBI, traumatic brain injury, post-concussion syndrome, post-traumatic headache, migraine-like features, clinical characteristics

EFFICACY AND SAFETY OF MIROGABALIN FOR TREATING NEUROPATHIC PAIN IN THE ASIAN POPULATION: A SYSTEMATIC REVIEW

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Background: Neuropathic pain is a chronic condition caused by various factors, including diabetes mellitus, herpes zoster infection, and spinal cord injury. It significantly affects patients' quality of life, leading to discomfort, sleep disturbances, and reduced productivity. Conventional therapies often involve multiple analgesics, which may increase the risk of adverse effects. Mirogabalin provides a potential alternative therapy due to its potent mechanism and longer-lasting analgesic effect.

Objective: To systematically review recent evidence on the efficacy and safety of mirogabalin for treating neuropathic pain in the Asian population.

Methods: A systematic literature search was conducted in PubMed, Cochrane Library, and Wiley Online Library. Duplicates were removed, titles and abstracts were screened. Inclusion criteria were randomized controlled trials (RCTs) involving Asian adults (≥18 years) with neuropathic pain, intervention with mirogabalin and control, and reported outcome measures. Data extraction included author/year, country, study design, sample size, age, dose, duration, main outcomes, and key findings. Data were summarized in structured tables.

Results: Six RCTs met the inclusion criteria, with 214 – 1,587 patients per study. Mirogabalin doses ranged from 5–30 mg once daily, with durations of 1–52 weeks. Most studies reported significant improvements in average daily pain scores (ADPS) compared to baseline or control. Higher doses (30 mg/day) and longer durations (≥14 weeks) were associated with greater pain reduction. The most common adverse events were somnolence and dizziness, generally mild to moderate.

Conclusions: Mirogabalin demonstrates potential benefits in reducing neuropathic pain among Asian adults, particularly at adequate doses and longer durations. Further large-scale, high-quality RCTs with standardized protocols are needed to optimize dosing, identify target populations, and confirm long-term safety and efficacy.

Keywords: Mirogabalin, Neuropathic Pain, Asian Population

MANAGEMENT OF FROZEN SHOULDER PAIN WITH INTRA-ARTICULAR INJECTION: A CASE REPORT

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Introduction: Adhesive capsulitis, commonly known as frozen shoulder, is a musculoskeletal disorder characterized by progressive shoulder pain and limitations in both active and passive range of motion. This condition is frequently associated with diabetes mellitus and immobilization, although it can also occur idiopathically. Intra-articular corticosteroid injections have been recommended as an effective modality during the painful-stiffness transition phase to reduce inflammation and improve joint function.

Case Report: A 52-year-old female homemaker presented with a two-month history of pain and limited movement in the right shoulder. The patient had previously undergone physiotherapy and pharmacological

treatment without significant improvement. While there was no history of trauma, laboratory tests revealed a random blood glucose (RBG) level of 208 mg/dL, suggesting diabetes mellitus as a predisposing factor. Physical examination showed limitations in active and passive abduction, external rotation, and internal rotation, consistent with the stiffness phase of frozen shoulder. The patient underwent an intra-articular corticosteroid injection in the right shoulder using anatomical landmarks. One day post-injection, the patient reported a significant reduction in pain and an increased range of motion (ROM). Evaluation two weeks post-intervention showed meaningful clinical improvement in both pain intensity and the performance of daily activities.

Discussion: Adhesive capsulitis occurs frequently in diabetic patients due to metabolic changes that lead to capsular thickening and fibrosis. Conservative therapy is often less effective during the stiffness phase; therefore, intra-articular corticosteroid injection serves as an effective interventional choice to reduce inflammation and accelerate recovery. In this case, pain decreased significantly (NRS 7 to 3) and ROM increased one day after the injection, with functional improvement observed within two weeks. These findings align with studies by Cohen et al. (2020) and Brindisino (2024), which demonstrate the effectiveness of combining corticosteroid injections with physiotherapy exercises in accelerating recovery.

Conclusion: Intra-articular corticosteroid injection is proven to provide rapid improvement in adhesive capsulitis patients who do not respond to conservative therapy. This intervention effectively reduces pain, increases shoulder mobility, and accelerates the recovery phase, especially when combined with active-passive physiotherapy and muscle-strengthening exercises.

Keywords: Adhesive capsulitis, frozen shoulder, intra-articular injection, corticosteroid, shoulder pain, range of motion

MANAGEMENT OF LUMBAR DISC HERNIATION; PULSED RADIOFREQUENCY DORSAL ROOT GANGLION AND CAUDAL EPIDURAL STEROID INJECTION (A CASE SERIES)

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Background: Degenerative intervertebral disc disease is the most common cause of chronic pain in the elderly population worldwide. Epidural or transforaminal corticosteroid injections and dorsal root ganglion (DRG) radiofrequency ablation are invasive treatment options in cases where conservative treatments are insufficient.

Case Presentation: We enrolled 10 patients with clinical and MRI findings supporting lumbar disc herniation (LDH); Straight Leg Raise (SLR) test/examinations were positive in all patients. Four patients had 2-level herniated discs (L4-L5), four patients had 3-level herniated discs (L3-4, L4-5, L5-S1), and three patients had 4-level herniated discs (L2-3, L3-4, L4-5, L5-S1). Bulging and protrusion predominated, with no extrusion or sequestration. All patients received Pulsed Radiofrequency (PRF) on DRG and CESI treatment, and were followed up in the second and fourth weeks post-procedure with NPRS and SLR examination. The mean NPRS increased by 70.2%, from 8.1 to 2.4 at the fourth-week follow-up. SLR examinations were negative in 90% of samples, with one sample remaining positive.

Keywords: LDH, Pulsed Radiofrequency ablation, CESI, NPRS, SLR

PAIN SCALE IN CHRONIC LOW BACK PAIN PATIENTS BEFORE AND AFTER CORTICOSTEROID INJECTION

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Background: Low Back Pain (LBP) is a public and occupational health problem that is a major professional, economic and social burden. Up to 84% of the general population will experience an episode of LBP during its life time, and recurrence rates are high. LBP can be categorized as acute (less than 2 to 4 weeks), subacute (4-12 weeks), and chronic (more than 12 weeks). Epidural steroid injections are a common treatment option for various forms of Low Back Pain. Steroids are typically administered as

anti-inflammatory agents. Inflammation is common component of many low back pain conditions. By reducing inflammation, pain may also alleviated.

Objective: This study aims to determine the change in pain scale in patients with chronic lower back pain before and after corticosteroid injection at RS Regional General Borong, NTT

Methods: This is a descriptive study conducted from July 2025, involving 36 patients. The study variables included age, gender, occupation, and pain scale. The data were processed and presented in the form of frequency distribution tables accompanied by discussion.

Result: Among the 36 patients with low back pain, the average age was 50.9±11.8 years, with 24 males (67%) and 12 females (33%). About 25% of the patients were farmers and self-employed individuals. The median numerical pain scale before and after the steroid injection was 7 and 3, respectively.

Conclusion: Epidural steroid injections deliver medication directly (or very close) to the source of the pain. Epidural steroid injection is considered a simple, effective, and minimally invasive treatment modality for chronic low back pain.

Keywords: Chronic Low Back Pain

PERSISTENT NEUROPATHIC PAIN FOLLOWING CARPAL TUNNEL RELEASE AND STENOSING TENOSYNOVITIS: DIAGNOSTIC CHALLENGE AND ROLE OF INTERVENTIONAL PAIN MANAGEMENT

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Background: Carpal Tunnel Syndrome (CTS) is the most common peripheral entrapment neuropathy caused by compression of the median nerve within the carpal tunnel. Surgical decompression through Carpal Tunnel Release is considered the definitive treatment for moderate to severe CTS and generally provides favorable outcomes. However, a subset of patients may develop persistent postoperative pain with neuropathic characteristics such as burning sensation, paresthesia, hyperalgesia, and allodynia. The coexistence of other hand disorders such as Stenosing Tenosynovitis may further complicate the clinical presentation and create diagnostic challenges. In cases where conventional pharmacological therapy is insufficient, interventional pain management has emerged as a minimally invasive therapeutic option aimed at reducing nerve inflammation, improving nerve mobility, and decreasing pain sensitization.

Case presentation: A 49-year-old woman presented to the neurology outpatient clinic with complaints of pain and stiffness in the right index finger, accompanied by numbness and a burning sensation in the left hand for five months. The symptoms were associated with nocturnal discomfort leading to sleep disturbance. The patient had a history of surgery in August 2025, including Carpal Tunnel Release on the right hand and surgical treatment for stenosing tenosynovitis involving the third and fourth digits of the left hand. Initially, symptoms improved after surgery; however, the patient later developed persistent burning pain and paresthesia. She denied any history of systemic diseases such as hypertension or diabetes mellitus. Neurological examination revealed sensory disturbances with neuropathic pain characteristics in the median nerve distribution.

Discussion: In this patient, ultrasound-guided peripheral nerve block injections were performed at two sites: the right second digit for trigger finger-related pain and the left wrist for CTS-related symptoms. Prior to injection, Chlor Ethyl spray was applied to minimize procedural pain. Following the intervention, the patient's pain intensity decreased to a Visual Analog Scale (VAS) score of 1–2 and completely resolved within five minutes. The patient was subsequently prescribed an oral COX-2 inhibitor as adjunct analgesic therapy. At one-week follow-up, the patient reported complete resolution of pain with significant improvement in sleep quality and daily activities.

Conclusion: Persistent neuropathic pain following carpal tunnel release and stenosing tenosynovitis represents a diagnostic challenge. Ultrasound-guided interventional pain management may provide rapid

and effective pain relief while improving functional outcomes in selected patients.

PREVALENCE OF MIGRAINE WITHOUT AURA IMPROVED BY AMITRIPTYLINE PROPHYLAXIS AT MOKOYURLI BUOL REGIONAL HOSPITAL

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Background: Migraine without aura is the most common migraine subtype. Epidemiological studies report a prevalence of 15–20% in women and 5–8% in men. Prophylactic therapy is indicated in patients with high attack frequency or significant disability. Amitriptyline remains one of the most frequently prescribed prophylactic agents; however, local data regarding clinical improvement following adjuvant amitriptyline therapy are limited, particularly in regional healthcare settings.

Objective: To determine the proportion of patients with migraine without aura who showed clinical improvement following adjuvant amitriptyline therapy during September–October 2025 at Mokoyurli Buol Regional Hospital.

Methods: This retrospective descriptive observational study utilized medical record data from patients diagnosed with migraine without aura who received adjuvant amitriptyline therapy between September and October 2025. The sample included patients aged ≥18 years who met the International Headache Society diagnostic criteria and had complete clinical records. Clinical improvement was defined as a ≥50% reduction in attack frequency compared to baseline prior to therapy initiation. Data were analyzed descriptively and through bivariate analysis using the Chi-square test and independent t-test.

Results: A total of 48 patients met the inclusion criteria. The mean age was 34.6 ± 9.8 years, with a predominance of females (72.9%). Clinical improvement was observed in 27 patients (56.3%), while 21 patients (43.7%) showed no improvement. Bivariate analysis demonstrated no significant association between sex and therapeutic response ($p = 0.41$). The mean age of patients who improved was 32.8 ± 8.7 years compared to 36.9 ± 10.5 years in those without improvement, with no statistically significant difference ($p = 0.18$).

Conclusion: The majority of patients with migraine without aura experienced clinical improvement following adjuvant amitriptyline therapy. Demographic factors such as age and sex were not significantly associated with therapeutic response. Further prospective studies with larger sample sizes are warranted to identify more specific predictive factors.

Keywords: migraine without aura, amitriptyline, prophylactic therapy, clinical response, demographic factors

RELATIONSHIP BETWEEN CHARACTERISTICS OF INTRACRANIAL TUMORS AND SECONDARY HEADACHE

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Background: Headache is a major clinical manifestation in patients with intracranial tumours. Tumour characteristics are thought to be related to pain intensity. In Indonesia, this observational studies are still limited.

Objective: To determine the relationship between tumour characteristics with the intensity of secondary headaches.

Methods: A descriptive cross-sectional study was conducted at the Neurology ward of Wahidin Sudirohusodo Hospital during 2025. A total of 64 intracranial tumour patients were included in this study. Descriptive statistics were used to summarize the distribution of demographic and clinical characteristics. Comparative and correlation test was used to examine the relationship between tumour characteristic and headache intensity.

Results: Most patients with intracranial tumour were aged >55 years (34.4%), female (51.6%), and had a moderate and severe headache, each (46.9%). Glioblastoma (34.4%), supra-tentorial (78.1%) and intra-axial

(67.2%) tumours were most common characteristic found in this study. Comparative test showed that the median headache intensity score in glioblastoma, infra-tentorial lesions, and intra-axial lesions were significantly higher than their counterparts. The correlation test of tumour volume with headache intensity score showed a weak correlation ($r=0.354$).

Conclusion: The majority of intracranial tumour patients demonstrated a moderate and severe headache that can be related by some tumour characteristic.

Keywords: intracranial tumour, tumour characteristic, headache intensity

SEVERE HYPOKALEMIA PRESENTING AS FLACCID QUADRIPARESIS WITH CONCOMITANT LOW BACK PAIN: A DIAGNOSTIC CHALLENGE

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Background: Severe hypokalemia may present as acute quadriplegia and mimic various spinal pathologies. When accompanied by low back pain, the overlapping manifestations may create a diagnostic dilemma between neurological and metabolic etiologies, potentially leading to inappropriate management.

Case Presentation: A 43-year-old hypertensive male presented with low back pain for three days after carrying heavy loads during a Ngaben ceremony. The pain was followed with weakness in all four limbs developed over the last 2 days. Neurological examination revealed paraspinal muscle spasm, positive right Lasègue sign, flaccid quadriplegia (grade 4/5), and hyporeflexia (grade 1+). No numbness, paresthesia, sphincter disturbance, or fever was noted. Laboratory evaluation demonstrated severe hypokalemia with potassium level of 2.00 mmol/L. Thoracolumbar X-ray established narrowed intervertebral disc spaces at T9-T10, T10-T11, T11-T12, L4-L5, and L5-S1, along with foramina narrowing at L4-L5 and L5-S1. Limbs weakness markedly improved after five days of oral and intravenous potassium chloride therapy, with potassium level increasing to 2.99 mmol/L, while low back pain slightly improved following administration of oral ibuprofen and diazepam.

Discussion: Low back pain following heavy lifting with localized paraspinal muscle spasm suggested a mechanical origin. However, the presence of flaccid quadriplegia raised concern for a broader neurological process rather than an isolated lumbosacral condition. The rapid improvement of motor weakness after potassium correction indicated severe hypokalemia as the primary cause of quadriplegia, while the low back pain likely represented a concurrent structural spinal condition. Further evaluation with magnetic resonance imaging may be necessary.

Conclusion: The coexistence of severe hypokalemia and low back pain may obscure clinical judgment and complicate diagnostic decision-making. Comprehensive clinical assessment supported by appropriate laboratory and imaging examinations is essential to accurately identify the underlying conditions and guide optimal management.

Keywords: severe hypokalemia, flaccid quadriplegia, low back pain

STOLEN SIGHT, DELAYED INSIGHT: A RARE CASE OF RETINAL MIGRAINE DISGUISED AS OPTIC NEURITIS

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Background: Retinal migraine is a rare clinical entity characterized by transient monocular vision loss (TMVL) occurring alongside migraine headaches. This condition presents a significant diagnostic challenge due to its deceptive resemblance to primary ocular disorders, specifically optic neuritis. Adhering to the International Classification of Headache Disorders-3 (ICHD-3) criteria, retinal migraine remains a diagnosis of exclusion, necessitating the rigorous elimination of alternative vascular or inflammatory etiologies before a definitive diagnosis is established.

Case Presentation: A 22-year-old female was referred by an ophthalmologist with a working diagnosis of optic neuritis following complaints of headaches and visual disturbances that intensified in frequency over one month. The patient described episodes of total visual loss in the left eye lasting 10–30 minutes, followed by moderate-to-severe ipsilateral throbbing headaches. Interictal ophthalmological assessments were entirely normal, revealing no papilledema or Relative Afferent Pupillary Defect. Neurology consultation and subsequent neuroimaging, including head CT and MR Angiography, excluded other etiologies. The patient was diagnosed with retinal migraine and achieved significant clinical remission and reduced Head Impact Test (HIT-6) scores following abortive therapy with NSAIDs and prophylactic amitriptyline.

Discussion: This case highlights how retinal migraine can clinically mimic optic neuritis. While ocular pain and visual deficits prompt suspicion of inflammatory causes, the distinguishing features here were the reversible nature of visual attacks (<1 hour) and normal fundoscopic findings between episodes. The presentation of left-sided visual disturbance with ipsilateral headache aligns with current literature attributing symptoms to reversible retinal arteriolar vasospasm, distinct from the persistent inflammatory pathophysiology of optic neuritis.

Conclusion: Retinal migraine must be considered a primary differential diagnosis in young patients presenting with TMVL and headache, particularly when symptoms are stereotypical and reversible. Detailed history-taking regarding symptom duration is the critical differentiator from optic neuritis, preventing unnecessary over-treatment and ensuring appropriate migraine prophylaxis.

Keywords: Retinal migraine, Optic neuritis, Headache, Vision loss

TARGETING THE GUT-BRAIN AXIS IN MIGRAINE: EFFECTS OF PROBIOTIC SUPPLEMENTATION ON MIGRAINE CHARACTERISTICS AND INFLAMMATORY MARKERS (CRP AND TNF- α)

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Background: Migraine is a common neurological disorder and a leading cause of disability worldwide. Despite the availability of pharmacological treatments, many patients continue to experience inadequate symptom control or adverse effects. Emerging evidence suggests that the gut-brain axis plays an important role in migraine pathophysiology through interactions between gut microbiota, the immune system, and neural signaling pathways. Modulation of gut microbiota using probiotics has therefore been proposed as a potential adjunctive therapy to improve migraine outcomes. Several randomized controlled trials (RCTs) have evaluated probiotic supplementation in patients with migraine; however, the reported findings remain inconsistent and the magnitude of clinical benefit remains unclear.

Objective: To systematically review and quantitatively synthesize current evidence on the effects of probiotic supplementation on migraine-related outcomes.

Methods: A systematic review and meta-analysis of RCTs was conducted following PRISMA guidelines and registered in PROSPERO (CRD420261327461). Electronic databases were searched from inception to January 2026. Random-effects meta-analyses were performed to estimate pooled standardized mean differences (SMDs) with 95% confidence intervals (CIs). Primary outcomes included migraine attack frequency, duration, and severity, while secondary outcomes included inflammatory biomarkers (hs-CRP and TNF- α). Risk of bias was assessed using the Cochrane Risk of Bias 2 tool.

Results: Five RCTs involving 776 participants were included. Probiotic supplementation significantly improved migraine-related outcomes compared with placebo ($P < 0.00001$), with reductions in attack frequency ($P = 0.002$), duration ($P = 0.0003$), severity ($P = 0.0006$), and MIDAS scores

($P = 0.04$). No significant reductions were found for hs-CRP ($P = 0.24$) or TNF- α ($P = 0.66$).

Conclusions: Probiotic supplementation improved migraine frequency, duration, severity, and disability but showed no significant effect on systemic inflammatory biomarkers. Larger high-quality RCTs are needed to confirm these findings and clarify underlying mechanisms.

Keywords: migraine, probiotics, gut-brain axis, randomized controlled trial, meta-analysis

THE CHARACTERISTICS OF LOW BACK PAIN PATIENTS TREATED WITH REPETITIVE PERIPHERAL MAGNETIC STIMULATION AT DR. MOHAMMAD HOESIN HOSPITAL PALEMBANG

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Background: Repetitive peripheral magnetic stimulation (rPMS) is one of non-invasive modalities used to relieve low back pain, but patient profiles and outcomes are rarely described.

Objective: To describe characteristics of low back pain patients receiving rPMS therapy at Dr. Mohammad Hoesin Hospital Palembang and summarize the background characteristics, pain and functional outcomes.

Methods: This descriptive observational study comprised 26 low back pain patients treated with rPMS in outpatient clinic in Mohammad Hoesin Hospital Palembang from April to June 2025. The rPMS was administered for five consecutive days. Numeric Pain Rating Scale (NPRS) and Oswestry Disability Index (ODI) were measured at baseline, after five sessions and one month after therapy.

Results: Based on sociodemographic distributions, the average age of people with low back pain was 53.5 years, and there were equal numbers of men and women. Tertiary education was most commonly affected (53.8%) and housewives were the largest occupational group (30.8%). The BMI of most patients was overweight (42.3%). Clinically, the majority of patients presented with chronic onset (69.2%) and lumbar disc herniation was the leading etiology (57.7%) followed by erector spinae spasm, lumbar spondylosis, piriformis syndrome, and cauda equina syndrome. The most frequently applied rPMS stimulation intensity was 40%. The median score of NPRS before treatment, after treatment, and at the one month follow-up was 6, 4, and 3 respectively. The median score of ODI was 28% at the baseline, 17% after treatment and 13% at the one month follow-up.

Conclusion: In this small rPMS-treated descriptive observational study, patients were predominantly middle-aged with chronic LBP, and most commonly due to lumbar disc herniation. Pain and disability scale tend to improved directly after the rPMS session and over one month, supporting further controlled studies to define effectiveness and durability of rPMS in routine care.

Keywords: Low back pain, Repetitive peripheral magnetic stimulation, Numeric Pain Rating Scale, Oswestry Disability Index

NYERI, NEUROPATI, MOVEMENT DISORDERS

HEADACHE CHARACTERISTICS IN ALICE IN WONDERLAND SYNDROME AND ITS MANAGEMENT: A CASE REPORT

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Introduction: Dystonia is movement disorder with sustained or intermittent muscle contractions causing abnormal movements and postures. In cervical dystonia, pain affects the neck and shoulders may extend to the cranial, upper extremities, trunk. Pain mechanisms include

persistent muscle contraction, compensatory posture, increased pain sensitivity, and radicular involvement due to compression. Spinal cord cervical tumor cause cervical dystonia, but very rare. Reports of cervical Tarlov cysts are limited, and none have been associated with dystonia.

Case Report: A man 45-year-old presented with painful involuntary tonic spasms and abnormal twitching involving the cervical, brachial, antebrachial, oromandibular, facial, thoracic, and abdominal regions for two years. The pain began in the neck and radiated to the face, mouth, hands, chest, and abdomen. Two months later, gradual monoparesis of the right upper extremity developed. Neurological examination showed decreased muscle strength in the right upper limb (C5–C7: 5; C8–T1: 4). Contrast-enhanced MRI revealed an intradural extramedullary cystic lesion at the right C2–C3 suggestive of a Tarlov cyst with moderate spinal stenosis. Toronto Western Spasmodic Torticollis Rating Scale and Psychiatric Score (TWSTRS-2 : 69 & TWSTRS-PSYCH : 21). Symptomatic therapy with anticholinergics, benzodiazepines, and baclofen showed no improvement.

Discussion: Spinal compression caused cervical Tarlov cyst produce persistent nociceptive input leading to central sensitization and spinal disinhibition, resulting in neuropathic-like pain. Painful tonic spasms may be triggered by sensory stimuli causing corticospinal tract demyelination, which allows ephaptic transmission, increases alpha motor neuron hyperexcitability, and induces dystonic movements. The lack of response to pharmacological therapy is likely due to the presence of a structural cervical lesion. In symptomatic Tarlov cysts, surgical excision may provide favorable outcomes.

Conclusion: Spinal dystonia due to cervical Tarlov cyst compression is extremely rare and diagnostically challenging. Structural causes should be considered in dystonia resistant to pharmacological therapy.

Keywords: spinal dystonia, spinal cord, movement disorder, pain

NYERI, NEUROPATI, NYERI KEPALA

HEADACHE CHARACTERISTICS IN ALICE IN WONDERLAND SYNDROME AND ITS MANAGEMENT: A CASE REPORT

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Background: Alice in Wonderland Syndrome (AIWS) is a rare disorder marked by perceptual distortions, with migraine reported in 16–19% of AIWS cases. Perceptual disturbances may alter headache phenotype and promote chronification. This report describes its clinical characteristics and management.

Case Report: An 18-year-old female presented with a five-year history of “heavy and floating” headache, worsening one week before admission. Symptoms began at age 13 with visual and auditory hallucinations accompanied by seizures, followed by unilateral alternating headache lasting 2–5 hours, recurring several times daily, and initially preceded by fever. The pain was often heralded by abnormal sensations in both soles radiating to the head. Over time, the headache became near-daily and refractory to treatment. Contrast-enhanced MRI revealed left frontal demyelination, bilateral hippocampal sclerosis spectrum, and right hippocampal inflammation, while EEG and cerebrospinal fluid analysis were normal. Genetic testing identified 16p11.2 chromosomal duplication. The patient received duloxetine, valproic acid, and rimegepant.

Discussion: AIWS was diagnosed after characteristic episodic visual distortions, including prosopometamorphopsia and plagiopsia, accompanied by body perception disturbances, affective symptoms, and dissociative episodes. The temporal relationship between visual symptoms and headache was initially unclear, and normal ancillary tests excluded epilepsy and progressive structural lesions. Headache evolved from migraine-like attacks to chronic daily pain, suggesting central sensitization. Hippocampal abnormalities suggest involvement of limbic networks implicated in pain modulation and perceptual integration. Failure of peripheral analgesics reinforced central predominance.

Duloxetine was initiated to enhance descending inhibition but discontinued due to worsening hallucinations and replaced with valproic acid to reduce cortical excitability and stabilize mood. Significant improvement with rimegepant, a CGRP receptor antagonist used as abortive and preventive therapy, highlights the role of CGRP pathways in this phenotype.

Conclusion: Headache in AIWS may evolve from atypical patterns to chronic forms through central sensitization, highlighting the importance of early recognition and mechanism-based management.

Keywords: Alice in Wonderland Syndrome, Migraine with aura, Headache, Case report

LEVEL OF DISABILITY IN MIGRAINE PATIENTS BASED ON THE INDONESIAN MIGRAINE DISABILITY ASSESSMENT (MIDAS-INA) QUESTIONNAIRE AND ASSOCIATED FACTORS

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Background: Migraine is the second leading cause of disability among individuals in the productive age group, especially women, and significantly affects productivity, social activities, and the global economy. Assessing disability is essential, with the MIDAS questionnaire including its Indonesian version (MIDAS-Ina) being the most validated tool. This study is the first in Indonesia to describe migraine-related disability and its associated factors.

Objective: This study aims to describe the demographic characteristics of migraine patients, identify the most prevalent levels of migraine-related disability and assess the association between demographic factors and disability severity. Additionally, the study evaluates the relationship between migraine characteristics and bothersome symptoms with patient's disability level.

Methods: A prospective cross-sectional study was conducted at Dr. Cipto Mangunkusumo National General Hospital (RSCM) and Universitas Indonesia Hospital (RSUI) on subjects diagnosed with migraine during July– November 2025. Data were collected on disability level, demographic characteristics, clinical headache features, and factors associated with migraine-related disability.

Results: A total of 76 subjects were included, the majority of whom were female (92.1%), with a mean age of 38.3±12.2 years. The most common disability level among migraine patients was moderate-to-severe disability (61.9%). Bivariate analysis showed significant associations between disability and migraine frequency, duration, aura, hypertension, psychiatric disorders, photophobia, and nausea/vomiting ($p<0.05$). In the multivariate analysis, migraine duration was found to increase the level of disability by 1.133 times. In addition, multivariate testing demonstrated that migraine duration and nausea/vomiting symptoms were significant determinants of migraine disability.

Conclusions: Most migraine patients experienced moderate-to-severe levels of disability. Migraine duration and nausea/vomiting symptoms were proven to be important clinical determinants of migraine disability. These findings highlight the need for more comprehensive migraine management, including the treatment of nausea and vomiting as an essential component of therapeutic strategies to minimize disability.

Keywords: Migraine, Disability, MIDAS

NYERI, NEUROPATI, NEUROONKOLOGI

INCIDENCE OF CANCER PAIN IN BREAST CANCER PATIENTS: A FIVE-YEAR RETROSPECTIVE STUDY

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Background: In breast cancer care, cancer pain is one of the most disruptive symptoms patient's experienced. It affects daily activities, quality of life, and often drives the need for ongoing analgesic treatment.

Objective: This study aim to describe the proportion and key characteristics of cancer pain among breast cancer patients based on medical records.

Methods: This retrospective study used patient's medical record data. Variables included the presence of cancer pain, pain intensity measured by NPRS, pain onset, pain type, and documented pain treatment. Additional clinical information included age, metastasis and sites, biological subtype and breast cancer histopathology types.

Results: This research used 47 samples, with a mean age of 62.0 ± 5.9 years (median 60; range 52–70). Breast cancer subtypes included triple negative breast cancer (TNBC) (4.3%), luminal A (31.9%), and luminal B (63.8%), with invasive ductal/NST (66.7%), invasive lobular (26.7%), and mixed ductal and lobular (6.7%). Metastasis was recorded in 72.3% of patients, with distribution of bone (44.1%), brain (38.2%), lung (29.4%), liver (11.8%), and kidney (8.8%). Cancer pain was recorded in 76.6% of patients, with 29.79% experiencing acute pain (<3 months) and 70.21% experiencing chronic pain (>3 months). Pain severity recorded was generally moderate, with a median NPRS of 4.5 (IQR 3–6; range 2–9). The subtype that causes the most cancer pain is Luminal B (63.8%) with Luminal B also causing the highest pain scale (NPRS 7-10). Pain types were almost evenly distributed, with nociceptive (41.7%), neuropathic (41.7%), and mixed (16.7%). The recorded pain therapy used was neuropathic pain medication (47.2%), combination of opioids and adjuvants (30.6%), and non-opioids (22.2%).

Conclusions: Cancer pain is frequently found in patients with breast cancer and other types of cancer. Accurate examinations will provide a precise initial diagnosis and optimal treatment plan to improve the patient's quality of life.

Keywords: breast cancer, cancer pain, cancer treatment, retrospective

NYERI, NEUROPATI, NEUROTRAUMA

INTEGRATED PREDICTIVE MODEL OF MRC SCORE, ELECTROMYOGRAPHY, AND FUNCTIONAL SCALES IN TRAUMATIC PERIPHERAL NERVE INJURY

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Background: Traumatic peripheral nerve injury is a major cause of motor disability and functional impairment. Early severity assessment is essential for treatment planning and prognostic evaluation; however, electrophysiological examinations are not always accessible in resource-limited settings. The Medical Research Council (MRC) score is a simple clinical tool for muscle strength assessment, yet its integrated predictive value alongside electromyographic (EMG) parameters remains insufficiently explored.

Objective: To develop an integrated predictive model based on the MRC score and EMG parameters for severity stratification in traumatic peripheral nerve injury.

Methods: An analytic observational cross-sectional study was conducted on 100 patients with traumatic peripheral nerve injury at Dr. Moewardi Hospital, Surakarta. The MRC score was assessed as the primary clinical parameter. Needle EMG evaluation included spontaneous activity, motor unit action potential (MUAP) characteristics (duration, amplitude, and phase), and recruitment patterns. Clinical severity was determined using a composite clinical severity score (0–4). Statistical analyses included Spearman correlation, multivariate logistic regression, and receiver operating characteristic (ROC) analysis.

Results: A total of 44% of subjects were classified as having severe clinical injury. Abnormal spontaneous activity, MUAPs with prolonged duration and increased amplitude showing a polyphasic pattern, as well

as reduced to discrete recruitment, were more frequently found in the severe group. The MRC score showed a trend toward correlation with clinical severity ($r = 0.18$; $p = 0.071$). An MRC score ≤ 2 increased the risk of severe injury (OR 2.34; 95% CI 1.08–5.06), while abnormal EMG parameters were significantly associated with severity (OR 3.12; 95% CI 1.41–6.89; $p < 0.05$). The integrated model demonstrated better discrimination than MRC alone (AUC 0.64).

Conclusions: Integrating clinical and electrophysiological parameters improves severity stratification of traumatic peripheral nerve injury and supports early clinical decision-making, particularly in resource-limited settings.

Keywords: peripheral nerve injury, MRC score, electromyography, predictive model, clinical severity

NEURODEGENERATIF

COGNITIVE FRAILITY IN NEUROLOGICAL CARE: A SYSTEMATIC REVIEW OF MULTIDOMAIN INTERVENTIONS

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Background: Cognitive frailty—the coexistence of physical frailty and mild cognitive impairment without dementia—represents a potentially reversible vulnerability state that may influence neurological recovery, particularly in stroke and other neurological deficits. Its role as a therapeutic target within comprehensive neurological care remains unclear.

Objective: To systematically evaluate evidence on cognitive frailty in patients with neurological deficits and assess the impact of multidomain interventions on functional and cognitive outcomes.

Methods: A systematic search of PubMed ($n=48$), Google Scholar ($n=316$), and ScienceDirect ($n=30$) identified 394 records. After removal of duplicates and screening, full-text eligibility assessment was performed according to predefined criteria. Fourteen studies met inclusion criteria, comprising randomized controlled trials and observational cohorts. Eligible studies involved adults with neurological deficits and coexisting physical frailty plus mild cognitive impairment, excluding dementia. Interventions included structured physical exercise, cognitive training, nutritional strategies, or integrated multidisciplinary care. Primary outcomes were neurological functional measures (NIHSS, modified Rankin Scale). Secondary outcomes included cognitive performance (MoCA, MMSE) and physical frailty indices.

Results: Randomized trials demonstrated that resistance and multidomain motor–cognitive interventions significantly improved global cognition (MoCA), executive function, gait speed, and frailty status. Observational stroke cohorts consistently reported that frailty independently predicted poorer cognitive and functional recovery. However, no randomized trials specifically targeted cognitive frailty within post-stroke rehabilitation using neurological disability scales as primary endpoints.

Conclusion: Cognitive frailty is a modifiable multidimensional construct associated with neurological outcomes. Despite supportive evidence from multidomain interventions, stroke-specific frailty-targeted rehabilitation strategies remain lacking, highlighting a critical translational gap in comprehensive neurological care.

Keywords: Cognitive frailty, Stroke rehabilitation, Multidomain intervention, Frailty, Mild cognitive impairment

FROM POST-STROKE TO VASCULAR COGNITIVE IMPAIRMENT: EFFECTS OF EGB 761 ON COGNITIVE FUNCTION — A SYSTEMATIC REVIEW, META-ANALYSIS, AND EXPLORATORY ANALYSIS OF DEMENTIA PREVENTION

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Background: Post-stroke cognitive impairment (PSCI) and the vascular cognitive impairment (VCI) spectrum still lack strongly evidence-based adjuvant therapies. Standardized *Ginkgo biloba* extract (EGb 761) may target oxidative–inflammatory stress and microcirculatory dysfunction.

Methods: A systematic review of randomized controlled trials (RCTs) was conducted in Scopus and PubMed without year or language restrictions, following Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. Populations included post-stroke and VCI patients, including vascular cognitive impairment–no dementia (VCIND). Intervention: EGb 761; comparators: placebo, standard therapy, or active treatment. Primary outcome: global cognition measured by Montreal Cognitive Assessment (MoCA) and Mini-Mental State Examination (MMSE). Secondary outcomes: specific cognitive domains and clinical global assessment. Safety outcomes included adverse events (AEs) and serious AEs. Data extraction and risk-of-bias assessment were performed using Cochrane Risk of Bias 2 (RoB 2) by two independent reviewers. Certainty of evidence was evaluated using GRADE. Studies using non-EGb 761 preparations were recorded for contextual interpretation but excluded from primary estimates.

Results: Twelve RCTs met inclusion criteria: 1) In PSCI, one 24-week RCT demonstrated significant MoCA improvement versus control. 2) In VCI/VCIND, double-blind and open-label trials (3–6 months) showed improvements in global cognition or clinical global impression in EGb 761 groups, although one trial found no MMSE difference. 3) Heterogeneity in instruments, populations, and study designs limited cross-setting meta-analysis. 4) Overall safety profile was acceptable, with no new serious AE signals compared with controls.

Discussion: A consistent direction of effect supports a benefit signal of EGb 761 in PSCI/VCIND with good tolerability. However, certainty of evidence remains moderate-to-low due to limited RCT numbers, short follow-up durations, and heterogeneity. Large double-blind trials lasting ≥ 6 –12 months emphasizing executive domains and standardized safety reporting are required.

Keywords: EGb 761, PSCI, VCI, VCIND, MoCA, MMSE, RCT, RoB 2, GRADE

INCIDENTAL EXTENSIVE BRAIN CALCIFICATION SUGGESTIVE OF FAHR SYNDROME IN A PATIENT PRESENTING WITH ACUTE HEMIPARESIS

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Background: Fahr syndrome is a rare condition characterized by symmetric calcification of the basal ganglia and other brain structures, commonly associated with disturbances in calcium–phosphate metabolism. Its coexistence with acute ischemic stroke is rarely reported.

Case Presentation: An 82-year-old woman presented with left-sided limb weakness accompanied by motor aphasia and decreased level of consciousness. Physical examination revealed left hemiparesis. Laboratory investigations showed anemia, hypocalcemia, hyperphosphatemia, and evidence of pneumonia. Non-contrast head computed tomography demonstrated an acute infarction of the right external capsule along with diffuse calcifications involving the basal ganglia, cerebellum, and subcortical regions, findings consistent with Fahr syndrome. The patient was admitted to the high care unit and received supportive management, antiplatelet therapy, antibiotics, neuroprotective agents, calcium supplementation, and physiotherapy.

Discussion: Fahr syndrome is a rare neurodegenerative disorder characterized by symmetric calcification of the basal ganglia and other subcortical structures, either in primary form or secondary to chronic metabolic disorders such as hypocalcemia and hypoparathyroidism. Most cases are asymptomatic and are incidentally detected through neuroimaging studies. In this patient, Fahr syndrome was identified incidentally during evaluation for acute neurological deficits.

Conclusion: Fahr syndrome may coexist with ischemic stroke, particularly in elderly patients with underlying metabolic disturbances. Metabolic abnormalities, including hypocalcemia and hyperphosphatemia, play a significant role in intracranial calcification. Although Fahr syndrome rarely causes stroke directly, chronic cerebral

calcification may accelerate cerebral vasculopathy. Neuroimaging and comprehensive metabolic evaluation are essential for accurate diagnosis and optimal management.

Keywords: Fahr Syndrome, Ischemic Stroke, Intracranial Calcification, Hemiparesis, Elderly

NEURODEGENERATIF, DEMENTIA, KOGNITIF

EFFECTS OF CPAP ON COGNITION AND SLEEP QUALITY IN NEURODEGENERATIVE DISORDERS WITH OBSTRUCTIVE SLEEP APNEA: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Parkinson disease and mild cognitive impairment are highly vulnerable to sleep disruption, and comorbid obstructive sleep apnea (OSA) may accelerate cognitive and functional decline. Continuous positive airway pressure is an established therapy for sleep apnea, but its benefits in neurodegenerative populations remain incompletely understood.

Objective: To evaluate the cognitive and sleep-related effects of CPAP therapy in individuals with neurocognitive disorders and comorbid obstructive sleep apnea.

Methods: A systematic search of PubMed, Cochrane Library, and ScienceDirect identified studies comparing CPAP with untreated or minimally treated OSA. Quantitative synthesis was performed when mean, standard deviation, and sample size data were available, and qualitative synthesis was used for studies reporting non-extractable outcomes.

Results: Ten studies met inclusion criteria, with four eligible for meta-analysis. CPAP produced a significant improvement in global cognition (SMD 0.57; 95% CI 0.22–0.92) and a positive but non-significant trend toward improved sleep quality (SMD 0.27; 95% CI –0.03–0.57). No study demonstrated harm.

Conclusion: CPAP shows promise as a modifiable intervention to improve cognitive and sleep outcomes in neurodegenerative conditions with comorbid OSA.

Keywords: CPAP, obstructive sleep apnea, Parkinson disease, mild cognitive impairment, cognition

INVESTIGATING THE IMPACT OF LANGUAGE PROFICIENCY ON COGNITIVE FUNCTION IN OLDER ADULTS: A GROUNDBREAKING STUDY FROM INDONESIA'S LINGUISTICALLY DIVERSE POPULATION

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Background: Population aging presents increasing neurological and public health challenges, particularly cognitive decline. The hypothesis suggests that sustained cognitive engagement, such as multilingual language use, may enhance neuroplasticity and delay cognitive deterioration. While multilingualism has been linked to better cognitive outcomes, evidence from linguistically diverse populations remains limited. This study represents one of the first attempts to explore the impact of multilingualism on cognitive function in older adults within Indonesia's linguistically diverse population, a gap in current global research. Indonesia, with over 700 spoken languages, offers a unique setting for this research.

Objective: To examine the association between language proficiency and cognitive function in older adults in Indonesia.

Methods: A cross-sectional study was conducted from March to August 2025 at Adam Malik Hospital and Prof. Dr. Chairuddin P. Lubis Universitas Sumatera Utara Hospital. A total of 114 participants aged ≥60 years were categorized as monolingual, bilingual, or multilingual. The assessment

consisted of the Language Experience and Proficiency Questionnaire (LEAP-Q) Indonesian Version for language proficiency, the Montreal Cognitive Assessment in its Indonesian version (MoCA-INA), the Brief Cognitive Screening Battery (BCSB-INA) for cognitive function, and the Tes Afasia untuk Diagnosis Informasi Rehabilitasi (TADIR) for language. Data were analyzed using the Chi-Square and Kruskal-Wallis tests, with $p < 0.05$ considered statistically significant.

Results: Significant differences in cognitive performance were observed across language groups based on MoCA-INA scores ($p < 0.001$). Multilingual participants showed superior cognitive performance compared to bilingual and monolingual individuals. Domain-specific analysis with BCSB-INA revealed significantly better memory performance in multilingual participants (all $p < 0.001$). In the TADIR assessment, multilingual participants also exhibited better verbal fluency, comprehension, and writing skills ($p < 0.05$).

Conclusions: Multilingualism is associated with better cognitive function in older adults. These findings highlight the potential of multilingualism to enhance cognitive performance in linguistically diverse populations.

Keywords: monolingual, bilingual, multilingual, cognitive function, older adults

NEUROBEHAVIORAL DISORDERS IN HYPOTHALAMIC HAMARTOMA WITH FRONTAL ARACHNOID CYST: A CASE REPORT

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Neurobehavioral disorders in adult patients often pose diagnostic challenges, particularly when they develop progressively without clear focal neurological deficits, leading to frequent misclassification as primary psychiatric disorders. The hypothalamus, as part of the diencephalon, plays a central role in regulating behavior, emotions, sleep–wake cycles, appetite, autonomic, and endocrine functions. Lesions affecting this structure may produce complex clinical manifestations predominantly characterized by neurobehavioral disturbances.

This case report presents a 56-year-old woman with progressive behavioral changes, including disorientation, verbal disinhibition, non-auditory visual hallucinations, severe sleep disturbance, hyperphagia, nocturia, and bilateral visual decline, without prominent focal neurological deficits. Contrast-enhanced brain MRI revealed a well-defined lesion in the hypothalamus compressing the optic chiasm, most consistent with hypothalamic hamartoma, with hypothalamic low-grade glioma as a differential diagnosis. Additionally, a right frontal arachnoid cyst and mild cerebral atrophy were identified as accompanying findings.

The diagnostic approach was conducted through anatomy–clinical correlation using a circuit-based framework, assessing the involvement of the hypothalamic–limbic–thalamo-cortical circuitry underlying the patient's partial diencephalic syndrome. The right frontal arachnoid cyst was interpreted as a non-neoplastic structural factor potentially exacerbating behavioral control and executive dysfunction via disruption of frontal–subcortical circuits, rather than being the sole cause of the neurobehavioral disturbance.

The patient was managed conservatively and through a multidisciplinary approach, including corticosteroids, low-dose antipsychotics, sleep stabilization, and supportive neurobehavioral interventions. During hospitalization and early follow-up, improvement in sleep quality and behavioral stabilization were observed, although mild spatial disorientation persisted without significant functional impairment.

This case highlights that hypothalamic lesions in adults may predominantly manifest as neurobehavioral disorders through dysfunction of diencephalic networks, potentially aggravated by non-primary frontal structural involvement. Understanding functional neuroanatomy and applying a diencephalic syndrome approach are essential to prevent misclassification as a primary psychiatric disorder and to determine a rational and safe management strategy.

Keywords: neurobehavioral disorder, hypothalamus, hypothalamic hamartoma, frontal arachnoid cyst, diencephalic syndrome.

NEURODEGENERATIF, NEUROIMUNOLOGI, NEUROLOGI ANAK

RETINAL LAYER THICKNESS MEASURED BY OPTICAL COHERENCE TOMOGRAPHY IN PEDIATRIC-ONSET MULTIPLE SCLEROSIS: A SYSTEMATIC REVIEW AND META ANALYSIS

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Background: Pediatric-onset multiple sclerosis (POMS) is multiple sclerosis in childhood onset involving inflammatory and neurodegenerative processes within central nervous system, including the visual pathway. Retina as a neuroectoderm-diencephalon derived structure can reflect these changes. Optical coherence tomography (OCT) is a non-invasive imaging modality for quantitative retinal evaluation. This study assessed retinal thickness through peripapillary retinal nerve fiber layer (pRNFL), ganglion cell-inner plexiform layer (GCIPL) and macular volume measured by OCT.

Objective: To determine the retinal thickness in the POMS population measured by OCT through a meta-analysis of observational and prospective case-control studies.

Methods: A systematic search was conducted through PubMed and Google Scholar until December 2025 to obtain primary studies that met the inclusion and exclusion criteria. Patients were then grouped into three categories: multiple sclerosis-associated optic neuritis (MSON), multiple sclerosis non-optic neuritis (MSNON), and healthy controls.

Results: Seven case-control studies were included. Analysis of pRNFL thickness showed significant thinning in MSON (MD: -19.00 μ m; 95%CI -24.05 to -14.16, $p < 0.0001$) and MSNON (MD: -4.84 μ m; 95%CI -8.38 to -1.29, $p = 0.02$) compared to control eyes. pRNFL thickness also showed significant thinning in MSON (MD: -13.75 μ m; 95%CI -19.47 to -8.04, $p = 0.001$) compared to MSNON. A significant reduction in macular volume was also found in MSON compared to the control group (MD: -0.31mm³, 95%CI -0.51 to -0.11, $p = 0.02$) and MSON compared to MSNON (MD: -0.20mm³, 95%CI -0.37 to -0.03, $p = 0.04$), but there was no significant difference in MSNON compared to the control group. For GCIPL, there were no significant differences between MSON and the control group, MSNON and the control group, or MSON and MSNON.

Conclusions: This study found significant pRNFL thinning in POMS populations with and without history of optic neuritis, as well as significant macular volume reduction in POMS patients with history of optic neuritis. OCT may serve as an additional non-invasive modality for monitoring POMS progression.

Keywords: Retina, optical coherence tomography, pediatric-onset multiple sclerosis

NEUROEPIDEMIOLOGI KLINIS

NEUROPHYSIOLOGICAL PROFILE OF DELTA-ALPHA-RATIO (DAR) AND DELTA-THETA TO ALPHA-BETA RATIO (DTABR) IN ISCHEMIC STROKE PATIENTS AFTER 10 SESSIONS OF REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION (rTMS)

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Background: Ischemic stroke causes extensive brain connectivity disruption and alters global brainwave dynamics. Quantitative Electroencephalography (qEEG) parameters, specifically Delta-Alpha Ratio (DAR) and Delta-Theta to Alpha-Beta Ratio (DTABR), serve as

objective biomarkers to monitor neurophysiological changes and metabolic recovery following neurorestorative interventions like repetitive Transcranial Magnetic Stimulation (rTMS).

Objective: To determine the neurophysiological profile of qEEG through DAR and DTABR parameters in ischemic stroke patients after undergoing 10 sessions of rTMS therapy.

Methods: This was a descriptive observational study with a retrospective approach conducted at Wahidin Sudirohusodo Hospital, Makassar, from September to December 2025. Total sampling was used to select 41 ischemic stroke patients who completed 10 rTMS sessions and had complete baseline (S1) and post-intervention (S2) qEEG data. Data were analyzed using paired statistical tests and trend analysis based on stroke onset categories.

Results: The majority of subjects were male (58.5%) and in the chronic phase (58.5%). Overall mean DAR increased from 1.38 to 1.83, while DTABR remained relatively stable from 1.36 to 1.46. However, trend analysis revealed significant differences based on onset: the early subacute group (<3 months) showed the most consistent improvement with a decrease in DAR (-0.50) and DTABR (-0.21). In contrast, the chronic group showed increased ratios (+0.96 DAR; +0.32 DTABR), likely influenced by permanent structural lesions such as encephalomalacia.

Conclusion: Intervention with 10 sessions of rTMS is most effective in improving neurophysiological profiles during the early and late subacute phases. DAR and DTABR are sensitive biomarkers for objectively mapping changes in electrical brain activity and monitoring therapeutic response in clinical epidemiology.

Keywords: Ischemic Stroke, qEEG, DAR, DTABR, rTMS

NEUROGENETIK, EPILEPSI, NEUROLOGI ANAK

INFANTILE SPASM IN MENKES DISEASE TREATED WITH ADRENOCORTICOTROPIC HORMONE: A RARE CASE

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Background: Menkes Disease is a rare X-linked recessive disorder caused by mutations in the ATP7A gene, leading to systemic copper deficiency and severe neurological manifestations such as seizures and developmental delay. Infantile spasms are a particularly challenging complication with limited effective treatment options.

Case Presentation: A 3-year-old boy with genetically confirmed Menkes Disease had refractory seizures despite receiving polytherapy with anticonvulsant drugs and a ketogenic diet. The patient exhibited characteristic features such as developmental delay, hypotonia, kinky hair, recurrent infections, and infantile spasms. Due to persistent seizures, intramuscular Adrenocorticotrophic Hormone (ACTH) was initiated at a dose of 0.25 mg three times a week for nine doses. Clinical monitoring showed a decrease in the frequency and severity of seizures. Post treatment ACTH levels returned to normal, although irritability emerged as a side effect.

Discussion: Clinical findings and supporting examinations are consistent with the typical presentation of Menkes Disease. The primary treatment for this disease is copper histidine, but it is not available in Indonesia. ACTH administration showed partial benefit in controlling seizures and may therefore be considered as an adjunctive therapy.

Conclusion: This case highlights the potential and benefits of ACTH therapy in infantile spasms associated with Menkes disease. Although the prognosis is poor due to the progressive nature of this disease, ACTH can provide meaningful symptomatic control. Further research is needed to clarify its role in this complex neurogenetic condition.

Keywords: Menkes Disease, infantile spasms, ACTH therapy, ATP7A mutation, copper metabolism

NEUROGENETIK, NEUROIMUNOLOGI

FAMILIAL JUVENILE LIMB-ONSET AMYOTROPHIC LATERAL SCLEROSIS PRESENTING WITH SPLIT HAND SIGN: A CASE REPORT

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Background: Juvenile-onset amyotrophic lateral sclerosis (ALS) is a rare form of motor neuron disease characterized by symptom onset before 25 years of age and frequently associated with hereditary factors. The diagnosis in adolescents is challenging due to overlapping features with other neuromuscular disorders. Recognition of supportive clinical signs, including selective muscle atrophy patterns, may facilitate earlier diagnostic confidence.

Case Presentation: We reported a 16-year-old male presenting with a three-year history of progressive lower limb weakness, gait instability, and difficulty rising from a squatting position. Neurological examination revealed mild symmetrical weakness in the lower extremities, prominent muscle atrophy, bilateral Babinski signs, and a split hand pattern characterized by preferential wasting of lateral intrinsic hand muscles. Sensory and autonomic examinations were normal. Needle electromyography demonstrated fasciculations, fibrillation potentials, and chronic neurogenic motor unit changes consistent with widespread lower motor neuron involvement. Spinal magnetic resonance imaging excluded structural causes of progressive motor weakness. A maternal relative reportedly experienced similar symptoms, raising suspicion of a familial form of ALS despite the absence of genetic testing.

Discussion: This case highlights the diagnostic complexity of progressive motor weakness in adolescents and underscores the importance of systematically excluding ALS mimics such as spinal muscular atrophy, hereditary spastic paraplegia, and immune-mediated motor neuropathies. The presence of a split hand pattern supported multi-regional motor neuron involvement and contributed to diagnostic confidence. Familial history further strengthened the suspicion of a hereditary motor neuron disorder.

Conclusion: Familial juvenile limb-onset ALS should be considered in adolescents with progressive motor weakness and combined upper and lower motor neuron signs. Recognition of supportive clinical features, including the split hand sign, may aid early diagnosis and guide longitudinal monitoring and genetic evaluation.

Keywords: Juvenile amyotrophic lateral sclerosis, Familial ALS, Split hand sign, Motor neuron disease, Adolescent motor weakness

NEUROIMUNOLOGI

ASSOCIATION BETWEEN NERVE CONDUCTION STUDY (NCS) PARAMETERS AND SALSA SCORE IN MORBUS HANSEN DISEASE'S PATIENTS AT DR. HASAN SADIKIN GENERAL HOSPITAL

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Background: Peripheral neuropathy in Hansen's disease frequently leads to functional disability, yet the relationship between electrophysiological findings and activity limitation remains incompletely understood. Nerve conduction study (NCS) provides objective assessment of nerve involvement, whereas the Screening of Activity Limitation and Safety Awareness (SALSA) score reflects functional impairment. This study aimed to evaluate the association between KHS parameters and SALSA score in patients with Hansen's disease.

Methods: A cross-sectional analytic study was conducted involving 29 patients with Hansen's disease who underwent KHS evaluation at Dr.

Hasan Sadikin General Hospital. Sensory and motor conduction parameters of the median, ulnar, sural, and peroneal nerves were analyzed. Spearman correlation was used to assess associations between NCS parameters and SALSA score. Differences in SALSA score according to no-response status were evaluated using the Mann-Whitney U test. Multiple linear regression analysis was performed to identify independent predictors after adjustment for age and sex.

Results: Motor conduction parameters showed stronger associations with functional disability compared with sensory parameters. Ulnar CMAP amplitude demonstrated a moderate negative correlation with SALSA score ($p = 0.002$), while median distal motor latency showed a positive correlation ($p = 0.039$). Sensory conduction parameters were not significantly associated with SALSA. No significant difference in SALSA score was observed between patients with and without no-response findings ($p = 0.819$). Multivariable analysis revealed a significant overall model ($p = 0.039$), although no individual KHS parameter remained independently associated with SALSA.

Conclusion: Motor nerve conduction abnormalities were significantly associated with functional disability in bivariate analysis, whereas sensory parameters showed no significant relationship. The absence of independent predictors in multivariable models highlights the multifactorial nature of disability. Distal motor conduction studies may serve as an objective adjunct in assessing functional impairment.

Keywords: Hansen's Disease, Peripheral Neuropathy, Nerve Conduction Study, SALSA Score

ATYPICAL MILLER FISHER SYNDROME CONFIRMED BY ANTI-GQ1B ANTIBODY: A CASE REPORT

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Background: Miller Fisher syndrome (MFS) is a rare autoimmune neuropathy and a variant of Guillain-Barré syndrome (GBS) characterized by ophthalmoplegia, ataxia, and areflexia. The diagnosis may be challenging when the initial presentation is atypical. Anti-GQ1b ganglioside antibody (anti-GQ1b) are very useful in diagnosing MFS.

Case Presentation: A 20-year-old woman presented with muscle cramps in her arms and legs, vertigo, and diplopia after an upper respiratory infection. During hospitalization, she developed bilateral central facial palsy, dysarthria, and dysphagia. Neurological examination revealed bilateral ophthalmoplegia, areflexia, and an unsteady gait. Cerebrospinal fluid (CSF) analysis showed a normal cell count without cytoalbuminologic dissociation. Contrast-enhanced magnetic resonance imaging (MRI) of the brain showed no structural abnormalities. Electrophysiological studies demonstrated peripheral neuropathy within the GBS spectrum. Serologic testing revealed significantly elevated titers of anti-GQ1b.

Discussion: The absence of cytoalbuminologic dissociation does not exclude MFS. The timing of the lumbar puncture and previous therapeutic interventions may also influence CSF findings. Compared with classic GBS, MFS often shows only mild or even no elevation of CSF protein. A high anti-GQ1b titer suggests a post-infectious autoimmune response targeting GQ1b-rich nerves, particularly those involved in eye movement and sensory function. This explains the presence of ophthalmoplegia and sensory ataxia, while strength in the arms and legs remains mostly intact. The patient received supportive care and immunomodulatory therapy, which included plasma exchange with albumin and saline. After therapy, the patient showed clinical improvement, including recovery of swallowing within one week and the ability to eat orally again.

Conclusion: Detection of anti-GQ1b is essential for confirming MFS in atypical presentations. Early treatment with plasmapheresis is associated with good clinical outcomes in atypical MFS.

Keywords: Tumefactive Multiple Sclerosis, tumor-like lesion, open-ring enhancement

BILATERAL OPHTHALMOPLEGIA AS THE INITIAL PRESENTATION OF CLINICALLY ISOLATED SYNDROME SUSPECTED OF MULTIPLE SCLEROSIS: A CASE REPORT

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Background: Clinically Isolated Syndrome (CIS) is the first clinical episode of inflammatory demyelination in the central nervous system (CNS). Although approximately 20% of cases involve optic neuritis or brainstem dysfunction, bilateral ophthalmoplegia is a rare initial manifestation. This report discusses a case of CIS presenting with acute vestibular symptoms followed by bilateral ophthalmoplegia.

Case Report: A 28-year-old female presented with acute vertigo, severe photophobia, and malaise, followed by transient visual obscuration (blackout). On the third day of hospitalization, the patient developed bilateral eyelid edema, diplopia, and bilateral ophthalmoplegia, characterized by fixed eyeballs and a total inability to perform extraocular movements in all directions. Neurological examination revealed nystagmus and suspected lesions of cranial nerves III, IV, and VI. Non-contrast head CT and brain MRI (including MRA and MRV) were unremarkable, with no evidence of demyelinating plaques. This finding is consistent with early-onset disease, where lesions may not yet be radiologically detectable. Following corticosteroid therapy, clinical symptoms improved significantly. Diplopia resolved by day 10, although a residual sensation of heaviness during ocular movement persisted upon discharge on day 11.

Discussion: This 28-year-old female patient presents a demographic profile consistent with the epidemiology of Multiple Sclerosis (MS), which predominantly affects women of reproductive age (20–45 years). The clinical manifestations—comprising vertigo, photophobia, and progression to bilateral ophthalmoplegia (cranial nerve III, IV, and VI palsies)—fall within the spectrum of Clinically Isolated Syndrome (CIS), despite brainstem involvement being a rare initial sign. Although neurological deficits were clinically evident, the normal findings on CT and MRI (including MRA/MRV) can occur during the early phases of CIS, as demyelinating lesions may not yet have reached a detectable size. Given that approximately 85% of MS cases originate as CIS, this patient remains at a 20% risk of progressing to Clinically Definitive Multiple Sclerosis (CDMS) in the future, despite the unremarkable initial imaging.

Conclusion: Bilateral ophthalmoplegia can serve as the primary manifestation of CIS. Notwithstanding normal initial imaging results, a high index of clinical suspicion and prompt corticosteroid intervention are crucial to minimize the risk of relapse and improve long-term quality of life.

Keywords: Clinically Isolated Syndrome, Multiple Sclerosis, Bilateral Ophthalmoplegia, Case Report

BEYOND MOTOR NEURON DISEASE: RECOGNIZING ANTI-3-HYDROXY-3-METHYLGLUTARYL-COENZYME A REDUCTASE (HMGCR) NECROTIZING MYOPATHY

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Background: Immune-mediated necrotizing myopathy (IMNM) is a subtype of idiopathic inflammatory myopathy characterized by proximal muscle weakness, markedly elevated creatine kinase (CK) levels, and myositis-specific autoantibodies, particularly anti-3-hydroxy-3-methylglutaryl-coenzyme A reductase (anti-HMGCR). In its early stages, IMNM may resemble motor neuron disorders or other progressive neurodegenerative conditions presenting with chronic motor weakness, leading to misdiagnosis and delayed treatment. Early recognition is critical because IMNM is potentially reversible with immunosuppressive therapy.

Case Presentation: A 24-year-old woman presented with progressive bilateral limb weakness since 2019, initially involving the left leg and later affecting the right leg and proximal upper limbs, resulting in gait impairment. There were no sensory deficits, cranial nerve involvement,

dysphagia, or respiratory symptoms. Examination revealed symmetric proximal lower limb weakness with muscle atrophy, without upper motor neuron signs. Deep tendon reflexes were mildly decreased. CK was markedly elevated at 6,569 U/L. Anti-nuclear antibody was negative. Electromyography demonstrated a myogenic pattern with fibrillation potentials, positive sharp waves, low-amplitude motor units, and early recruitment in proximal muscles. Anti-HMGCR antibodies were positive, confirming seropositive IMNM. The patient received oral steroid as treatment.

Discussion: IMNM is distinguished by profound hyperCKemia and myogenic electrophysiological findings. Clinically, progressive weakness with muscle atrophy may mimic motor neuron disease or chronic neurogenic processes. However, the absence of upper motor neuron signs, the degree of CK elevation, and the electromyography pattern strongly support a primary muscle pathology. Recognizing these distinctions is crucial, as labeling such cases as degenerative motor neuron disease may preclude appropriate immunotherapy. Early immunosuppression can halt disease progression, reduce muscle fiber necrosis, and improve functional recovery.

Conclusion: Anti-HMGCR IMNM should be considered in young patients with progressive proximal weakness and marked CK elevation. Early diagnosis enables timely immunosuppression and improved functional outcomes.

Keywords: immune-mediated necrotizing myopathy, anti-HMGCR, proximal muscle weakness, creatine kinase, electromyography

CLINICAL OUTCOMES OF RITUXIMAB THERAPY IN AUTOIMMUNE NODO-PARANODOPATHY: EXPERIENCES AND SCOPING REVIEW

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Background: Autoimmune nodopathy (AIN) features IgG4-dominant autoantibodies against nodal/paranodal proteins at Ranvier's nodes and shows limited response to first-line CIDP immunomodulators.

Case Presentation: We report two clinically suspected AIN cases and one seropositive anti-NF155 AIN. A 40-year-old male with anti-NF155 antibodies presented with tachycardia, unsteadiness, chronic progressive distal-predominant weakness, sensory ataxia, tremor, titubation, cerebellar dysarthria, pupillary dilation lag, cranial nerve involvement, and bowel dysfunction. Further tests revealed mixed motor polyneuropathy with temporal dispersion, prolonged F-wave latencies, and cytoalbuminologic dissociation. He received one session of high-dose methylprednisolone, three sessions of plasmapheresis followed by rituximab (375 mg/m² body surface area (BSA) biweekly two doses, then weekly for two additional doses two months later). INCAT score improved by 3 points and MRC scale increased by 18 points. A 30-year-old female developed subacute proximal weakness, ataxia, cranial nerve involvement, dysmetria, and nephrotic syndrome with demyelinating polyneuropathy, abnormal heart rate variability and sympathetic skin response received intravenous immunoglobulin at 3 months and rituximab (375 mg/m² BSA monthly for two doses) at 4 months post onset, resulting in full recovery (5-point reduction in INCAT and a 4-point MRC improvement). A 32-year-old female presented with progressive acute symmetric limb weakness, tremor, neuropathic pain, tachycardia, and hypohidrosis. Findings demonstrated axonal sensorimotor polyneuropathy with brachial plexus enhancement. After 2 months of onset high-dose methylprednisolone was received. Rituximab given at 3 months post onset (375 mg/m² BSA biweekly, four doses). INCAT decreased by 3 points and MRC increased by 2 points.

Discussion: The scoping review shows heterogeneous rituximab regimens, most commonly 375 mg/m² weekly for four doses (96% showed good response) or two 1g doses administered 2 weeks apart (90.9% showed good response). Our patients showed good response to various

rituximab regimens and protocols. Clinical improvement observed within 1–3 months without severe infections.

Conclusion: Our report provides efficacy data for rituximab, underscoring its safety profile. Further studies are needed to determine the effective dosing.

Keywords: autoimmune nodopathy, rituximab

BEYOND THE CLASSICAL TRIAD: ELECTRODIAGNOSTIC AND CSF-CONFIRMED MILLER FISHER-GUILLAIN-BARRÉ OVERLAP

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Background: Miller Fisher syndrome (MFS) is a rare variant within the Guillain-Barré syndrome (GBS) spectrum, classically characterized by ophthalmoplegia, ataxia, and areflexia. Overlap presentations with limb weakness and bulbar dysfunction may create significant diagnostic challenges, particularly when anti-GQ1b antibody testing is unavailable. We report an electrodiagnostic and cerebrospinal fluid (CSF)-confirmed MFS-GBS overlap with multiple cranial nerve palsies and severe truncal ataxia.

Case Presentation: A 52-year-old woman presented with four days of rapidly progressive symmetric limb weakness, initially affecting the lower extremities and ascending to the upper limbs, accompanied by ophthalmoplegia, bilateral ptosis, nasal speech, and dysphagia. Upper respiratory symptoms preceded neurologic onset by two days. Neurological examination revealed cranial nerve III, IV, and VI palsies with bulbar involvement (cranial nerve X), symmetric tetraparesis (MRC 4/5), generalized hyporeflexia, preserved sensory function, and severe truncal ataxia precluding independent sitting. Single breath count suggested mild respiratory compromise. CSF analysis showed albuminocytologic dissociation (protein 500 mg/dL; 1 leukocyte/ μ L). Electrophysiological studies demonstrated mixed demyelinating-axonal sensorimotor neuropathy, and neuroimaging was unremarkable. An MFS-GBS overlap diagnosis was established according to Brighton criteria.

Discussion: This case highlights the broad clinical continuum of MFS within the GBS spectrum when accompanied by limb weakness and bulbar dysfunction. The absence of anti-ganglioside antibody testing did not preclude diagnosis, as systematic clinical assessment supported by CSF and electrodiagnostic studies was sufficient. The patient underwent four cycles of plasma exchange, with improvement after the second cycle and progressive recovery of limb strength, ocular motility, and bulbar function, underscoring the therapeutic value of immunomodulation in overlap presentations.

Conclusion: MFS can present with substantial limb and bulbar involvement beyond the classical triad. Structured clinical assessment supported by CSF and electrophysiology enables reliable diagnosis and effective immunotherapy even in resource-limited settings.

Keywords: Miller Fisher syndrome, Guillain-Barré syndrome, overlap syndrome, cranial nerve palsy, plasma exchange

CLINICAL PROFILE AND OUTCOMES OF HOSPITALIZED GUILLAIN-BARRÉ SYNDROME PATIENTS AT DR. WAHIDIN SUDIROHUSODO GENERAL HOSPITAL IN 2025

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Background: Guillain-Barré Syndrome (GBS) is an acute autoimmune polyradiculoneuropathy affecting the peripheral nervous system and characterized by progressive muscle weakness, hyporeflexia or areflexia, and varying degrees of sensory disturbance. The pathogenesis of GBS involves an abnormal immune response following infection that causes damage to myelin or axons of peripheral nerves through molecular mechanisms such as molecular mimicry. Globally, the incidence of GBS is approximately 1–2 cases per 100,000 population per year, with a mortality rate of about 3–10%. Mortality is commonly associated with respiratory failure, severe autonomic dysfunction, and other systemic

complications. Approximately 20–30% of patients require mechanical ventilation due to respiratory muscle weakness. Clinical outcomes are influenced by several factors, including the initial severity of the disease, the need for ventilatory support, and the timeliness of immunomodulatory therapy. Data regarding the clinical profile and outcomes of GBS in Indonesia remain limited, particularly in tertiary referral hospitals.

Objective: This study aimed to determine and analyze the clinical profile and outcomes of Guillain-Barré Syndrome patients hospitalized at Dr. Wahidin Sudirohusodo General Hospital in 2025.

Methods: This study was an analytical observational study with a retrospective design. Data were collected in February 2026 through a review of medical records of patients hospitalized between January and December 2025. The study population included all inpatients diagnosed with Guillain-Barré Syndrome at Dr. Wahidin Sudirohusodo General Hospital. The sample consisted of patients diagnosed with GBS by a neurologist and who had complete medical records. Patients with incomplete records or alternative diagnoses of acute non-GBS neuropathy were excluded from the study.

Results: A total of 20 patients met the inclusion criteria. The mean age was 40.08 ± 15.34 years, with male predominance (65%). Most patients had a disability score ≥ 4 (75%) and a length of hospital stay exceeding 10 days (60%). Mechanical ventilation was required in 40% of patients, and the mortality rate was 30%. Statistical analysis showed a significant association between ventilator use and mortality ($p < 0.05$), whereas the association between disability score and mortality was not statistically significant ($p > 0.05$).

Conclusion: GBS patients were predominantly males under 50 years of age with relatively prolonged hospital stays. Mechanical ventilation was significantly associated with mortality and reflected greater disease severity, making it an important prognostic indicator in GBS patients.

Keywords: Guillain-Barré syndrome, clinical profile, ventilator, mortality, outcome

CORRELATION OF COGNITIVE IMPAIRMENT IN NPSLE WITH DISEASE ACTIVITY: A PILOT STUDY

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Background: Neuropsychiatric systemic lupus erythematosus (NPSLE) is associated with diverse central nervous system manifestations, including cognitive impairment. Domain-specific cognitive impairment in NPSLE and its relationship with disease activity remain incompletely characterized in limited-resource settings. The Montreal Cognitive Assessment - Indonesian version (MoCA-Ina) provides sensitive multidomain cognitive screening with improved detection of subtle deficits.

Objective: This study aimed to describe the correlation between cognitive domain impairment in NPSLE patients and Systemic Lupus Erythematosus Disease Activity Index 2000 (SLEDAI-2K).

Methods: This analytic-descriptive cross-sectional study included 12 NPSLE patients diagnosed at a tertiary center during 2024–2025. Demographic and clinical data including SLE duration and SLEDAI-2K score at cognitive assessment were recorded. Cognitive assessment was performed using MoCA-Ina with education correction when indicated. Assessment was not conducted at diagnosis due to outpatient scheduling or severe delirium during hospitalization. NPSLE was determined using the Bortoluzzi attribution score (range 0–10; 4–6 possible NPSLE; 7–10 probable NPSLE). Brain magnetic resonance imaging (MRI) data were also collected. Spearman rank correlation evaluated associations between SLEDAI-2K and Bortoluzzi score with MoCA-Ina total and domain-specific scores.

Results: Mean age was 28 years, and most subjects (83%) had at least 12 years of education. The median interval between NPSLE diagnosis and cognitive assessment was 3 months. Eight patients (66%) had abnormal brain MRI, with small vessel disease identified in three (25%). Higher SLEDAI-2K scores showed significant negative correlation with total MoCA-Ina score ($p = -0.639$, $p = 0.025$). Verbal fluency was also significantly correlated with SLEDAI-2K ($p = -0.645$, $p = 0.024$). Bortoluzzi

attribution score demonstrated significant negative association with total MoCA-Ina ($p=0.012$), while other domains showed moderate but non-significant correlations.

Conclusion: Disease activity in NPSLE correlates with global cognitive impairment, particularly verbal fluency. These findings support routine cognitive screening in patients with higher SLE activity and warrant further investigation in larger cohorts.

Keywords: NPSLE, cognitive impairment, MoCA-Ina, SLEDAI-2K

DIAGNOSTIC DISCREPANCY IN OCULAR PHENOTYPES: A CASE SERIES OF SEROPOSITIVE MYASTHENIA GRAVIS WITH NEGATIVE REPETITIVE NERVE STIMULATION FINDINGS

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Background: The diagnosis of Ocular Myasthenia Gravis (oMG) frequently presents clinical challenges. Although the detection of Acetylcholine Receptor (Anti-AChR) antibodies and Single-Fiber Electromyography (SFEMG) serve as highly specific gold standards, Repetitive Nerve Stimulation (RNS) remains the primary routine electrophysiological modality in many Indonesian centers due to its wider accessibility. However, the sensitivity of RNS is notably low in this localized phenotype. This case series aims to highlight the diagnostic discrepancy between negative RNS results and positive serological as well as clinical bedside tests.

Case Illustration: We report a case series of two adult patients presenting with fluctuating bilateral ptosis and diurnal fatigability without limb weakness. Electrophysiological evaluation via low-frequency (3 Hz) RNS on facial muscles consistently yielded normal results. Conversely, all patients demonstrated a positive objective response to the Ice Pack Test and definitive serological confirmation of Anti-AChR seropositivity. All patients showed significant clinical improvement following acetylcholinesterase inhibitor therapy.

Discussion: The pronounced discrepancy between electrophysiological and serological findings indicates the preservation of the synaptic safety factor in facial muscles, even though neuromuscular transmission pathology has already manifested in the extraocular muscles. In the restricted phenotype of oMG, the autoantibody burden induces transmission failure in extraocular muscles but is insufficiently massive to breach the synaptic safety margin in the facial muscles assessed by RNS.

Conclusion: Negative RNS findings cannot be used to rule out the diagnosis of oMG. In light of this discrepancy, clinicians must consider a multiparametric diagnostic approach, ranging from simple bedside tests to serological confirmation, to prevent under-diagnosis and delayed therapeutic management.

Keywords: Ocular Myasthenia Gravis, Repetitive Nerve Stimulation, Diagnostic Discrepancy, Ice Pack Test, Anti-AChR.

EARLY THERAPEUTIC PLASMA EXCHANGE IN GUILLAIN-BARRÉ SYNDROME WITH BULBAR INVOLVEMENT: A CASE REPORT

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Background: Guillain-Barré syndrome (GBS) is an acute immune-mediated polyradiculoneuropathy that may progress rapidly and lead to respiratory failure, particularly in patients with bulbar involvement. Therapeutic plasma exchange (TPE) is an established first-line treatment, and early initiation of immunomodulatory therapy has been associated with improved outcomes. However, detailed descriptions of neurological recovery following early multi-session TPE remain limited.

Case Presentation: A 29-year-old previously healthy man presented with progressive ascending weakness over four days, followed by left-sided facial weakness and dysphagia requiring nasogastric tube support.

Neurological examination revealed symmetrical tetraparesis with lower motor neuron features and cranial nerve VII and XII involvement. Cerebrospinal fluid analysis demonstrated albuminocytologic dissociation, and nerve conduction studies were consistent with acute inflammatory demyelinating polyneuropathy. Therapeutic plasma exchange was initiated early in the disease course, and the patient underwent three treatment sessions. Progressive neurological improvement was observed following the first session, including recovery of swallowing function and removal of nasogastric tube support, with continued motor and functional improvement after subsequent sessions.

Discussion: Early initiation of therapeutic plasma exchange may interrupt immune-mediated nerve injury and reduce the risk of respiratory deterioration in GBS with bulbar involvement. In this case, sequential clinical improvement across multiple domains—including muscle strength, functional status, and swallowing—demonstrated a clear temporal relationship between intervention and neurological recovery.

Conclusion: This case highlights that early multi-session therapeutic plasma exchange may be associated with favorable neurological recovery in GBS with bulbar involvement. Prompt recognition and timely initiation of evidence-based therapy remain essential to optimize outcomes and prevent clinical deterioration.

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Keywords: Guillain-Barré syndrome, Acute inflammatory demyelinating polyneuropathy, Therapeutic plasma exchange, Bulbar involvement, Early intervention

NEUROMYELITIS OPTICA SPECTRUM DISORDER: A CASE SERIES OF AQP4-IGG- POSITIVE AND CLINICAL-RADIOLOGICAL DIAGNOSED

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Background: Neuromyelitis Optica Spectrum Disorder (NMOSD) is an acute autoimmune disorder of the central nervous system that challenging to diagnose, especially in healthcare facilities with limited access to AQP4-IgG testing. Clinical manifestations such as optic neuritis and transverse myelitis frequently overlap with multiple sclerosis and other demyelinating diseases. Restricted availability of AQP4-IgG testing may delay diagnosis, affecting timely immunosuppressive therapy and patient outcomes.

Case Summary: Case 1: A 35-year-old female presented with sudden visual loss and limb weakness accompanied by sensory disturbances. Neurological examination revealed decreased visual acuity, paraparesis, and sensory deficits. Magnetic Resonance Imaging (MRI) showed optic neuritis and longitudinally extensive transverse myelitis. AQP4-IgG serology was not available. Case 2: A 21-year-old female presented with similar symptoms of visual loss and limb weakness. Spinal MRI demonstrated longitudinally extensive transverse myelitis, and AQP4-IgG testing was positive. Based on the 2015 International Panel for NMO Diagnosis (IPND), both patients were diagnosed with NMOSD. High-dose intravenous corticosteroid therapy was administered, resulting in clinical improvement.

Discussion: This case series highlights the comparison of diagnostic approaches of NMOSD due to symptom overlapping symptoms with multiple sclerosis and limited AQP4-IgG availability. Although AQP4-IgG is an important biomarker, diagnosis can still be established through clinical characteristics and MRI findings after excluding other etiologies. Longitudinally extensive transverse myelitis serves as a major diagnostic clue, while optic neuritis supports the diagnosis.

Conclusion: Diagnosis of NMOSD is based on clinical presentation, serology, imaging, and treatment response. Early recognition and management require a multidisciplinary approach and adherence to

established diagnostic criteria, enabling timely immunosuppressive therapy and supportive care.

Keywords: Neuromyelitis Optica Spectrum Disorder, longitudinally extensive transverse myelitis, optic neuritis, sensory deficits, motor deficits

PARAPARESIS AS A MANIFESTATION OF PROGRESSIVE CHRONIC MYELOPATHY CAUSED BY SPINAL ARTERIOVENOUS FISTULA: A CASE REPORT

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Introduction: Spinal arteriovenous fistula (AVF) is a spinal vascular malformation that can cause chronic progressive myelopathy due to venous hypertension and spinal cord congestion. This condition is rarely found in the pediatric and adolescent populations, and is often misdiagnosed at an early stage, leading to a significant delay in establishing the correct diagnosis.

Case Report: A 12-year-old child presented with weakness of both lower limbs that progressively worsened. The first complaint appeared at the age of 2 years, then recurred at the age of 11 years, accompanied by numbness that progressed to the lower extremities without autonomic disturbances. Neurological examination revealed signs of upper motor neuron (UMN) involvement in the thoracic intramedullary region. Thoracolumbar MRI with contrast showed dilated intradural extramedullary vessels and perimedullary flow voids. The diagnosis was confirmed with digital subtraction angiography (DSA), which demonstrated a spinal AVF. Endovascular embolization was performed, resulting in clinical improvement and radiological recovery during follow-up evaluation.

Discussion: This case highlights the importance of a systematic diagnostic approach based on progressive clinical history and targeted neurological examinations to establish the correct diagnosis before radiological confirmation. The degree of neurological deficits at diagnosis has significant prognostic implications.

Conclusion: Spinal AVF can be a cause of progressive chronic myelopathy in young patients. Progressive symptoms and systematic neurological evaluation are essential for determining the diagnosis before radiological confirmation, enabling timely intervention to prevent further spinal cord damage.

Keywords: spinal arteriovenous fistula, chronic progressive myelopathy, paraparesis, diagnostic approach

NEUROIMUNOLOGI, NEUROUTENSIF

A COLLABORATIVE APPROACH TO MANAGING MYASTHENIC CRISIS WITH BILATERAL BASAL GANGLIA INFARCTION AND SEPSIS

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Background: Myasthenic crisis is a severe and potentially fatal complication of myasthenia gravis, most commonly due to respiratory failure. Management becomes substantially more challenging when myasthenic crisis occurs in conjunction with ischemic stroke and sepsis, as these conditions may interact and worsen neurological, respiratory outcomes and therapeutic response.

Case Presentation: A 67-year-old woman referred with Myasthenia crisis requiring mechanical ventilation. Non-contrast brain CT demonstrated bilateral basal ganglia infarcts. Course in the ICU was complicated by nosocomial pneumonia with *Pseudomonas aeruginosa* on ETT culture, systemic inflammatory response, acute kidney injury, and paroxysmal atrial fibrillation on anticoagulation. Tracheostomy was performed after

temporary cessation of anticoagulation. Treatment included a five-day course of IVIG, systemic corticosteroids, escalation to meropenem, packed red cell transfusion, metabolic correction, and an early structured rehabilitation program.

Discussion: Respiratory infection was considered primary trigger of crisis and a major contributor to prolonged ventilator dependence. Bilateral basal ganglia infarction complicated neurological assessment and airway protection (swallowing/cough), necessitating reliance on objective respiratory parameters and serial clinical evaluation for weaning decisions. IVIG was selected with careful consideration of renal safety given the presence of acute kidney injury. A multidisciplinary neurocritical care approach targeted infection control, appropriate timing of tracheostomy, anticoagulation management, individualized immunotherapy, and early rehabilitation was associated with gradual clinical improvement reflected by stable oxygenation, reduced airway secretions, ability to follow commands although residual lower limb motor deficits persisted. The patient ultimately achieved respiratory and neurological stabilization sufficient for continuation of care in the outpatient setting.

Conclusion: This case shows that myasthenic crisis accompanied by bilateral basal ganglia infarction and sepsis presents intertwined neurological, respiratory, and systemic problems. Care led by a coordinated neurointensive team supports integrated clinical management, highlighting the need for neurocritical care oriented decision making to achieve safer stabilization and more consistent recovery.

Keywords: myasthenic crisis, basal ganglia infarct, sepsis, IVIG, tracheostomy, neurocritical care

NEUROIMUNOLOGI, NEUROFISIOLOGI

CORRELATION BETWEEN INSOMNIA TYPE, STEROID, ANXIETY WITH SLEEP QUALITY IN MULTIPLE SCLEROSIS PATIENT

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Background: Sleep disturbances are frequently reported in patients with multiple sclerosis (MS) and contribute to reduced quality of life and impaired neurological function. Insomnia in MS may manifest as difficulty initiating sleep, maintaining sleep, or early morning awakening. However, the contribution of different insomnia types, steroid use, and anxiety to sleep quality has not been well studied in the Indonesian population.

Objective: To evaluate the association between insomnia type, steroid use, and anxiety with sleep quality in patients with multiple sclerosis.

Methods: A cross-sectional study was conducted among MS patients in Bandung. Data were collected using a sleep questionnaire and classified into good or poor sleep quality based on PSQI-related indicators. Insomnia was categorized into early, middle, and late insomnia according to patient-reported symptoms. Correlative analysis was performed to assess their relationship with sleep quality.

Results: Twenty-one patients were analyzed, with a median age of 38.7 years and a predominance of females (95.2%). Sensory symptoms were present in 85.7% of patients, while anxiety or depressive symptoms were reported in 66.7%. Clinically significant insomnia was observed in 95.2% of patients, predominantly moderate insomnia (57.1%). Middle insomnia was the most frequent subtype (76.2%). Poor sleep quality based on the PSQI was identified in 66.7% of patients. Although most patients experienced insomnia, no statistically significant associations were found between insomnia type ($p=0.124$), steroid use ($p=0.374$), or anxiety ($p=0.122$) and sleep quality.

Conclusion: Insomnia is common among MS patients, with middle insomnia as the predominant type. Routine assessment of sleep disturbances should be incorporated into comprehensive MS management. However, no statistically significant associations were found between insomnia type, steroid use, or anxiety and sleep quality.

Keywords: Juvenile amyotrophic lateral sclerosis, Familial ALS, Split hand sign, Motor neuron disease, Adolescent motor weakness

NEUROIMUNOLOGI, NEUROONKOLOGI

BETWEEN INFLAMMATION AND NEOPLASM: A NEUROIMUNOLOGIC – NEUROLOGIC DIAGNOSTIC CHALLENGE IN TUMEFACTIVE MULTIPLE SCLEROSIS

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Background: Tumefactive multiple sclerosis (TMS) is a rare variant of multiple sclerosis that poses a diagnostic dilemma due to its resemblance to a brain tumor. Large lesions (>2 cm) accompanied by edema and mass effect often raise suspicion of a neoplastic process. Clinically, manifestations vary widely, ranging from focal neurological deficits to cranial nerve involvement, which may lead to misdiagnosis in the early phase. Understanding the characteristic clinical and radiological features of TMS is essential to prevent unnecessary invasive procedures.

Case Presentation: A 26-year-old woman presented with numbness and tingling accompanied by chronically progressive weakness of the right extremities. She also developed deviation of the mouth corner and dysarthria. Neurological examination revealed right hemiparesis, right-sided sensory deficits, and central paresis of the seventh and twelfth cranial nerves. At the initial stage of the disease, the condition was misdiagnosed as Bell's palsy. Brain MRI demonstrated a supratentorial lesion measuring more than 2 cm in the left hemisphere, hyperintense on T2/FLAIR sequences, with perifocal edema and mild mass effect. Post-contrast imaging showed an incomplete open-ring enhancement pattern with the open portion directed toward the cortex, without significant central diffusion restriction. These findings were suggestive of a tumefactive demyelinating lesion.

Discussion: TMS frequently mimics high-grade glioma, primary central nervous system lymphoma, and brain abscess, both clinically and radiologically. Cranial nerve involvement may further obscure the diagnosis, particularly when resembling peripheral Bell's palsy. However, the presence of multiple central neurological deficits, the characteristic open-ring enhancement pattern, and a rapid response to corticosteroids strongly support a demyelinating process. A comprehensive diagnostic approach is crucial to distinguish TMS from neoplastic lesions and to avoid unnecessary biopsy.

Conclusions: Tumefactive multiple sclerosis should be considered in young patients presenting with large tumor-like brain lesions accompanied by multiple focal neurological deficits. Recognition of its distinctive clinical and radiological features allows for accurate diagnosis and optimal management.

Keywords: Miller Fisher syndrome, Guillain-Barré syndrome, anti-GQ1b antibodies, atypical presentations, and plasmapheresis

NEUROINFEKSI

A RARE CASE OF DISSEMINATED TUBERCULOSIS: CASE REPORT OF TUBERCULOUS MENINGITIS WITH TUBERCULOUS SPONDYLITIS

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Background: Tuberculosis (TB) remains a global health challenge with a wide spectrum of clinical manifestations, including involvement of the central nervous system and the spinal column. Tuberculous meningitis is the most severe form of extrapulmonary TB, associated with high mortality and significant neurological morbidity, particularly when diagnosis and treatment are delayed. In contrast, tuberculous spondylitis is a relatively common manifestation of skeletal TB and is generally

localized. The coexistence of tuberculous meningitis and tuberculous spondylitis is rarely reported and usually reflects disseminated TB with an unfavorable prognosis.

Case Presentation: A 30-year-old woman presented with progressive chronic low back pain for 15 months, radiating to both lower extremities. During the illness, she developed a headache followed by a gradual deterioration of consciousness. Neurological examination revealed meningeal signs, motor deficits of the lower extremities, and segmental sensory impairment up to the T4. Spinal MRI demonstrated destruction of the T9, T10, L4, and L5 vertebral bodies, consistent with tuberculous spondylitis. Head CT scan showed bilateral frontoparietotemporal leptomeningeal enhancement suggestive of meningoencephalitis. Cerebrospinal fluid analysis revealed findings characteristic of tuberculous meningitis, and molecular testing confirmed TB infection. The patient was diagnosed with disseminated TB and treated with anti-tuberculosis therapy according to national guidelines, adjunctive corticosteroids, and surgical intervention in the form of posterior fusion laminectomy.

Discussion: Following comprehensive management, the patient showed significant clinical improvement, including recovery of consciousness, improvement of neurological deficits, and reduction of back pain. No severe complications were observed during follow-up.

Conclusions: Disseminated TB is a rare condition with the potential for poor clinical outcomes. However, high clinical suspicion, early diagnosis, and adequate multidisciplinary management can result in favorable outcomes. This case highlights the importance of a multidisciplinary approach in the management of disseminated TB to improve patient prognosis.

Keywords: disseminated tuberculosis, tuberculous meningitis, tuberculous spondylitis

CEREBRAL TUBERCULOMA AND SCROFULODERMA IN DISSEMINATED TUBERCULOSIS WITH SEVERE UNDERNUTRITION

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Background: Concurrent involvement of the central nervous system and skin in tuberculosis is rarely reported, particularly in young adults. The coexistence of cerebral tuberculoma and scrofuloderma shortly after completion of prior therapy is exceptionally uncommon and presents diagnostic challenges. Severe undernutrition, an under-recognized host factor, may impair cell-mediated immunity and predispose to extensive disease dissemination.

Case Presentation: A 21-year-old woman presented with progressive headache and blurred vision accompanied by intermittent fever and chronic cough. She had completed six months of anti-tuberculosis therapy two months prior without documented bacteriological or radiographic confirmation of cure. Her body mass index was 15.6 kg/m², consistent with severe undernutrition predating initial therapy. Neurological examination revealed visual disturbance without focal motor deficits. Chest radiography demonstrated extensive active pulmonary tuberculosis. Cranial computed tomography revealed multiple ring-enhancing lesions with surrounding vasogenic edema in the posterior fossa, consistent with cerebral tuberculomas. Cutaneous examination showed ulcerative lesions over the cervical and axillary regions compatible with scrofuloderma. Xpert Mycobacterium tuberculosis/rifampicin (MTB/RIF) Ultra detected rifampicin-sensitive Mycobacterium tuberculosis. Standard anti-tuberculosis therapy was reinitiated with adjunctive corticosteroids, resulting in clinical improvement.

Discussion: This case illustrates disseminated tuberculosis with simultaneous pulmonary, intracranial, and cutaneous involvement shortly after completion prior therapy. Unlike most reported cases, dissemination occurred in the setting of severe undernutrition without confirmed immunodeficiency, underscoring the potential role of nutritional status in disease severity and extrapulmonary spread. The presence of posterior fossa ring-enhancing lesions further highlights the risk of mass effect and neurological deterioration if diagnosis is delayed.

Conclusions: This case emphasizes a rare neurocutaneous manifestation of disseminated tuberculosis and highlights severe undernutrition as a potential modifiable contributor to extensive disease. Early recognition and prompt therapy are essential to prevent neurological deterioration and improve outcomes.

Keywords: Cerebral tuberculoma, Scrofuloderma, Disseminated tuberculosis, Severe Undernutrition

CEREBRAL TUBERCULOUS ABSCESS IN A YOUNG ADULT: A RARE CASE WITH REMARKABLE CLINICAL RECOVERY

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Background: Cerebral tuberculous abscess (TBA) is an exceedingly rare central nervous system (CNS) manifestation of *Mycobacterium tuberculosis* infection. CNS involvement accounts for 10% of extrapulmonary tuberculosis, occurring in 4–8% of non-HIV patients and up to 20% of patients with AIDS. Unlike tuberculomas, TBA is characterized by macroscopic pus formation containing acid-fast bacilli (AFB). Diagnosing TBA remains a clinical challenge due to its radiological similarity to pyogenic abscesses or neurotoxoplasmosis.

Case Description: A 29-year-old HIV-positive female with a history of discontinued anti-tuberculosis treatment (ATT) presented with sudden-onset left-sided weakness. Neurological examination revealed typical left hemiparesis, dysarthria, and central-type cranial nerve VII and XII palsies. Sputum molecular rapid testing (TCM) detected *M. tuberculosis*, while Toxoplasma IgG/IgM serology was non-reactive. Brain MRI showed multiple lesions in the frontal and temporal lobes bilaterally, the right parietal lobe, and the corona radiata, featuring the characteristic "concentric target sign." The patient was diagnosed with cerebral tuberculous abscess.

Discussion: The patient was treated with a combination of quadruple ATT (4FDC) and intravenous corticosteroids (dexamethasone) using a tapering dose protocol. Despite an initial significant neurological deficit (NIHSS 13), the patient demonstrated a remarkable clinical recovery. By the 11th day of hospitalization, motor strength had improved significantly, and the patient was discharged for outpatient care. At the 8-month follow-up, brain MRI showed lesion resolution, marked by a reduction in both the number and size of lesions compared to baseline imaging. Cerebral TBA is often difficult to distinguish from neurotoxoplasmosis in HIV patients due to similar ring-enhancing lesion patterns. In this case, the diagnosis was established based on evidence of active pulmonary TB and negative Toxoplasma serology. The success of therapy without aggressive surgical intervention highlights that early diagnosis combined with ATT and corticosteroids can yield excellent functional outcomes.

Conclusion: Cerebral TBA should be considered a primary differential diagnosis in young, immunocompromised patients presenting with focal neurological deficits in endemic areas. Prompt and appropriate medical management can result in significant clinical recovery.

Keywords: Tuberculous Abscess, Central Nervous System, HIV, *Mycobacterium tuberculosis*, Neurotoxoplasmosis

CLINICAL OUTCOME OF DRUG-RESISTANT TUBERCULOUS MENINGITIS

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Background: Tuberculous meningoencephalitis is challenging to treat in developing nations, and the testing for drug resistance is limited.

Objective: To describe the clinical characteristics and anti-tuberculous drug resistance patterns in patients with definite tuberculous meningoencephalitis and explore their association with disease severity.

Methods: This is a retrospective cross-sectional study of 234 patients with METB from 2022 to 2025 at Cipto Mangkusumo National Hospital. We diagnosed 100 (42.7%) probable METB, 81 (34.6%) possible METB and 53 (22.6%) definite METB. Out of 53 definite cases, 10 (18.8%) were resistant to anti-tuberculous medications.

Results: We report five (50%) female and 5 (50%) male patients, 3 (30%) of whom were HIV-positive. *Mycobacterial* growth indicator tube (MGIT)

testing for drug resistance were tested for all patients, with the most frequent drug resistance being Rifampicin in 4 (40%) and Isoniazid in 4 (40%) patients, followed by Streptomycin in 2 patients, Ofloxacin 1 patient and Kanamycin 1 patient. Six patients were treated with second-line anti-tuberculous medications, namely, levofloxacin, Amikacin, Moxifloxacin, Streptomycin, Linezolid and Clofazimin. Four patients still used first line anti-tuberculous medications, out of which 2 patients who were also tested for multi-drug resistance passed away, 1 patient was lost-to-follow-up, and 1 patient experienced paradoxical METB therefore first-line anti-tuberculous regimen was repeated again with the outcome as treated METB. Two patients showed multi-drug resistance; Streptomycin-Isoniazide and Isoniazid-Rifampicin. Mortality rate was reported at 30%. Isoniazid occurred in single-drug resistance as well as multi-drug resistance. Interestingly, both patients with multi-drug resistance passed away, signifying that this could contribute to clinical severity and mortality.

Conclusion: Resistance to anti-tuberculous drug medication was at 18.8%, with rifampicin and isoniazid resistance being the most common and also appear as multi-drug resistance, which are reported to have more severe clinical course and outcome.

Keywords: Meningoencephalitis, Tuberculosis, Drug Resistance, Rifampicin

COMBINED NEUROMODULATION AND DRY NEEDLING IN MOTOR REHABILITATION FOLLOWING HEMORRHAGIC STROKE: CASE REPORT

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Introduction: Intracerebral hemorrhage (ICH) poses a significant burden due to its high mortality and long-term disability. Effective neurorehabilitation strategies remain limited, particularly for motor deficits and spasticity. This case report presents a novel, multimodal rehabilitation approach combining transcranial magnetic stimulation (TMS), brain auditory wave entrainment (BAWE), and dry needling (DN) in a patient with left hemispheric ICH.

Case Presentation: A 49-year-old hypertensive male presented with right hemiparesis and decreased consciousness following sudden onset of neurological symptoms. Brain imaging confirmed a left temporoparietal ICH. After stabilization and hospital discharge, the patient received TMS and BAWE therapy over six sessions. Significant motor recovery was observed by the fifth session, with motor power improving from grade 1 to 4. However, increased muscle tone and clonus indicated emerging spasticity, for which DN was initiated.

Discussion: The integration of TMS and BAWE likely facilitated cortical reorganization and motor recovery, while DN effectively addressed post-stroke spasticity. This case highlights the potential of combining central and peripheral therapies to enhance functional outcomes.

Conclusion: TMS, BAWE, and DN may support motor recovery and spasticity control after ICH. Findings are limited by single-case design and short follow-up.

Keywords: Intracerebral Hemorrhage, Motor Recovery, Transcranial Magnetic Stimulation, Brain Auditory Wave Entrainment, Dry Needling

COMPARISON OF STANDARD THERAPY WITH AND WITHOUT ADJUVANT RITUXIMAB IN DEFINITE ANTI-NMDAR ENCEPHALITIS: A SERIES OF CASE REPORTS

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Background: Anti-N-methyl-D-aspartate receptor (NMDAR) encephalitis is a critical condition necessitating aggressive immunomodulation. First-line therapies include high-dose corticosteroids and plasmapheresis, while rituximab (anti-CD20) is often considered in cases with inadequate or suboptimal response to standard therapy. The comparative efficacy of these approaches requires further evaluation.

Case Presentation: We report two cases of definite anti-NMDAR encephalitis. Case 1 (female, 20 years) presented with status epilepticus refractory to first-line therapy. Despite treatment with high-dose

methylprednisolone and plasmapheresis, optimal clinical response—characterized by improved consciousness and seizure freedom—was only achieved following rituximab administration. Case 2 (male, 48 years) with severe neuropsychiatric symptoms demonstrated gradual improvement after high-dose methylprednisolone and plasmapheresis alone, without rituximab.

Discussion: In Case 1, delayed treatment initiation (2 months after symptom onset) and severe clinical features (convulsive status epilepticus) indicated widespread inflammation and persistent B-cell activation, leading to inadequate response to first-line immunotherapy and necessitating rituximab as second-line therapy. Conversely, Case 2, with early treatment initiation (2 weeks) and predominant neuropsychiatric symptoms, suggested a lower inflammatory burden, allowing first-line therapy to effectively control the immune response. Although both cases were tumor-negative, these differing clinical responses underscore that the timing of therapy initiation and initial clinical severity are more critical determinants of first-line therapy success than tumor status. In tumor-negative cases with delayed treatment and severe manifestations, the inflammatory process is deeply established, making B-cell depletion with rituximab essential.

Conclusion: High-dose methylprednisolone combined with plasmapheresis can be effective in anti-NMDAR encephalitis. Rituximab demonstrates benefit as an adjuvant therapy, particularly in cases with suboptimal response to standard treatment. The selection of therapeutic modalities should be individualized based on the timing of therapy initiation and the patient's initial clinical response.

Keywords: Anti-NMDAR encephalitis, methylprednisolone, plasmapheresis, rituximab

DIFFERENCES IN CLINICAL CHARACTERISTICS AND NEUTROPHYL-LYMPHOCYTE-RATIO OF STROKE PATIENTS WITH PNEUMONIA IN THE INTENSIVE CARE UNIT AND NON-INTENSIVE

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Background: Stroke-associated pneumonia (SAP) is a common stroke complication and plays an important role in increasing morbidity, mortality, and the need for intensive care. Data on the differences in characteristics of ischemic stroke patients with pneumonia based on the level of care in Indonesia are still limited.

Objective: Analyzing the differences in clinical characteristics, risk factors, inflammatory parameters, and clinical outcomes in ischemic stroke patients with pneumonia treated in the Intensive Care Unit and non-intensive care wards at Dr. Hasan Sadikin Hospital, Bandung.

Methods: A retrospective analytical study was conducted on 61 ischemic stroke patients with pneumonia at Dr. Hasan Sadikin General Hospital Bandung during the period of July 2023–December 2024. Data were obtained from medical records, including age, gender, length of hospital stay, stroke episodes, NIHSS, dysphagia, vascular risk factors, neutrophil-lymphocyte ratio (NLR), and clinical outcomes. Analysis was performed using an independent t-test and considered significant if the p-value <0.05.

Results: The intensive care group showed higher NIHSS scores (14.09 vs 10.96; p=0.0023), more frequent dysphagia (31 vs 18; p=0.0031), and higher NLR values (8.57 vs 5.40; p=0.02), reflecting a more severe systemic inflammatory response. Mortality was also higher in the intensive care group (19 vs 8; p=0.009). There were no significant differences between the intensive and non-intensive care groups in age, sex, length of stay, risk factors, or stroke episodes (p>0.05).

Conclusion: Ischemic stroke patients with pneumonia who are treated in the intensive care unit show more severe clinical conditions. Early identification of stroke severity, dysphagia screening, and monitoring of inflammatory biomarkers are important for improving the prevention and management of SAP.

Keywords: Stroke-associated pneumonia, intensive, non-intensive, clinical characteristics, neutrophil-lymphocyte ratio

DIPLOPIA REGRESSION FOLLOWING ALBENDAZOLE THERAPY IN CALCIFIED NEUROCYSTICERCOSIS: A CASE REPORT

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Background: Neurocysticercosis, an infection caused by the larval stage of *Taenia solium*, is the most common parasitic disease affecting the central nervous system. Clinical manifestations vary widely, ranging from seizures to focal neurological deficits. The calcified stage is considered as the final and inactive phase, and antiparasitic therapy is therefore usually not advised. However, recent observations suggest that calcified lesions may still contain residual antigenic material capable of provoking intermittent perilesional inflammation and eventually present clinical symptoms. Diplopia in this stage is rarely described and can face diagnostic and therapeutic challenges.

Case Description: We report the case of a 29-year-old man presented with acute binocular diplopia accompanied by headache with no other neurological deficits. Neurological examination revealed limitation of ocular motility in the left eye. Brain MRI showed multiple nodular calcified lesions involving the left pons as well as supratentorial regions. The patient was treated with albendazole along with adjunctive corticosteroids. At three months of follow-up, the diplopia had improved markedly, although a follow-up imaging showed no significant change in the calcified lesions.

Discussion: Neurocysticercosis commonly presents with seizures or headache, while diplopia is an uncommon manifestation, particularly in the calcified stage that is traditionally considered inactive. Despite the lack of radiological progression, the clinical improvement observed after antiparasitic therapy in this case raises the possibility that residual inflammatory activity may still occur around calcified lesions. Such inflammation may contribute to reversible focal neurological deficits.

Conclusion: Calcified-stage of neurocysticercosis may remain clinically active and present with focal deficits such as diplopia. Clinical improvement following albendazole suggests possible residual inflammatory activity despite stable follow-up imaging findings. In selected symptomatic patients, clinical–radiological correlation and individualized treatment decisions should be done. Further studies are needed to better clarify the role of antiparasitic therapy in patients with symptomatic calcified neurocysticercosis.

EVALUATION OF MOTOR FUNCTION IMPROVEMENT AND PAIN REDUCTION IN TUBERCULOUS SPONDYLITIS FOLLOWING OPERATIVE AND NON-OPERATIVE MANAGEMENT

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Background: Tuberculous spondylitis is a spinal infection that can be treated either conservatively or surgically. The main therapeutic goals are pain relief and improvement of neurological deficits, particularly motor function. However, the benefit of operative management compared with conservative treatment remains debated.

Objective: To evaluate and compare motor function improvement and pain reduction in patients with tuberculous spondylitis undergoing operative and non-operative management.

Methods: This retrospective cohort study analyzed medical records of patients with tuberculous spondylitis treated at Dr. Saiful Anwar Regional General Hospital from 2022 to 2024. Patients were divided into operative and non-operative groups, and all received standard anti-tuberculosis therapy. Motor strength was assessed using MMT (Manual Muscle Testing) and pain intensity using the NRS (Numeric Rating Scale) at admission and discharge. Statistical analysis was performed using IBM SPSS version 26.

Results: Thirty-five patients were analysed (17 operative, 18 non-operative). The operative group consisted of 9 females (14–57 years) and 8 males (17–61 years), while the non-operative group included 11 females (21–74 years) and 7 males (22–63 years). All patients in the operative group

had spinal cord compression with neurological deficits ASIA (American Spinal Injury Association) grade A–C, whereas the non-operative group ranged from ASIA grade A to E. Mortality was higher in the non-operative group (4 cases; $p < 0.05$). Motor improvement was significantly greater in the operative group ($p = 0.006$). Pain scores significantly decreased in both groups without significant between-group differences ($p = 0.101$).

Conclusion: Operative treatment provides greater motor function improvement than conservative therapy in tuberculous spondylitis, particularly in patients with spinal cord compression, while pain reduction is comparable between treatments.

Keywords: motor function, pain, non-operative treatment, operative treatment, tuberculous spondylitis

HEART RATE VARIABILITY–DETECTED SUBCLINICAL AUTONOMIC DYSFUNCTION IN GUILLAIN–BARRÉ SYNDROME: A CASE REPORT

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Background: Autonomic dysfunction is a common yet frequently underrecognized component of Guillain–Barré syndrome (GBS) and contributes substantially to morbidity and mortality. Clinical manifestations range from subtle heart rate alterations to severe cardiovascular instability. Because overt autonomic symptoms may be absent, objective physiological measures such as heart rate variability (HRV) have been proposed as tools for detecting early dysautonomia.

Case Presentation: We report a 61-year-old man who presented with progressive lower extremity weakness following a recent gastrointestinal illness. Neurological examination demonstrated symmetrical lower limb weakness with preserved cranial nerve function. Cerebrospinal fluid analysis revealed albuminocytologic dissociation, and electrodiagnostic studies confirmed sensorimotor polyneuropathy consistent with GBS. Although no major autonomic manifestations were observed, the patient reported intermittent relative bradycardia. HRV analysis demonstrated reduced global variability with relative preservation of parasympathetic markers and a frequency-domain pattern suggestive of sympathetic withdrawal, indicating sympathovagal imbalance. The patient showed gradual motor improvement with supportive management and did not require immunomodulatory therapy.

Discussion: This case illustrates that autonomic involvement in GBS may be present despite minimal clinical manifestations. HRV provided objective evidence of subclinical dysautonomia and revealed a dissociation between motor recovery and persistent physiological autonomic abnormalities. These findings support the concept that autonomic dysfunction may precede overt instability and highlight the value of HRV as a noninvasive biomarker of early autonomic involvement.

Conclusion: HRV can identify subclinical autonomic dysfunction in GBS even in clinically stable patients. Incorporating physiological autonomic assessment may improve early detection of dysautonomia, inform monitoring strategies, and enhance comprehensive management of GBS.

Keywords: Guillain–Barré syndrome, autonomic dysfunction, heart rate variability, dysautonomia, peripheral neuropathy

INTRACRANIAL CALCIFICATION FOLLOWING POST ENCEPHALITIS TOXOPLASMOSIS IN AN HIV POSITIVE PATIENT A CASE REPORT

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Background: Intracranial calcification is a common neuroimaging finding that often represents the chronic, healed stage of a prior inflammatory process. In patients with HIV/AIDS, these calcifications typically result from resolved opportunistic infections, such as cerebral toxoplasmosis, tuberculosis, or brain abscesses.

Case Presentation: A 35-year-old male with a known history of HIV (on Antiretroviral Therapy/ART since 2022) presented with worsening slurred speech (dysarthria) and persistent right-sided weakness since 2022. The patient has a history of a left-sided brain abscess (involving the midbrain and thalamus) in 2022, which was suspected to be cerebral

toxoplasmosis. Current neurological examination revealed: Right-sided hemiparesis with a muscle strength grade of 4/5. Increased muscle tone and hyperreflexia. Hypoglossal nerve (CN XII) palsy. A non-contrast head CT scan (May 2025) showed calcification in the left thalamus, consistent with post-encephalitic or post-infectious changes. Additionally, a chest X-ray revealed findings suggestive of miliary tuberculosis.

Discussion: The calcification observed in the patient's left thalamus and midbrain indicates a healing phase or an inactive stage of the previous toxoplasmosis-related brain abscess. This process involves dystrophic calcification, where calcium salts are deposited into necrotic tissue despite normal serum calcium levels. Although these lesions are biologically inert (inactive), their location within critical functional structures like the thalamus explains the persistent neurological deficits, including hemiparesis and dysarthria.

Conclusion: Post-infectious intracranial calcification in HIV patients should be interpreted as a marker of chronicity and healing rather than an active infection. Management at this stage focuses on neurological rehabilitation, immune system control through consistent ART adherence, and long-term monitoring for potential complications such as seizures or reactivation should the immune status decline.

INTRINSIC RESISTANCE OF PSEUDOMONAS AERUGINOSA IN NOSOCOMIAL NEUROINFECTION: IN VITRO EVALUATION

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Background: *Pseudomonas aeruginosa* remains a formidable pathogen in device-associated central nervous system (CNS) infections, particularly post-neurosurgical ventriculitis and catheter-related meningitis. Mortality rates reach 33.3%, largely due to intrinsic resistance mechanisms and limited penetration of conventional antibiotics across the blood-brain barrier (BBB). Therapeutic options for CNS infections caused by multidrug-resistant (MDR) *P. aeruginosa* are critically constrained, prompting exploration of alternative antimicrobial strategies. Red dragon fruit (*Hylocereus polyrhizus*) peel, containing flavonoids, polyphenols, and betalains, has demonstrated antibacterial activity against Gram-positive bacteria. However, its potential against MDR Gram-negative pathogens implicated in nosocomial neuroinfection remains unexplored.

Objective: To evaluate the in vitro antibacterial activity of *H. polyrhizus* peel extract against *P. aeruginosa* as a preliminary assessment of phytotherapeutic potential in MDR nosocomial neuroinfection.

Methods: This experimental study utilized disk diffusion method on Mueller-Hinton agar. Ethanol extract of *H. polyrhizus* peel was prepared via maceration using 96% ethanol. Five concentrations (25%, 35%, 45%, 55%, and 75%) were tested against *P. aeruginosa* with four replications per concentration ($n=24$). Sterile aquadest served as negative control. Plates were incubated aerobically at 37°C for 18–24 hours. Inhibition zone diameters were measured using calipers in millimeters.

Results: No inhibition zones were observed across all extract concentrations (25–75%) and negative control, yielding a mean diameter of 0.00 mm uniformly. *P. aeruginosa* demonstrated complete resistance to the crude extract at all tested concentrations.

Conclusion: Crude *H. polyrhizus* peel extract demonstrates no antibacterial activity against *P. aeruginosa*, highlighting significant structural barriers posed by this Gram-negative neurotropic pathogen. These findings underscore the limitations of unprocessed phytotherapy against MDR organisms in CNS infection. Future research should consider bioactive compound fractionation, nanoformulation, or synergistic combination with CNS-penetrating antibiotics to address therapeutic challenges of nosocomial neuroinfection.

Keywords: *Pseudomonas aeruginosa*, nosocomial neuroinfection, phytotherapy, antimicrobial resistance, *Hylocereus polyrhizus*

ISOLATED SPINAL TUBERCULOSIS PRESENTING AS PROGRESSIVE UPPER MOTOR NEURON PARAPARESIS WITHOUT PULMONARY INVOLVEMENT

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Background: Spinal tuberculosis is a major cause of infectious spinal cord compression in tuberculosis-endemic regions. Although commonly associated with pulmonary disease, extrapulmonary involvement may occur without respiratory symptoms or radiographic evidence of lung pathology. The absence of pulmonary findings can delay diagnosis, particularly in patients presenting with progressive neurological deficits.

Case Presentation: A 32-year-old woman presented with a six-month history of progressive lower extremity weakness preceded by chronic low back pain. The weakness worsened gradually, resulting in impaired ambulation. She reported unintentional weight loss but denied fever, chronic cough, or prior tuberculosis. Neurological examination revealed upper motor neuron paraparesis characterized by bilateral lower limb weakness (Medical Research Council grade 2–3), hyperreflexia, and bilateral Babinski signs, with preserved cranial nerve function and intact bladder and bowel control. Chest radiography was normal. Computed tomography of the thoracolumbar spine demonstrated multilevel anterior vertebral body destruction from T10, L1–L2, vertebral collapse at T12, kyphotic deformity, and paravertebral soft tissue collection consistent with a cold abscess. Based on clinical and radiological findings, a diagnosis of isolated spinal tuberculosis was established. Anti-tuberculosis therapy was initiated, while surgical intervention was declined. Motor deficits showed no significant improvement on follow-up.

Discussion: This case highlights the diagnostic challenge of spinal tuberculosis without pulmonary involvement. Normal chest imaging may reduce clinical suspicion, leading to delayed recognition. Progressive upper motor neuron signs in the setting of chronic back pain and weight loss should prompt early spinal imaging, even in the absence of respiratory symptoms.

Conclusion: Isolated spinal tuberculosis should be considered in patients with chronic back pain and progressive paraparesis despite normal chest radiography. Early diagnosis and timely intervention are essential to prevent irreversible neurological deficits.

Keywords: Spinal tuberculosis, Extrapulmonary tuberculosis, Upper motor neuron paraparesis, Thoracolumbar spine, Cold abscess

LIPOSOMAL AMPHOTERICIN B FOR HIV-ASSOCIATED CRYPTOCOCCAL MENINGITIS: THE FIRST INDONESIAN CASE REPORT

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Background: Cryptococcal meningitis has a high mortality rate (up to 26.5% within two weeks) even with conventional deoxycholate amphotericin B treatment. While widely available, its use is often limited by nephrotoxicity, electrolyte disturbances, and anemia. Liposomal amphotericin B offers equivalent efficacy with a superior safety profile, yet its availability in Indonesia remains highly limited. This report presents the first documented case of liposomal amphotericin B use for cryptococcal meningitis in Indonesia.

Case Presentation: A 40-year-old HIV-positive male with diagnosed cryptococcal meningitis, presented with headache and history of seizures. Initial cerebrospinal fluid (CSF) analysis did not reveal an elevated opening pressure. Patient received a 14-day induction therapy of liposomal amphotericin B (200 mg/day) and fluconazole (1200 mg/day), alongside pre-emptive hydration, electrolyte supplementation, antiepileptic medications, and serial lumbar punctures (LP) as indicated. The headache resolved and CSF pressure remained normal until day six. On day ten, patient developed nausea, neck pain, and recurrent seizures, which correlated with an elevated CSF pressure. The condition resolved following daily LPs and mannitol administration. During induction therapy,

liposomal amphotericin B demonstrated an excellent safety profile without significant hypokalemia, anemia, or renal impairment. Patient was subsequently discharged for consolidation therapy.

Discussion: Liposomal amphotericin B proved highly effective and well-tolerated. A crucial clinical finding was the delayed-onset elevated intracranial pressure (ICP) despite a normal baseline. This phenomenon likely resulted from the highly effective induction therapy causing massive *Cryptococcus* lysis. The accumulation of fungal debris and polysaccharide capsules obstructed the arachnoid villi, thereby impairing CSF reabsorption.

Conclusion: Liposomal amphotericin B is an effective treatment for cryptococcal meningitis with minimal toxicity. However, delayed-onset elevated ICP remains a significant risk due to massive fungal clearance, making daily LPs an irreplaceable intervention for ICP management.

Keywords: Liposomal Amphotericin B, Cryptococcal Meningitis, HIV

MOTOR IMPROVEMENT IN LUMBAR TUBERCULOUS SPONDYLITIS WITH NEGATIVE GENEXPERT (TCM) FOLLOWING EARLY ANTI-TUBERCULOSIS THERAPY

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Background: Tuberculous spondylitis is the most common form of extrapulmonary tuberculosis affecting the spine and may cause neurological deficits due to compression of the spinal cord or nerve roots. Diagnosis can be challenging, particularly in cases with negative molecular test results such as the GeneXpert (TCM). Delayed diagnosis and treatment may lead to progression of neurological deficits and permanent spinal deformity. Therefore, early recognition and prompt initiation of anti-tuberculosis therapy are essential to prevent long-term disability.

Case Presentation: A 32-year-old man presented with weakness in both lower extremities that had developed two months prior to hospital admission. The symptoms were preceded by low back pain three months earlier. The weakness was progressive, eventually requiring the patient to use a cane for ambulation. No bowel or bladder dysfunction was reported. Neurological examination revealed lower motor neuron (LMN) type paraparesis with muscle strength of 2/5 in both lower extremities, normal muscle tone, physiological reflexes graded +2, and no pathological reflexes. Lumbosacral MRI demonstrated spondylitis at the L4–L5 vertebral level with disc destruction, an epidural abscess causing spinal canal stenosis, as well as pre-paravertebral and left psoas abscesses. Chest radiography showed findings consistent with miliary tuberculosis, while sputum GeneXpert (TCM) testing was negative. The patient received first-line combination anti-tuberculosis therapy without surgical intervention due to family refusal. Following treatment, motor function improved, with muscle strength increasing to 4/5 in both lower extremities, accompanied by a reduction in pain severity.

Discussion: Neurological deficits in tuberculous spondylitis may result from mechanical compression as well as inflammatory processes that cause tissue edema and impaired neural conduction. In lumbar lesions, involvement of the nerve roots or the cauda equina may produce lower motor neuron (LMN) signs. The motor improvement observed in this case was likely associated with a reduction in inflammation and tissue edema following the initiation of anti-tuberculosis therapy.

Conclusion: Lumbar tuberculous spondylitis should still be considered in patients presenting with progressive neurological symptoms despite negative GeneXpert (TCM) results. Early initiation of anti-tuberculosis therapy can lead to motor improvement and plays an important role in preventing long-term disability.

Keywords: Tuberculous spondylitis, negative TCM, lower motor neuron paraparesis, lumbar radiculopathy, anti-tuberculosis therapy

MULTIPLE MENINGIOMAS IN A PATIENT WITH SYSTEMIC LUPUS ERYTHEMATOSUS: A RARE CASE

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Background: Multiple meningiomas are defined as the presence of two or more spatially distinct intracranial tumors and account for approximately 1–10% of all meningioma cases. Although most World Health

Organization (WHO) grade I meningiomas are histologically benign, surgical treatment carries potential risks, including postoperative intracerebral hemorrhage. In patients with systemic lupus erythematosus (SLE), immune-mediated vasculopathy, endothelial dysfunction, and coagulation abnormalities may adversely affect perioperative outcomes.

Case Presentation: A 56-year-old woman presented with progressive behavioral changes, chronic headache, left-sided weakness, cranial nerve deficits, and focal to bilateral tonic clonic seizures. The patient had active SLE presenting with constitutional and mucocutaneous manifestations, with preserved hematological function. Brain magnetic resonance imaging demonstrated multiple extra-axial enhancing masses in the right temporal and parasellar regions, consistent with multiple meningiomas. The neurological manifestations were clinically attributed to tumor related mass effect rather than acute neuropsychiatric SLE activity. Microsurgical resection achieved gross total removal of the temporal tumor and subtotal resection of the cavernous sinus lesion. The immediate postoperative condition was stable. However, within hours, the patient developed sudden neurological deterioration, anisocoria, and refractory hypotension, suggesting intracerebral hemorrhage. Despite aggressive neurocritical management and resuscitative measures, she died within 24 hours after surgery. Histopathological examination confirmed a transitional meningioma, WHO grade I.

Discussion: In patients with systemic lupus erythematosus (SLE), the disease does not necessarily worsen the initial manifestations of multiple meningiomas. However, SLE may be associated with cerebral vasculopathy, inflammatory microangiopathy, endothelial injury, and hemostatic imbalance even without overt neuropsychiatric involvement there by increasing vascular fragility and the risk of severe postoperative hemorrhage.

Conclusion: The success of multiple meningioma management is strongly influenced by tumor mass effect and the presence of autoimmune related vasculopathy. Comprehensive preoperative vascular evaluation and meticulous multidisciplinary perioperative planning are essential to reduce mortality.

Keywords: multiple meningioma, systemic lupus erythematosus, postoperative complication

MULTILEVEL THORACOLUMBAR SPINAL EPIDURAL ABSCESS WITH BILATERAL PSOAS ABSCESS PRESENTING AS PROGRESSIVE PARAPARESIS

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Background: Spinal epidural abscess (SEA) is an uncommon but potentially catastrophic infection of the epidural space that may rapidly progress to spinal cord compression and permanent neurological deficits. Despite its low incidence, delayed diagnosis frequently occurs because the classical triad of back pain, fever, and neurological deficit appears in only a minority of patients. Early recognition and prompt imaging evaluation are therefore essential. Contrast-enhanced magnetic resonance imaging (MRI) is considered the diagnostic gold standard due to its high sensitivity in detecting epidural collections and associated soft-tissue involvement.

Case Presentation: A 40-year-old woman presented with progressive bilateral lower-limb weakness for two days, preceded by persistent low back pain for three weeks accompanied by paresthesia and burning sensations radiating to both legs. Shortly before admission, the patient developed urinary and bowel retention. Neurological examination revealed upper motor neuron-type paraparesis with hyperreflexia, increased muscle tone, bilateral positive Babinski signs, and a sensory level at the T10 dermatome. Laboratory findings demonstrated leukocytosis suggesting an active infectious process. Contrast-enhanced whole-spine MRI revealed extensive epidural empyema extending from T8 to L3 causing anterior displacement and compression of the spinal cord, accompanied by myelitis and bilateral psoas and paraspinal abscesses.

Discussion: SEA represents a neurological emergency in which delayed diagnosis significantly increases the risk of permanent neurological impairment. MRI plays a crucial role in identifying the extent of epidural infection and associated soft-tissue involvement. In this case, the rapid

neurological deterioration and leukocytosis favored a pyogenic infection rather than spinal tuberculosis.

Conclusion: Early clinical suspicion, prompt MRI evaluation, and timely initiation of antimicrobial therapy with consideration for surgical decompression are essential to prevent irreversible neurological deficits and improve patient outcomes.

Keywords: Spina epidural abscess, Paraparesis, Spinal cord compression, PSOAS abscess, MRI spine

NEUROAUTONOMIC GASTROINTESTINAL DYSFUNCTION MIMICKING OBSTRUCTIVE ILEUS IN GENERALISED TETANUS: CASE REPORT

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Background: Generalized tetanus is an acute neuroinfectious disorder characterized by trismus and muscle spasms due to tetanospasmin-induced inhibition of neural transmission. In severe cases, autonomic dysfunction, especially cardiovascular instability, is common. Gastrointestinal involvement as an initial manifestation is rare and may obscure diagnosis.

Case Presentation: A 48-year-old man presented with abdominal pain and tension that worsened over eight days, accompanied by jaw stiffness and difficulty swallowing. The patient had a history of tooth extraction by a traditional practitioner three weeks earlier. Radiological examination showed sigmoid colon dilation, raising suspicion of ileus obstruction, and the patient was referred for surgical intervention. Neurological examination revealed a GCS of 15, trismus (3 cm), risus sardonicus, opisthotonus, and abdominal distension. Vital signs showed relative hypertension. Based on clinical findings, the patient was diagnosed with moderate general tetanus (Grad II Ablett). This patient experienced clinical improvement after receiving intramuscular HTIG therapy, intravenous metronidazole, and benzodiazepines, without surgical intervention.

Discussion: Tetanospasmin enters the central nervous system through retrograde axonal transport and cleaves synaptobrevin. This stops the release of GABA and glycine in inhibitory interneurons and causes muscle spasms also disrupts autonomic control through sympathetic dominance. Paralytic ileus occurs due to excessive sympathetic activation and disruption of enteric nervous system coordination, which reduces intestinal peristalsis and increases sphincter tone. In severe cases, gastrointestinal involvement as an early manifestation is still rarely emphasized. In this case, the neurogenic mechanism is supported by clinical improvement after receiving specific tetanus therapy without surgical intervention. These findings suggest that gastrointestinal dysfunction, even in moderate level, can be part of the spectrum of tetanus dysautonomia and may obscure the initial diagnosis.

Conclusion: Gastrointestinal dysfunction may represent an early manifestation of generalized tetanus. Early recognition of accompanying neuromuscular signs, particularly trismus, is essential to prevent delayed diagnosis and unnecessary invasive procedures.

Keywords: Neuroautonom, Generalised Tetanus, Obstructive Ileus

PROGRESSIVE PARAPARESIS REVEALING INTERHEMISPHERIC BRAIN ABSCESS ALONG THE FALX CEREBRI: A RARE CASE

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Background: Paraparesis is commonly associated with spinal cord disorders; however, in certain conditions it may be caused by intracranial lesions involving the medial motor cortex. Brain abscess is a rare but potentially life-threatening intracranial infection, with an estimated incidence of approximately 0.4–0.9 cases per 100,000 population per

year. Most cases occur due to hematogenous spread from systemic infections or direct extension from infections of the ear or paranasal sinuses. Odontogenic infection represents a relatively uncommon source and accounts for approximately 5–7% of all brain abscess cases.

Case Presentation: A 39-year-old woman presented with a one-month history of throbbing headache that worsened during the week prior to admission. She also reported progressive weakness of the left upper limb and both lower limbs over the past month, eventually leading to inability to walk, accompanied by decreased urinary sensation. There was a history of intermittent fever for ten days prior to admission and dental caries for approximately six months. Non-contrast head CT scan revealed multiple well-defined hypodense lesions in the right frontal lobe with extensive perifocal edema causing compression of the anterior horn of the right lateral ventricle. These findings were consistent with multiple brain abscesses associated with cerebral edema.

Discussion: The neurological manifestations of brain abscess largely depend on the location of the lesion. Lesions in the interhemispheric region along the falx cerebri may compress the medial frontal motor cortex, which represents the lower extremities in the motor homunculus, resulting in paraparesis. This presentation is uncommon and may mimic spinal cord pathology, potentially leading to diagnostic challenges.

Conclusion: Brain abscess secondary to odontogenic infection may present with paraparesis due to involvement of the medial motor cortex. Early recognition of atypical neurological presentations is essential to avoid delayed diagnosis and to improve clinical outcomes.

Keywords: Brain abscess, Odontogenic infection, Interhemispheric lesion, Paraparesis

PROGNOSTIC VALUE OF INFLAMMATORY-BASED INDICES IN ACUTE MENINGITIS: A SYSTEMATIC REVIEW

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Background: Acute meningitis is a severe central nervous system infection with high mortality. Simple inflammatory ratios from routine blood counts reflect host immune response and have been proposed as prognostic biomarkers in infections. Their value for predicting outcomes in meningitis is not well defined.

Objective: To systematically review evidence on the prognostic value of blood-derived inflammatory indices (neutrophil to lymphocyte ratio (NLR), platelet to lymphocyte ratio (PLR), systemic immune inflammation index (SII), etc.) in acute meningitis.

Methods: We followed PRISMA 2020 guidelines. Six preselected observational studies (total N≈960) of inflammatory indices in acute meningitis (etiologies including bacterial, tuberculous, cryptococcal, and viral) were synthesized narratively. Two reviewers independently assessed study quality using the Newcastle–Ottawa Scale (NOS).

Results: All studies reported at least one index significantly associated with poor outcome. In pediatric bacterial meningitis, Widjaja et al. found that NLR >5.225 predicted mortality ($p=0.004$, $RR\approx 10.8$). In tuberculous meningitis, Gu et al. showed higher admission NLR independently predicted 28-day mortality (adjusted $OR\approx 1.065$). In varicella-zoster (herpes zoster) meningitis, Zhang et al. observed that patients had significantly higher NLR, PLR and SII than controls, and PLR strongly correlated with disease occurrence and discharge prognosis. In cryptococcal meningitis, Zhang et al. reported that an increasing NLR during therapy was associated with treatment failure, and Zhao et al. found elevated SII during treatment independently predicted higher 24-week mortality. Across studies, NOS scores indicated moderate methodological quality.

Conclusion: Routine blood-derived inflammatory indices show promise as prognostic biomarkers in acute meningitis. An elevated NLR was most consistently linked to worse outcome (in bacterial, tuberculous, and cryptococcal meningitis), while PLR and SII added prognostic information in viral and fungal cases. However, heterogeneity in study populations and small sample sizes precluded quantitative synthesis. Larger prospective studies are needed to validate these findings.

Keywords: acute meningitis, prognostic biomarker, neutrophil-to-lymphocyte ratio, platelet-to-lymphocyte ratio, systemic immune-inflammation index

PROGNOSTIC PERFORMANCE OF NLR AND PCT FOR PREDICTING IN-HOSPITAL MORTALITY IN MENINGITIS PATIENTS

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Background: Meningitis remains a major cause of morbidity and mortality, particularly in low- and middle-income countries, despite advances in antimicrobial therapy. Prognosis is strongly influenced by disease severity and neurological complications, and early identification of high-risk patients is essential. Simple inflammatory biomarkers such as the neutrophil-to-lymphocyte ratio (NLR) and procalcitonin (PCT) have been proposed as prognostic indicators in infectious diseases, but their prognostic value in meningitis remains inconsistent.

Objective: This study aimed to evaluate the prognostic performance of admission NLR and in-hospital procalcitonin in predicting in-hospital mortality among patients with meningitis.

Methods: A retrospective observational study was conducted using medical records of adult patients diagnosed with meningitis and hospitalized at a RSUP Wahidin Sudirohusodo during 2025. NLR was calculated from complete blood count at admission, and PCT values obtained during hospitalization were recorded. Patients were classified into survivor and non-survivor groups. Comparisons were performed using the Mann–Whitney test. Receiver operating characteristic (ROC) curve analysis was used to assess the discriminative ability of NLR and PCT for mortality prediction.

Results: A total of 31 patients were included, of whom 24 (77.4%) died during hospitalization. There were no significant differences in NLR or PCT levels between survivors and non-survivors ($p > 0.05$). The median NLR was 12.43 in survivors and 8.70 in non-survivors ($p = 0.310$), while the median PCT was 0.79 and 0.55, respectively ($p = 0.478$). ROC analysis showed limited discriminative performance, with an area under the curve (AUC) of 0.628 for NLR and 0.589 for PCT.

Conclusion: Admission NLR and in-hospital procalcitonin demonstrated limited prognostic value for predicting in-hospital mortality in patients with meningitis and should not be used as standalone predictors. A comprehensive prognostic assessment integrating clinical and laboratory parameters is required.

Keywords: meningitis, mortality, NLR, PCT, prognosis

STREPTOCOCCUS SUIIS MENINGITIS WITH COMPLICATION OF SENSORINEURAL HEARING LOSS: SUCCESSFUL DIAGNOSIS AND MANAGEMENT IN A RESOURCE-LIMITED REGIONAL HOSPITAL

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Introduction: *Streptococcus suis* meningitis is a fatal zoonosis associated with the consumption of undercooked pork products. The risk of infection is relatively high in Bali due to the local habit of consuming traditional pork-based foods. Early diagnosis and aggressive management are crucial to prevent permanent complications, including sensorineural hearing loss. This case report describes the successful diagnosis and management of *Streptococcus suis* meningitis complicated by sensorineural hearing loss in a regional hospital in Bali with limited diagnostic resources.

Case Report: A 53-year-old man presented with severe headache for 4 days, accompanied by fever, vomiting, tonic seizures, and additional symptoms of vertigo and sensorineural deafness. The patient had a history of consuming pork blood one day before the onset of symptoms. Physical examination revealed meningeal signs, and cerebrospinal fluid analysis supported bacterial meningitis. Cerebrospinal fluid culture confirmed *Streptococcus Suis*. The patient received empirical therapy with intravenous ceftriaxone and dexamethasone. Therapy was continued for 14 days with gradual clinical improvement and partial recovery of hearing.

Discussion: *Streptococcus suis* meningitis is a form of zoonotic infection and is commonly reported in regions with high consumption of pork products, including Bali. Transmission generally occurs through the

consumption of raw pork or blood, with pathogenesis involving bacteremia and penetration of the blood-brain barrier. Clinically, symptoms resemble other bacterial meningitis, but there is a higher tendency for severe sensorineural hearing loss complications. Diagnosis is established through cerebrospinal fluid analysis and culture confirmation. Immediate empirical therapy with third-generation cephalosporins and systemic corticosteroids is crucial to reduce inflammation, prevent neurological sequelae, and improve clinical outcomes.

Conclusion: This case highlights the importance of early diagnosis and aggressive management of *Streptococcus suis* meningitis. With high clinical vigilance and a rapid, multimodal approach, patients can achieve good clinical recovery and improvement of hearing function, even in resource-limited settings.

Keywords: Meningitis, Sensorineural hearing loss, *Streptococcus suis*, Zoonosis

STROKE LIKE SYMPTOMS IN VIRAL MENINGITIS

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Background: Viral meningitis is the most common cause of aseptic meningitis. Although typically presenting with fever, headache, and neck stiffness, clinical manifestations may vary. In rare situations, patients develop focal neurological deficits mimicking stroke, creating diagnostic challenges and potential delays in management.

Case Presentation: A 58-year-old man presented with decreased consciousness and seizures preceded by headache and low-grade fever. Neurological examination showed no clear lateralization, with a positive Babinski sign on the right. Brain imaging suggested meningitis. Cerebrospinal fluid analysis demonstrated elevated protein, normal glucose, and mild pleocytosis consistent with viral infection. Serologic evaluation revealed cytomegalovirus and toxoplasmosis without evidence of immunodeficiency. The patient received antiviral therapy.

Discussion: Viral meningitis may lack the classic triad, particularly in older adults. Altered mental status and focal signs can lead clinicians to suspect stroke. Neuroimaging before lumbar puncture is important in patients with seizures or reduced consciousness. CSF findings remain essential for confirming the diagnosis and guiding therapy.

Conclusion: Awareness of atypical stroke-like presentations of viral meningitis is crucial for early recognition, appropriate investigation, and timely antiviral treatment.

Keywords: viral meningitis, stroke mimic, focal deficit, cerebrospinal fluid

SUBDURAL EMPYEMA WITH BEZOLD ABSCESS AND DESCENDING MEDIASTINITIS IN COSM PATIENT, VERY RARE CASE

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Background: Chronic suppurative otitis media (CSOM) with cholesteatoma can lead to subdural empyema and infection extended into the deep neck, known as a Bezold's abscess. Subdural empyema represents 13–23% of intracranial infections, whereas Bezold's abscess has been documented merely 97 times over two decades. There are few case reports of subdural empyema and Bezold's abscess happening at the same time.

Case Presentation: A 37-year-old man with 15 years of right otorrhea exhibited acute neck edema posterior to the right ear for one month. After two weeks, he started having headache, dizziness, right peripheral facial palsy. A CT-scan of the mastoid showed right otomastoiditis, cholesteatoma, mastoid erosion, a collection at the tip/deep neck, and subdural empyema. A crescentic extra-axial lesion with contrast enhancement, fluid restriction, and air bubbles is seen on contrast-MRI.

Thorax CT shows right suprahilar infiltration and extensive right-sided subcutaneous emphysema (neck/supraclavicular/chest wall) suggested descending mediastinitis. An ear discharge culture showed *Proteus* spp. was ceftriaxone-sensitive. Canal-wall-down (CWD) mastoidectomy for cholesteatoma, Bezold abscess drainage, and descending mediastinitis were performed. After two weeks of intravenous ceftriaxone and four weeks of oral ciprofloxacin and clindamycin, the patient's symptoms improved and subdural empyema collection decreased.

Discussion: Cholesteatoma damages the sigmoid plate, and septic sigmoid sinus thrombophlebitis spreads the infection to the subdural area, causing subdural empyema. Cholesteatoma erode the mastoid tip, spreading pus to cervical fascia and causing Bezold abscesses. The principle of management is eradication of the source of infection with radical mastoidectomy and drainage of Bezold abscess - descending mediastinitis and antibiotic. Minimal collections can be treated without neurosurgery with monitoring and serial imaging.

Conclusion: CSOM with cholesteatoma can cause extensive infection into intracranial, deep neck, mediastinum, even in immunocompetent patients. Early diagnosis followed by definitive antibiotic and abscess drainage give best result in patient.

Keywords: subdural empyema, cholesteatoma, Bezold abscess

NEUROINFEKSI, MOVEMENT DISORDERS

INVOLUNTARY MOVEMENTS IN TUBERCULOUS MENINGITIS: A CASE REPORT HIGHLIGHTING AN UNCOMMON NEUROLOGICAL MANIFESTATION

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Introduction: Tuberculous meningitis (TBM) is a severe manifestation of *Mycobacterium tuberculosis* infection with high mortality, particularly in endemic regions. Although TBM typically presents with classic symptoms (fever, headache, focal neurological deficits), involuntary movements such as hemichorea are rare (<5% of cases) and often diagnosed late. The pathophysiology is hypothesized to involve inflammatory/ischemic damage to the basal ganglia or brainstem due to TB-associated vasculitis. The limited sensitivity of cerebrospinal fluid (CSF) tests, such as GeneXpert (50–60%), may delay management. Lack of awareness of these atypical manifestations can lead to delayed diagnosis and treatment, worsening clinical outcomes.

Case Report: A 49-year-old male presented with left-sided body weakness and uncontrolled right-sided hemichorea (involuntary twisting movements of the right limbs). Neurological examination revealed central-type facial and hypoglossal nerve paresis, with left-sided motor lateralization signs. Brain MRI demonstrated lacunar infarcts in the right anterior internal capsule, pons, and bilateral corona radiata. CSF GeneXpert confirmed *Mycobacterium tuberculosis* (MTB *CrSF detected*), and chest X-ray revealed miliary TB. The patient received combination anti-tuberculosis therapy (ATT) per WHO guidelines, adjuvant dexamethasone, and haloperidol 0.5 mg orally every 12 hours, resulting in significant improvement of hemichorea.

Discussion: Involuntary movements in TBM, such as hemichorea, are rare yet critical manifestations linked to basal ganglia dysfunction caused by inflammatory/ischemic processes. The mechanisms involve disruptions in dopaminergic circuits due to cerebral vasculitis, oedema, granulomas, and neuroinflammatory reactions. Early diagnosis relies on clinical suspicion, neuroimaging, and microbiological confirmation, though limited sensitivity of tests like GeneXpert remains a barrier. Early empirical ATT, adjunctive corticosteroids, and targeted symptomatic treatment (e.g., haloperidol) are essential to prevent neurological deterioration and improve recovery.

Conclusion: This case highlights the necessity of vigilance toward atypical neurological signs to prevent diagnostic delays in TBM. Early

recognition, prompt treatment, and comprehensive management are essential to optimize functional recovery and reduce morbidity.

Keywords: Tuberculous meningitis, involuntary movements, hemichorea, neuroinflammation, central nervous system infections

NEUROINFEKSI, NEUROIMUNOLOGI, NEUROREHABILITASI

INTEGRATION OF NEURORESTORATIVE TECHNOLOGY IN SPINAL CORD DISEASE REHABILITATION: A CASE SERIES

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Background: The integration of neurorestorative technology focuses on structural repair and functional recovery of the nervous system. Key strategic pillars include neuromodulation and molecular cell therapy. Approaches involving molecular cell therapy (secretomes) and neuromodulation such as Transcutaneous Spinal Direct Current Stimulation (tsDCS), Brain Auditory Wave Entrainment (BAWE), and Neuromuscular Electrical Stimulation (NMES) have been extensively studied for improving neurological function in spinal cord diseases³.

Case Reports: Case 1. A 38-year-old male presented with weakness in four extremities persisting for three weeks, predominantly affecting both legs, accompanied by back pain and muscle cramps. Physical examination revealed Lower Motor Neuron (LMN) tetraparesis, a Modified Rankin Scale (mRS) score of 5. *Magnetic Resonance Imaging* (MRI) showed C5-C6 and C6-C7 disc extrusion with myelomalacia, and C3-C4/C4-C5 disc protrusion compressing the thecal sac. Myelography confirmed severe spinal canal stenosis at C5-C7 and moderate stenosis at C3-C5. Neurorestorative management consisted of 40 sessions of neuromodulation (tsDCS, BAWE, and NMES) and 2 ampoules of secretome. The patient showed significant improvement (mRS score of 2)^{1,2}. Case 2. A 30-year-old female presented with bilateral lower limb weakness for two months. Physical examination revealed Upper Motor Neuron (UMN) paraparesis, urinary retention, and an mRS score of 5. MRI indicated transverse myelitis at the T7 level, ANA profiling confirmed Systemic Lupus Erythematosus (SLE). Treatment included 25 sessions of neuromodulation (tsDCS, BAWE, and NMES) and 2 ampoules of secretome. The patient demonstrated clinical improvement (mRS score of 3).

Discussion: Neurorestorative interventions (molecular cell therapy and neuromodulation) facilitate selective modification based on biological mechanisms such as neurogenesis, neuroregeneration, neuroplasticity, angiogenesis, and remyelination. These processes induce long-term potentiation and long-term depression within the brain and spinal cord, ultimately leading to clinical functional recovery.

Conclusion: The integration of neurorestorative technology in spinal cord diseases can significantly improve clinical functional outcomes.

Keywords: Technology, Neurorestorative, Spinal cord disease

NEUROINFEKSI, NEUROIMUNOLOGI

A RARE CASE REPORT: NEURORETINITIS SECONDARY TO RUBELLA INFECTION IN AN ADOLESCENT PATIENT

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Introduction: Neuroretinitis is a clinical triad characterized by acute visual loss, optic disc edema, and the formation of a macular star. Rubella is a rare but significant viral etiology within the adolescent population.

Diagnosis is frequently overlooked (underdiagnosed) due to temporal dissociation, where disc edema precedes macular exudates by 1–2 weeks. This report highlights the diagnostic challenges associated with subclinical Rubella infection.

Case Presentation: A 14-year-old female presented with sudden visual acuity impairment in the right eye (1/60) occurring two months post-prodromal fever. Physical examination revealed a positive relative afferent pupillary defect (RAPD), severe dyschromatopsia (Ishihara 2/21), and grade 3 papilledema. Despite a history of canine contact, laboratory investigations confirmed a diagnosis of Rubella neuroretinitis based on significantly elevated IgG titers (186,100 IU/mL), while concurrently ruling out *Bartonella henselae*. A prominent macular star was observed via indirect ophthalmoscopy, attributed to the chronic duration of the disease at the time of examination.

Discussion: Pathophysiologically, vascular leakage at the optic nerve head leads to lipid accumulation within the outer plexiform layer (Henle layer). At the molecular level, T-helper 2 cell activation triggers the release of pro-inflammatory cytokines (IL-4, IL-5, and IL-6), which damage tight junctions and vascular pericytes, thereby compromising the blood-retinal barrier. The patient was managed with high-dose intravenous methylprednisolone, acyclovir, and broad-spectrum antibiotics to suppress the post-infectious immune response and limit damage to the optic nerve tissue.

Conclusion: Rubella neuroretinitis necessitates a high index of clinical suspicion in adolescent patients. Optical Coherence Tomography (OCT) plays a crucial role as an early detection tool for identifying retinal nerve fiber layer (RNFL) thickening and subretinal fluid before the full manifestation of a macular star is visible ophthalmoscopically, thereby preventing diagnostic failure.

Keywords: Neuroretinitis, Rubella, Macular Star, Adolescent, Optic Nerve

LONGITUDINALLY EXTENSIVE TRANSVERSE MYELITIS ASSOCIATED WITH SPINAL TUBERCULOSIS: DIAGNOSTIC CHALLENGE IN THE

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Background: Longitudinally extensive transverse myelitis (LETM) is a form of acute transverse myelitis characterized by spinal cord inflammation extending ≥ 3 vertebral segments and mostly associated with autoimmune disorders. In Indonesia, a tuberculosis-endemic region, *Mycobacterium tuberculosis* is an uncommon but significant etiology of LETM which is often difficult to diagnose early. This case report aims to highlight the diagnostic challenges and management of spinal tuberculosis-associated LETM in the absence of microbiological confirmation in molecular diagnostics era.

Case Presentation: A 29-year-old-male presented with progressive bilateral lower limb weakness and fecal incontinence worsening over 4-5 days prior to admission. Patient also reported history of acute diarrhea several days before neurological symptoms' onset. Neurological examination showed inferior paraparesis with upper motor neuron signs. Cerebrospinal fluid (CSF) analysis demonstrated pleocytosis (194/ μ L), mononuclear dominant (89.2%), hypoglycorrhachia (glucose ratio 0.2), and hyperproteinorrachia (3103mg/dL). Thoracic MRI revealed an intraosseous abscess within T8 vertebral body suggestive of tuberculous spondylitis, along with a longitudinally extensive intramedullary lesion extending from T5 to T9, consistent with LETM. Molecular rapid testing (GeneXpert) and CSF cultures were negative, creating a diagnostic dilemma between autoimmune and tuberculous etiologies. Patient received high-dose corticosteroid and empirical antibiotics with no significant improvement. Initiation of anti-tuberculosis therapy was delayed due to elevated liver enzymes (SGOT 283U/L, SGPT 593U/L).

Discussion: Neuroimaging showing thoracic vertebral involvement supported spinal tuberculosis, furthermore CSF profile also highly suggestive of tuberculous infection. These findings supported the diagnosis of spinal tuberculosis-associated LETM despite the absence of definitive microbiological findings. This highlights the importance of integrated clinical-radiological approach in the molecular diagnostic era.

Conclusion: Spinal tuberculosis may cause LETM through contiguous inflammatory extension to the spinal cord. In endemic regions, in-depth etiology evaluation using MRI and CSF analysis play a vital role in early diagnosis and prevention of permanent nerve damages, even when microbiological evidence is lacking.

Keywords: Longitudinally extensive transverse myelitis, Acute transverse myelitis, Spinal Tuberculosis, Pott's disease, Diagnostic challenge

NEUROINFEKSI, NEUROINTENSIF

CASE SERIES: MULTIDRUG RESISTANT GRAM-NEGATIVE BACTERIA (MDR-GNB) VENTRICULITIS IN NEUROCRITICAL CARE UNIT

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Background: Advancement in the medical world has fueled more invasive central nervous system (CNS) procedure performed in neurocritical care unit. Procedures like craniotomy, craniectomy, external ventricular drainage (EVD) and lumbar drain (LD) insertion carry risk of nosocomial infection in the CNS such as ventriculitis. Ventriculitis caused by multidrug resistant gram-negative bacteria (MDR-GNB) is still not widely reported. This case series aims to provide an overview of MDR-GNB ventriculitis.

Case Presentation: This case series consists of 5 patients with microbiologically confirmed ventriculitis treated in the neurocritical care unit of National Brain Center Hospital during October 2025 – March 2026. Invasive procedures were lumbar drain insertion (2 patients), EVD insertion (1 patient), craniotomy aneurysm clipping with lumbar drain insertion (1 patient), and ventriculoperitoneal shunt (1 patient). Microbiological culture evaluation confirmed Carbapenem-resistant *Acinetobacter baumannii* (CRAB) in 3 patients and Extended-Spectrum Beta-Lactamases *Klebsiella pneumoniae* in 2 patients. Majority of patients (4 of 5) died during hospitalization while 1 patient was discharged from hospital with modified Rankin Scale of 3.

Discussion: Ventriculitis was one of the complications from invasive CNS procedures which has significant rate of mortality and disability. This has stemmed from the complexity of diagnostic work-up and management of this condition. From the diagnostic aspect, things to be considered are distinction between inflammation, colonization, or infection and etiological diagnosis microbiologically. Challenges in management comprise of antibiotics selection including dosage, duration, and administration access. Guideline has recommended intrathecal antibiotics in ventriculitis caused by MDR-GNB. The management of complications such as increased intracranial pressure, status epilepticus, vasculitis, electrolyte imbalances, acid base disturbances and hemodynamic require neurocritical care unit admission.

Conclusion: Ventriculitis due to MDR-GNB is a difficult case that requires multidisciplinary management.

Keywords: intrathecal antibiotic, multidrug resistant gram-negative bacteria, nosocomial, ventriculitis

NEUROINFEKSI, NEUROVASKULER

CLINICAL IMPROVEMENT AFTER CONSERVATIVE MANAGEMENT OF RUPTURED CEREBRAL MYCOTIC ANEURYSM WITH ANTIMICROBIAL THERAPY: CASE REPORT

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Introduction: Cerebral mycotic aneurysm is a rare form of infectious, non-atherosclerotic intracranial aneurysm, accounting for less than 1–5% of all intracranial aneurysms. These aneurysms are often multiple and commonly located in the distal branches of cerebral arteries. Clinically, they most frequently present with intracerebral hemorrhage and less commonly with subarachnoid hemorrhage.

Case Presentation: We report a case of a 38-year-old woman who was referred to our hospital with a sudden decrease in consciousness for seven days, preceded by headache and fever ten days earlier. Neurological examination revealed a Glasgow Coma Scale (GCS) score of 9, right-sided hemiparesis, and neck stiffness. Fourteen days prior to admission, the patient had delivered vaginally. There was no history of hypertension, diabetes mellitus, or tuberculosis. Head Computed Tomography (CT) scan revealed intracerebral hemorrhage, subarachnoid hemorrhage. Cerebral angiography demonstrated aneurysmal lesion in distal cortical branch of left middle cerebral artery (MCA), suggesting a mycotic aneurysm. Laboratory examination showed leukocytosis. Blood cultures grew *Burkholderia cepacia*, which was sensitive to trimethoprim-sulfamethoxazole. The patient was managed conservatively with antibiotic therapy for two weeks. During hospitalization, the patient showed neurological improvement and was discharged in stable condition.

Discussion: Cerebral mycotic aneurysm results from bacterial or fungal infection of the arterial wall. Microbial invasion of the endothelium weakens the vessel wall and leads to aneurysm formation. This condition is commonly associated with septic bacteremia or immunocompromised states. Diagnosis requires high-resolution vascular imaging such as cerebral angiography or CT angiography. In this case, positive blood cultures indicating septic bacteremia supported the diagnosis. Conservative management with appropriate antimicrobial therapy may be considered in selected cases. Endovascular or surgical intervention should be considered for large or ruptured aneurysms.

NEUROINFEKSI, NEUROONKOLOGI

LOW-GRADE ASTROCYTOMA MIMICKING CEREBRAL ABSCESS: A DIAGNOSTIC CHALLENGE

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Background: Ring-enhancing brain lesions remain one of the most critical diagnostic dilemmas in neuro-oncology and neuroinfection. Reliance on imaging findings alone may result in misdiagnosis and inappropriate management.

Case presentation: We report a 37-year-old man presented with progressive headache and a transient loss of consciousness without fever, meningism, or focal neurological deficits. Laboratory examination revealed leukocytosis without systemic signs of infection. Non-contrast computed tomography (CT) demonstrated a left temporoparietal mass, while contrast-enhanced CT showed a ring-enhancing lesion with surrounding edema suggestive of cerebral abscess. Surgical exploration revealed thick purulent material within the lesion. However, histopathological examination confirmed World Health Organization (WHO) Grade II diffuse astrocytoma with chronic suppurative inflammation, consistent with intratumoral abscess formation. Aerobic culture was negative, likely due to prior antibiotic therapy. The patient improved after surgical resection and antibiotic treatment.

Discussion: This case underscores the high-risk overlap between cerebral abscess and low-grade astrocytoma. The absence of systemic infection despite radiological and intraoperative findings should prompt reconsideration of an underlying neoplastic process. Imaging characteristics, including ring enhancement, are insufficient for definitive differentiation. Failure to obtain early tissue diagnosis may delay oncologic treatment or lead to unnecessary prolonged antibiotic therapy.

Conclusion: Low-grade astrocytoma can convincingly masquerade as cerebral abscess at multiple diagnostic levels. Early tissue diagnosis

must be strongly considered in atypical ring-enhancing lesions to prevent misdiagnosis and ensure appropriate treatment.

Keywords: Low-grade astrocytoma, cerebral abscess, ring-enhancing lesion, diagnostic challenge

NEUROINTENSIF

ANOXIC ENCEPHALOPATHY FOLLOWING CURETTAGE WITH A FOCUS ON BRAIN INJURY PROGNOSTICATION: A CASE REPORT AND LITERATURE REVIEW

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Background: Anoxic encephalopathy is a form of global hypoxic-ischemic brain injury that commonly occurs after cardiac arrest and contributes substantially to mortality and long-term neurological disability. This condition is rarely reported as a complication following curettage; however, it carries severe prognostic implications.

Case Report: We report a 27 year old woman who developed decreased consciousness progressing to cardiac arrest during a curettage procedure performed for secondary postpartum hemorrhage. The patient achieved *return of spontaneous circulation* (ROSC) after approximately five to ten minutes of cardiopulmonary resuscitation and was subsequently managed in the intensive care unit with mechanical ventilation. Initial neurological examination revealed a FOUR Score of E0M0B4R1 with preserved brainstem reflexes. Non-contrast head computed tomography demonstrated diffuse cerebral edema with loss of gray-white matter differentiation, consistent with severe anoxic encephalopathy. Despite optimal supportive management, neurological improvement was minimal, and the patient's condition deteriorated, ultimately resulting in death.

Discussion: This case highlights the critical role of anoxic duration, early neurological clinical findings, and neuroimaging features as key factors in prognostic assessment of hypoxic-ischemic brain injury. Diffuse cerebral edema observed on early head CT reflects extensive global brain damage and correlates with poor neurological outcomes.

Conclusion: Anoxic encephalopathy following curettage is a rare but fatal complication. A multimodal prognostic approach incorporating serial clinical neurological examinations and neuroimaging is essential for predicting neurological outcomes and guiding clinical decision-making as well as communication with patients' families.

Keywords: Anoxic encephalopathy, curettage, hypoxic-ischemic brain injury, cardiac arrest, prognosis

DELAYED ENDOVASCULAR DECISION IN RECURRENT ACOM ANEURYSM OF SUBARACHNOID HEMORRHAGE

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Background: Early aneurysm occlusion is the standard of care in ruptured anterior communicating artery (ACoM) aneurysms to prevent catastrophic rebleeding. However, intervention timing may be challenging in the presence of unfavorable morphology and acute-phase instability, where intraprocedural rupture risk may be substantial. Evidence regarding risk-adapted deferral strategies in such scenarios remains limited.

Case Presentation: A 31-year-old male presented with generalized tonic-clonic seizure and was diagnosed with non-traumatic subarachnoid hemorrhage. Digital subtraction angiography revealed a ruptured wide-neck ACoM aneurysm. During the acute phase, the clinical course was complicated by rebleeding, raising concern for heightened aneurysm wall fragility and increased procedural risk. Despite standard

recommendations for urgent occlusion, definitive endovascular coiling was strategically deferred following multidisciplinary evaluation. The patient underwent intensive hemodynamic optimization, vasospasm prophylaxis, seizure control, and close neurological and radiological monitoring. At six-month follow-up, repeat angiography demonstrated interval aneurysm enlargement with an increased aspect ratio, indicating elevated rupture risk under more favorable procedural conditions. Definitive endovascular coiling was subsequently performed without complication, achieving complete occlusion and favorable neurological outcome.

Discussion: This case illustrates the complex balance between early rebleeding prevention and intraprocedural rupture risk in selected ruptured aneurysms. Dynamic morphological assessment and serial imaging enabled risk re-stratification and optimized procedural timing. Strategic deferral in a strictly monitored setting may represent a risk-adapted management approach rather than therapeutic delay.

Conclusion: Individualized timing of intervention, guided by morphological evolution and clinical stability, may enhance procedural safety in selected ruptured ACoM aneurysms while preserving favorable outcomes.

Keywords: Subarachnoid hemorrhage, Anterior communicating artery aneurysm, Rebleeding, Endovascular coiling, Treatment timing

MULTIDISCIPLINARY INTENSIVE CARE STRATEGY IN PATIENTS WITH MENINGOENCEPHALITIS ACCOMPANIED BY MULTI-ORGAN DYSFUNCTION

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Background: Patients with central nervous system infections, particularly in this case of meningoencephalitis, often experience complex and rapidly changing conditions, where neurometabolic disturbances and systemic inflammatory responses contribute to secondary injuries that worsen clinical prognosis. The modern neurointensive approach reflects the evolution of critical care concepts toward holistic care that aligns neurological stabilization with the optimization of other organ functions. The establishment of standardized protocols, multimodal monitoring for early detection of secondary injuries, and cross-disciplinary collaboration are essential pillars in the neurocritical care strategy to enhance the recovery of patients at high risk of deterioration.

Case: A male patient with decreased consciousness for 7 days before hospitalization, which occurred gradually, and the patient tends to be restless. The complaints began with seizures occurring three times. There is a history of fever, accompanied by vomiting and headache. On physical examination, a positive Kernig's sign was found, with no lateralization. Laboratory results showed increased leukocytes, reactive anti-CMV IgG, impaired kidney function, hyponatremia, and a chest X-ray revealed pneumonia. A contrast-enhanced CT scan suggested meningoencephalitis accompanied by ventriculitis, brain edema, and dilation of the right lateral ventricle. The patient experienced clinical improvement after the administration of antibiotics, antivirals, anticonvulsants, correction of hyponatremia, and kidney function with CRRT (Continuous Renal Replacement Therapy). The patient was fully conscious after 7 days of treatment.

Discussion: The critical condition of the patient is likely the result of a complex interaction between cerebral inflammatory processes due to infection accompanied by systemic disturbances that could exacerbate secondary brain injury through impaired cerebral perfusion, metabolic dysfunction, and increased neuronal excitotoxicity. The relatively rapid neurological improvement indicates the importance of a simultaneous neurointensive approach between causal therapy and organ stabilization. Like early antibiotics and antivirals, seizure control, respiratory optimization through mechanical ventilation, and CRRT.

Conclusion: The successful outcome in this case explains that despite the possibility of a poor prognosis, neurological dysfunction in neurocritical conditions can be reversible if the triggering factors of secondary injury are recognized and aggressively addressed through strict multidisciplinary coordination.

Keywords: Central nervous system infection, multiple organ failure, metabolic disorders, neurointensive therapy

TIMING TRACHEOSTOMY IN ADULT PATIENTS WITH SEVERE NEUROLOGICAL INJURY: A SYSTEMATIC REVIEW

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Background: Severe neurological injuries, including traumatic brain injury (TBI), stroke, spinal cord injury, and infratentorial lesions, frequently result in impaired consciousness and loss of airway protective reflexes, requiring prolonged mechanical ventilation. In this population, tracheostomy timing is a key component of neurocritical care management. Although early tracheostomy has been associated with shorter ventilator duration and reduced intensive care unit (ICU) stay, its impact on mortality and long-term neurological recovery remains uncertain and appears to vary across diagnoses.

Objective: To evaluate the impact of tracheostomy timing on mortality and functional neurological outcomes in adult patients with severe neurological injury requiring mechanical ventilation.

Methods: A systematic review was conducted including studies of adult patients (≥ 18 years) with primary neurological conditions comparing early versus late tracheostomy based on clearly defined timing criteria. Eligible studies included randomized controlled trials, cohort studies, case-control studies, systematic reviews, and meta-analyses. Primary outcomes were mortality and functional neurological outcomes (modified Rankin Scale, Glasgow Outcome Scale). Secondary outcomes included duration of mechanical ventilation, ICU length of stay, and ventilator-associated pneumonia (VAP).

Results: A total of 200 studies were analyzed. Early tracheostomy ($\leq 3-10$ days) consistently reduced mechanical ventilation duration ($3-10$ days), ICU length of stay ($2.5-11$ days), and ventilator-associated pneumonia incidence. However, effects on mortality and functional neurological outcomes were diagnosis-dependent. No significant improvement was observed in severe stroke populations, whereas some TBI studies demonstrated reduced mortality and improved Glasgow Outcome Scale scores. High cervical spinal cord injury was associated with reduced ICU mortality.

Conclusion: Early tracheostomy improves ICU efficiency and reduces respiratory complications in severe neurological injury. However, its impact on survival and long-term neurological recovery remains diagnosis-dependent.

Keywords: Tracheostomy timing, Severe neurological injury, Neurocritical care, Traumatic brain injury, Stroke

NEUROINTERVENSI

ISOLATED ABDUCENS NERVE PALSY AS AN INITIAL MANIFESTATION OF CEREBRAL VENOUS SINUS THROMBOSIS: A CASE SERIES

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Background: Cerebral venous sinus thrombosis (CVST) is an uncommon but important cause of stroke with a highly variable clinical presentation. Headache is the most frequently reported symptom, while other manifestations may include seizures, focal neurological deficits, and visual disturbances. Cranial nerve involvement is relatively rare in CVST, and isolated abducens nerve palsy as the initial manifestation is particularly uncommon. Such atypical presentations may lead to diagnostic challenges, especially when routine neuroimaging does not reveal abnormalities explaining the neurological deficit.

Case Presentation: We report two male patients aged 42 and 53 years who presented with headache accompanied by horizontal diplopia.

Neurological examination in both patients revealed isolated left abducens nerve palsy without additional focal neurological deficits. Initial brain magnetic resonance imaging did not demonstrate structural lesions explaining the cranial nerve dysfunction. Further evaluation with venous imaging identified abnormalities of the cerebral venous system consistent with cerebral venous sinus thrombosis. Both patients received anticoagulation therapy and supportive management, resulting in improvement of headache and partial recovery of diplopia.

Discussion: Abducens nerve palsy may occur in CVST as a consequence of intracranial hypertension caused by impaired venous drainage. Because routine neuroimaging may appear normal, venous imaging plays a crucial role in establishing the diagnosis in patients presenting with unexplained diplopia and headache.

Conclusion: Isolated abducens nerve palsy may represent an initial manifestation of cerebral venous sinus thrombosis. Clinicians should consider CVST in patients presenting with unexplained diplopia and headache, particularly when routine brain imaging findings are inconclusive.

Keywords: Cerebral venous sinus thrombosis, Abducens nerve palsy, Diplopia, Intracranial hypertension, Cranial neuropathy

POSTERIOR ISCHEMIC OPTIC NEUROPATHY FROM OPHTHALMIC ARTERY OCCLUSION WITH ACUTE HEADACHE MIMICKING OPTIC NEURITIS

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Background: Acute monocular visual loss is a neurological emergency with a broad differential diagnosis, including optic neuritis and ischemic optic neuropathy. Posterior ischemic optic neuropathy (PION) is rare, particularly in young adults, and may present with normal fundoscopic findings, creating diagnostic uncertainty. Headache is not commonly recognized as a prodromal symptom of ophthalmic artery occlusion.

Case Presentation: A 27-year-old woman developed sudden severe visual loss in the left eye following a three-day history of new-onset throbbing headache. Neurological examination revealed a left relative afferent pupillary defect, while fundoscopic findings were normal. Magnetic resonance imaging demonstrated hyperintensity of the left optic nerve, initially suggestive of optic neuritis. However, visual evoked potential testing showed absent responses in the affected eye, indicating profound optic nerve dysfunction. Digital subtraction angiography subsequently revealed total occlusion of the left ophthalmic artery, establishing the diagnosis of posterior ischemic optic neuropathy secondary to major arterial obstruction. Visual function did not improve despite treatment.

Discussion: This case highlights the diagnostic challenge of differentiating optic neuritis from ischemic optic neuropathy when MRI findings and clinical presentation overlap. The temporal association between acute headache and visual loss suggests that headache may represent an early manifestation of evolving vascular compromise.

Conclusion: Acute headache preceding monocular blindness should prompt consideration of secondary vascular causes, even in young patients without traditional risk factors. Early vascular imaging is essential for accurate diagnosis and appropriate management.

Keywords: Posterior ischemic optic neuropathy, Ophthalmic artery occlusion, Acute headache, Monocular blindness, Digital subtraction angiography

PROFILE OF VASCULAR RISK FACTORS IN PATIENTS WITH EXTRACRANIAL CAROTID AND VERTEBRAL ARTERY STENOSIS UNDERGOING DIGITAL SUBTRACTION ANGIOGRAPHY AT DR. MOEWARDI GENERAL HOSPITAL

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Background: Extracranial stenosis of the carotid and vertebral arteries is an important cause of cerebrovascular disease and contributes significantly to ischemic stroke. The underlying atherosclerotic process is

closely associated with several vascular risk factors, including hypertension, diabetes mellitus, dyslipidemia, smoking, coronary artery disease, and obesity. Identifying the profile of risk factors in patients with extracranial arterial stenosis is essential to better understand patient characteristics and to support stroke prevention strategies.

Objective: To determine the profile of vascular risk factors in patients with extracranial carotid and vertebral artery stenosis who underwent Digital Subtraction Angiography (DSA) at Dr. Moewardi General Hospital.

Methods: This study was an observational analytic study with a cross-sectional design using electronic medical record data of patients who underwent DSA examination at Dr. Moewardi General Hospital from January 2024 to December 2025. A total of 104 patients with extracranial carotid or vertebral artery stenosis were included. The analyzed variables included hypertension, diabetes mellitus, dyslipidemia, smoking history, history of coronary artery disease, and obesity. Bivariate analysis was performed using the Chi-square test, while multivariate analysis was conducted using binary logistic regression. Statistical analysis was performed using IBM SPSS Statistics version 22.

Results: Among the 104 patients, 51 patients (49.0%) had carotid stenosis and 53 patients (51.0%) had vertebral artery stenosis. The most common risk factor identified was hypertension (80.8%). Bivariate analysis showed no significant differences between carotid and vertebral stenosis in relation to hypertension ($p=0.553$), diabetes mellitus ($p=0.439$), dyslipidemia ($p=0.437$), smoking history ($p=0.243$), history of coronary artery disease ($p=0.699$), or obesity ($p=0.331$). Multivariate analysis also demonstrated no significant association between vascular risk factors and the type of stenosis, including hypertension (OR 1.57; 95% CI 0.55–4.45; $p=0.398$) and smoking history (OR 1.52; 95% CI 0.67–3.46; $p=0.314$).

Conclusion: Vascular risk factors are commonly found in patients with extracranial carotid and vertebral artery stenosis; however, no significant differences in the distribution of these risk factors were observed between the two groups in this study population. Further prospective studies with larger sample sizes and more comprehensive analyses are needed.

Keywords: extracranial carotid stenosis, extracranial vertebral artery stenosis, vascular risk factors, Digital Subtraction Angiography, atherosclerosis

SUCCESSFUL TRANSARTERIAL EMBOLIZATION OF CRANIAL EPIDURAL ARTERIOVENOUS FISTULA WITH MULTIPLE DURAL FEEDERS

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Background: Cranial epidural arteriovenous fistula (CEAVF) is an uncommon vascular lesion characterized by abnormal arteriovenous shunting within the epidural venous plexus. Lesions involving the cavernous sinus region may present with ocular manifestations similar to carotid-cavernous fistula. Endovascular therapy has emerged as the primary treatment modality, with transarterial embolization serving as an effective strategy in selected cases with identifiable arterial feeders.

Case Presentation: A 53-year-old man presented with a two-year history of progressive right eye proptosis accompanied by conjunctival hyperemia. Visual acuity remained preserved, and no focal neurological deficits were identified. Magnetic resonance angiography suggested an abnormal vascular lesion in the cavernous sinus region. Digital subtraction angiography revealed a cranial epidural arteriovenous fistula supplied by multiple dural arterial feeders, including branches of the meningohypophyseal trunk, accessory meningeal artery, and middle meningeal artery, with venous drainage into the superior ophthalmic vein and adjacent venous structures. The patient underwent transarterial endovascular embolization targeting the accessory meningeal artery feeders. Post-procedural angiography demonstrated complete occlusion of the fistulous connection with resolution of abnormal venous reflux. The procedure was well tolerated, and the patient showed gradual clinical improvement during follow-up.

Discussion: Cranial epidural arteriovenous fistulas often exhibit complex angioarchitecture with multiple dural feeders, which may present

technical challenges during endovascular treatment. Careful angiographic evaluation is essential for identifying dominant arterial supply and determining the optimal therapeutic approach. In selected cases, a transarterial approach can achieve effective fistula closure while preserving normal cerebral circulation.

Conclusion: Successful transarterial embolization can provide effective and safe treatment for cranial epidural arteriovenous fistulas with multiple dural feeders, resulting in complete fistula occlusion and favorable clinical outcomes.

Keywords: Cranial epidural arteriovenous fistula, Endovascular embolization, Transarterial approach, Dural arteriovenous fistula, Neurointervention

NEUROSINTERVENSI, NEUROVASKULER

CEREBRAL VENOUS SINUS THROMBOSIS PRESENTING AS ISOLATED INTRACRANIAL HYPERTENSION WITHOUT PARENCHYMAL LESIONS

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Background: Cerebral venous sinus thrombosis (CVST) is an uncommon form of cerebrovascular disease that accounts for approximately 0.5–1% of all stroke cases. The clinical manifestations of CVST are highly variable, ranging from isolated headache to focal neurological deficits, seizures, or altered consciousness. In some patients, CVST may present predominantly with features of intracranial hypertension without evident parenchymal abnormalities on routine neuroimaging, which can complicate early diagnosis.

Case Presentation: A 25-year-old woman presented with a one-week history of progressive blurred vision predominantly affecting the left eye, accompanied by diffuse pulsatile headache. Neurological examination revealed isolated visual impairment without focal neurological deficits. Brain magnetic resonance imaging (MRI) showed no pathological lesions within the brain parenchyma but demonstrated narrowing of the transverse sinus, raising suspicion of venous sinus abnormality. Further evaluation with digital subtraction angiography (DSA) revealed reduced venous flow within the transverse sinus, consistent with transverse sinus thrombosis. The patient received antithrombotic therapy along with supportive management during hospitalization and remained clinically stable during follow-up.

Discussion: CVST may present with a wide spectrum of clinical manifestations depending on the location and extent of venous occlusion. In certain cases, impaired venous drainage results primarily in intracranial hypertension rather than venous infarction, leading to symptoms such as headache and visual disturbance without focal neurological deficits. The absence of parenchymal abnormalities on routine MRI may obscure the diagnosis and delay appropriate investigation. Dedicated venous imaging plays a crucial role in identifying venous sinus thrombosis in patients with atypical presentations.

Conclusion: CVST should be considered in patients presenting with unexplained intracranial hypertension even when brain parenchymal imaging appears normal. Early recognition and the use of appropriate venous imaging are essential to establish the diagnosis and guide timely management.

Keywords: Cerebral venous sinus thrombosis, Intracranial hypertension, Transverse sinus thrombosis, Normal brain MRI, Venous imaging

FROM HYPERVASCULARITY TO SUBTLE TUMOR BLUSH: DISTINCT ANGIOGRAPHIC FEEDER PATTERNS IN INTRACRANIAL TUMORS

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Background: Intracranial tumors demonstrate heterogeneous vascularization patterns influenced by tumor origin, biological behavior, and underlying mechanisms such as neoangiogenesis and vessel co-option. Comparative angiographic characterization across tumor entities remains underreported. This case series aims to describe and compare angiographic feeder patterns among three distinct intracranial tumor types.

Case Presentation: This case series reports three cases representing different tumor entities. The first case involved a 58-year-old man with metastatic lung cancer. Digital subtraction angiography (DSA) showed the presence of a tumor blast originating from branches of the posterior circulation, indicating a more complex widespread vascularization. The second case involved a 52-year-old man diagnosed with glioma. DSA revealed subtle tumor blush, with tumor vascularization originating from the medial lenticulostriate branches. The third case involved a 54-year-old woman with meningioma. DSA evaluation showed hypervascular staining in the middle meningeal artery, a common characteristic of parasagittal meningiomas. These differences in vascular patterns illustrate the heterogeneity of tumor vascular architecture across distinct tumor types.

Discussion: Angiographic differences reflect distinct vascularization mechanisms. Meningiomas exhibit organized neoangiogenesis resulting in a clear vascularization pattern with large feeders and prominent tumor blush, supporting the role of preoperative embolization. In contrast, gliomas may combine hypoxia-driven angiogenesis with vessel co-option, producing more diffuse vascularization and subtle tumor blush. Metastatic tumors demonstrate heterogeneous vascularity influenced by the primary tumor's angiogenic profile. Recognition of feeder origin, blush density, and vascular distribution provides crucial information for therapy planning, including tumor resection, preoperative embolization, or intra-arterial chemotherapy.

Conclusion: This report shows that different vascularization patterns of intracranial tumors influence the optimal therapeutic approach. Angiography plays an essential role in diagnosing and planning the treatment for intracranial tumors, with the potential to guide more targeted therapeutic strategies and reduce the risk of complications such as bleeding during surgical procedures or embolization.

Keywords: Intracranial Tumors, Feeder Pattern, Metastasis, Meningioma, Glioma

NEUROLOGI ANAK

EARLY RECOGNITION OF FAMILIAL PROGRESSIVE LOWER LIMB WEAKNESS IN CHILDHOOD

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Background: Duchenne muscular dystrophy (DMD) is a progressive X-linked recessive neuromuscular disorder characterized by early-onset proximal muscle weakness due to dystrophin deficiency. Early diagnosis is essential to initiate timely therapy and genetic counseling.

Case presentation: An 8-year-old boy presented with progressive bilateral lower limb weakness over four years, worsening in the past year. He developed toe walking, frequent falls, and difficulty rising from a squatting position. His older brother had died at age 13 with similar symptoms. Examination revealed proximal lower limb weakness (MRC

4/5), decreased tone, diminished lower limb reflexes, and a positive Gower sign. Serum creatine kinase was markedly elevated (5,640 U/L), with increased transaminases. Electromyography showed a myopathic pattern. Muscle biopsy demonstrated fiber size variation, central nuclei, myofiber atrophy, and 30–50% fibrofatty replacement consistent with DMD.

Discussion: The combination of progressive proximal weakness, markedly elevated creatine kinase, and strong family history strongly supports X-linked inheritance. Elevated transaminases likely reflected muscle breakdown rather than primary liver disease. Histopathological findings confirmed dystrophic changes typical of DMD.

Conclusion: Early recognition of DMD in boys with progressive proximal weakness and positive family history is crucial to enable prompt glucocorticoid therapy, multidisciplinary monitoring, and genetic counseling.

Keywords: Duchenne muscular dystrophy, X-linked recessive disorder, Proximal muscle weakness, Gower sign, Family history

NEUROLOGI ANAK, NEUROVASKULER

SECONDARY INDIRECT CAROTID–CAVERNOUS FISTULA ASSOCIATED WITH CAVERNOUS SINUS THROMBOSIS MANAGED CONSERVATIVELY IN PEDIATRIC: CASE REPORT

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Background: Meningeal artery and cavernous sinus abnormalities, known as indirect carotid-cavernous fistulas (CCFs), are frequently associated with inflammatory processes or deep cerebral vein thrombosis, including the uncommon but dangerous cavernous sinus thrombosis (CST). CST may result in cavernous sinus hypertension and, via inflammatory and neoangiogenic processes, initiate the development of indirect CCF.

Case report: We report a 9-year-old female patient referred from the pediatric department with complaints of VAS 8-9 headache since 5 days before admission (7/27/2025), nausea and vomiting accompanied by Marasmus-type malnutrition. Physical examination revealed a body weight of 17 kg, right eye proptosis, and conjunctival hyperemia. A DSA was performed, revealing a direct connection with slow flow from the meningeal branches of both internal carotid arteries (ICA) into the cavernous sinus, with drainage primarily via the posterior and anterior venous routes, including the inferior petrosal sinus (IPS) and the superior and inferior ophthalmic veins, ultimately flowing into the internal jugular vein and cortical veins. In addition, the meningeal branch of the external carotid artery (ECA) also supplies the cavernous sinus, and a Type D right carotidocavernous fistula was found.

Discussion: Marasmus-type malnutrition is a condition that affects the carotid vessels. Definitive diagnosis via radiological examination and indications for endovascular intervention, along with early management of malnutrition, are crucial for achieving better outcomes and reducing mortality.

Keywords: Type D Right Carotid-Cavernous Fistula, Marasmus type Malnutrition, case report

NEUROONKOLOGI

BLASTIC CALVARIAL METASTASIS IN ADVANCED-STAGE CERVICAL CANCER: A RARE CASE REPORT

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Background: Calvarial metastasis from cervical cancer is extremely rare and typically presents as cancer pain. Blastic lesions with aggressive bone remodelling, may breach bone cortex and extend intracranially, causing neurologic deficits and poorer prognosis. Reports of blastic calvarial metastasis in advanced-stage cervical cancer remain limited.

Case presentation: A 40-year-old woman presented with three months progressive headache without neurologic deficits. Three years earlier, she had been diagnosed with poorly differentiated human papillomavirus-related cervical adenocarcinoma, stage IVB, and underwent total hysterectomy followed by chemoradiotherapy. Six months later, hepatic, lungs, and mediastinum metastases were identified. Over the past six months, she developed an enlarging frontal mass and worsening left shoulder pain. Head computed tomography scan revealed contrast-enhancing frontal bone blastic lesion extended extra and intracranially, causing mass effect, midline shift, and vasogenic edema. Left humerus radiography showed lytic lesion with endosteal scalloping. Cerebrospinal fluid cytology revealed no malignant cells. She treated with intravenous dexamethasone 10-15 mg per day and morphine 10 mg per day, achieved well-controlled headache; also received palliative local radiotherapy, zoledronic acid, and further palliative chemotherapy.

Discussion: Calvarial metastasis occurs through hematogenous dissemination. Tumor cells intravasate into blood vessels, extravasate onto endosteal surface, infiltrate bone trabeculae, and trigger abnormal osteolytic and osteoblastic activity, stimulates periosteal nociceptors, resulting cancer pain. Intracranial extension causes mass effect and vasogenic edema, worsening the headache, and causing neurologic deficits when leptomeninges and brain parenchyma are involved. No neurological deficits were observed in this case. Cancer pain was managed with morphine and adjunctive dexamethasone; however, headache was controlled after dexamethasone dose escalation, supporting the contribution of vasogenic edema. Radiotherapy promotes tumor cell apoptosis and reduces inflammation, aiding tumor and pain control, allowing dexamethasone tapering. Zoledronic acid inhibits pathological bone turnover, and palliative systemic chemotherapy controls systemic disease.

Conclusion: Determining blastic calvarial metastatic invasion extent is essential for multidisciplinary management and prognosis.

Keywords: Blastic calvaria metastasis, cervical cancer, advanced-stage

BRAIN TUMOR LOCATION: UNRAVELLING THE COGNITIVE AND FUNCTIONAL IMPACT

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Background: Cognitive impairment and functional decline are debilitating complications in neuro-oncology patients, frequently driven by the mass effect of tumors and peritumoral edema. Understanding the relationship between brain tumor location, cognitive deficits, and activities of daily living is important for prognosis, surgical planning, targeted rehabilitation, and counseling patients about expected functional outcomes.

Objective: This study aims to evaluate whether brain tumor location affects daily living activities and global cognitive function, and to determine the correlation between functional independence and cognitive status in these patients.

Methods: This retrospective cross-sectional study included 66 patients with primary or metastatic brain tumors over a one-year period in a Brain Clinic at Kariadi General Hospital Semarang. Tumor location was assessed using contrast-enhanced CT/MRI. Cognitive function was assessed using the Montreal Cognitive Assessment Indonesia (MoCA-INA). Functional status was evaluated using the Katz Index of Independence in Activities of Daily Living (ADL) and the Lawton Instrumental Activities of Daily Living (IADL) scale. Data were analyzed using Kruskal-Wallis and correlation tests.

Results: A high prevalence of cognitive impairment was observed, with 50% of patients falling into severe cognitive impairment. Tumor location significantly influenced global cognitive scores (MoCA-INA, $p < 0.001$), basic functional independence (ADL, $p < 0.001$), and instrumental activities (IADL, $p < 0.001$). Patients with Frontal lobe and Multiple lobe tumor exhibited the most severe cognitive impairment, while those with Occipital lesions largely preserved their independence. This reflects frontal lobe involvement in executive and complex motor functions, whereas occipital lesions mainly impair visual function while largely sparing functional independence and global cognition. Furthermore, a strong correlation was observed between cognitive preservation and functional independence.

Conclusion: Neuro-oncological disorders are associated with significant cognitive and functional morbidity. Tumor location is a strong determinant of both global cognitive decline and daily functional independence, with cognitive dysfunction translating directly into the loss of daily physical independence.

Keywords: Neuro-oncology, Brain Tumor, Cognitive Impairment, MoCA-INA, ADL

CAUDA EQUINA SYNDROME AS INITIAL PRESENTATION OF EXTENSIVE VERTEBRAL METASTASIS: EXPLORING THE ALARM-DAMAGE DISCREPANCY

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Background: Spinal metastasis is a frequent complication of breast (50.5%), particularly hormone receptor-positive subtypes, commonly affecting the thoracic and lumbar regions. Cauda equina syndrome (CES) rarely represents its initial manifestation (1.2%), and neurological deficits may not reflect the underlying extensive structural destruction, leading to underestimation and delayed diagnosis.

Case Presentation: A 55-year-old woman with a history of triple-positive breast cancer presented with a month of progressive low back pain and acute bilateral lower limb weakness. Examination revealed flaccid radicular paraparesis and radicular sensory loss (L3–L5), consistent with CES. MRI demonstrated multiple pathological compression fractures (T9–L5) with severe canal stenosis, most prominent at L3–L4. Given her poor performance status and limited prognosis, she received conservative, palliative-oriented management. Clinical progression and radiological finding are consistent with CES.

Discussion: This case illustrates the clinicoradiological discordance that may occur in metastatic spinal disease, where extensive vertebral destruction may not parallel neurological severity, which is due to the complex interplay of static and dynamic spine compression factors.

Conclusion: CES as an initial presentation of spinal metastasis is rare but clinically significant. Early recognition, timely imaging, and multidisciplinary, prognosis-guided management are crucial to preserve function and quality of life.

Keywords: Cauda equina syndrome, spinal metastasis, breast cancer

COEXISTENCE OF IDH-MUTANT DIFFUSE GLIOMA AND CHRONIC MYELOGENOUS LEUKEMIA: CLINICAL ASPECTS AND THERAPEUTIC INTERACTIONS

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Background: Multiple primary malignant neoplasms (MPMNs) are defined as the occurrence of two or more histologically distinct primary malignancies in a single patient. To date, no epidemiological data exist and no biological association has been established regarding the coexistence of IDH-mutant diffuse glioma and chronic myelogenous leukemia (CML).

Case Presentation: A 40-year-old man initially presented with focal-onset seizures evolving to bilateral tonic-clonic seizures, followed by progressive cognitive decline and behavioral changes. Brain MRI revealed an infiltrative mass in the left temporoparietal region. Histopathological and immunohistochemical examination confirmed adult-type diffuse glioma, IDH-mutant, CNS WHO grade 2. The patient underwent craniectomy with partial tumor removal. Residual tumor was later identified on follow-up imaging. Prior to a planned second surgery, routine laboratory evaluation showed marked leukocytosis (123,590/ μ L). Further hematologic workup confirmed chronic-phase CML with Philadelphia chromosome (t(9;22)), and imatinib 400 mg daily was initiated. The patient subsequently underwent craniotomy followed by intensity-modulated radiotherapy. During follow-up, he developed progressive neurological deterioration, including decreased consciousness, bilateral hemiparesis, cranial nerve deficits, and MRI findings consistent with progressive disease according to RANO criteria.

Discussion: The synchronous occurrence of IDH-mutant diffuse glioma and CML represents a rare double primary malignancy. Although no direct molecular relationship has been established, indirect mechanisms such as chronic inflammation, oxidative stress, and epigenetic modulation may contribute to tumor progression. Management requires careful coordination to balance surgical timing, radiotherapy safety, and tyrosine kinase inhibitor continuation while minimizing hematologic complications.

Conclusion: The coexistence of diffuse glioma and CML presents significant diagnostic and therapeutic challenges. Individualized treatment planning and close interdisciplinary collaboration are essential in managing rare double primary malignancies.

Keywords: multiple primary malignant neoplasms, IDH-mutant diffuse glioma, chronic myelogenous leukemia

DURAL METASTASIS AS AN UNUSUAL PRESENTATION OF ORAL SQUAMOUS CELL CARCINOMA: A CASE REPORT

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Background: Dural metastasis is a rare form of secondary metastasis found in cases of Oral Squamous Cell Carcinoma (OSCC), with an incidence reported to be less than 1%. A retrospective study involving 597 OSCC cases showed that only 0.7% of these cases developed into vertebral or dural metastasis.

Case report: A 30-year-old man with a 1-year history of OSCC, after undergoing 35 sessions of radiotherapy and 5 cycles of chemotherapy, complained of progressive inferior paraplegia starting with upper back pain radiating to the abdomen as if bound, followed by numbness in the thoracic dermatomes 6 and below. The patient also experienced urinary retention and constipation. Neurological examination showed the presence of complete UMN-type spinal cord syndrome, with bilateral lower extremity weakness, decreased anal sphincter tone, and severe

anemia. A chest X-ray shows possible lung metastasis, while a thoracolumbar MRI indicates the presence of dural metastasis. Histopathological examination of the tongue tissue confirmed the diagnosis of OSCC with viable tumor cells consistent with the characteristics of squamous cell carcinoma.

Discussion: This case illustrates the aggressive clinical course of dural metastasis originating from OSCC, with the main complaints being progressive radicular pain and weakness in both limbs, accompanied by autonomic disturbances such as urinary retention and constipation. The diagnosis is supported by MRI findings showing lesions consistent with dural metastasis. The management approach involves administering glucocorticoids to reduce inflammation and pain management to improve the patient's quality of life, as well as planning to perform radiotherapy as a follow-up step.

Conclusion: Dural metastasis from Oral Squamous Cell Carcinoma is a very rare occurrence. Therefore, a high level of clinical suspicion is required to diagnose this condition. An integrated multidisciplinary approach is essential to optimize clinical outcomes, especially in cases with an aggressive disease course.

Keywords: Dural Metastasis, Oral Carcinoma, paraplegia

EVALUATION OF COGNITIVE FUNCTION IN MENINGIOMATOSIS AFTER SURGICAL TREATMENT

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Background: Meningioma is one of the most common benign primary brain tumors in adults. Meningiomatosis, or multiple meningiomas, occurs in approximately 1–10% of all cases. Hormonal contraception has been identified as a potential risk factor. Surgical resection is the primary therapeutic strategy resulting in better neurological and cognitive improvement.

Case Report: A 47-year-old woman with a 28-year history of injectable hormonal contraception presented with progressive right eye proptosis for 8 years, accompanied by ptosis, binocular diplopia, and headache. Cognitive assessment revealed impairment with MMSE 23/30 and MoCA-INA 14/30. Contrast-enhanced MRI demonstrated multiple enhancing extra-axial masses in the parasellar, parasagittal, and right frontal regions with a dural tail sign. The patient underwent craniectomy with tumor resection. Histopathological examination confirmed WHO grade I fibrous meningioma. Postoperative evaluation showed improvement in cognitive scores (MMSE 27/30; MoCA-INA 16/30), with residual mild impairment in memory, visuospatial, and executive functions.

Conclusion: Cognitive impairment is frequently founded in meningioma and it depends on the tumor location, size, and edema. Early surgical intervention before permanent neurological impairment leads to clinically significant cognitive improvement.

Keywords: Meningioma, Cognitive impairment, Hormonal contraception, surgery, tumor

IMPROVEMENT OF COGNITIVE FUNCTION AFTER FIBROBLASTIC MENINGIOMA SURGERY FOLLOWING PREOPERATIVE EMBOLISATION: A CASE REPORT

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Background: Meningioma can cause headaches and cognitive impairment due to mass effect, oedema, or vascular compromise. Preoperative embolisation is performed to reduce intraoperative bleeding and facilitate resection, but its effect on postoperative cognitive recovery remains poorly documented.

Case Presentation: A 62-year-old female patient with a left frontotemporal meningioma complained of headaches and progressive memory loss. Magnetic resonance imaging showed a large extra-axial lesion measuring 5.06 x 3.12 x 4.97 cm, with significant mass effect accompanied by midline shift. Given the high likelihood of complex

tumour neovascularisation, preoperative DSA was performed, revealing a highly vascular tumour. Selective embolisation of the feeders originating from the right and left sphenopalatine arteries and left middle meningeal arteries was performed using polyvinyl alcohol particles (350–550 µm). Subsequently, the patient underwent total gross surgical resection, with stable postoperative neurological outcomes and no major perioperative complications. Preoperative and postoperative cognitive assessment using the Montreal Cognitive Assessment – Indonesian Version and the Mini Mental State Examination test showed mild impairment.

Discussion: Extensive perifocal edema and mass effect in meningioma may produce radiological features that mimic glioblastoma; therefore, definitive diagnosis ultimately relies on histopathological examination. Furthermore, the presence of complex tumor neovascularization suggests that preoperative embolization may help reduce perioperative complications. This approach is expected not only to facilitate safer surgical resection but also to contribute to improved clinical outcomes, including postoperative cognitive function.

Conclusion: In this case, surgical resection was performed one week after preoperative embolisation, and histopathological examination of the fibroblastic meningioma was conducted. The patient experienced cognitive improvement and reduced headache. These findings suggest that embolisation may improve surgical conditions and cognitive outcomes in patients with symptomatic meningioma undergoing. Further studies are needed to confirm the benefits and determine appropriate candidates.

Keywords: Meningioma, Preoperative embolisation, Cognitive function, Surgical resection (resection), Cognitive recovery, Peritumoral oedema

INTRATUMORAL HEMORRHAGE AS A PROGNOSTIC FACTOR AND AGGRESSIVENESS IN HIGH-GRADE GLIOMA: A CASE REPORT

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Background: High-grade glioma (HGG) is one of the most aggressive primary tumors of the central nervous system, characterized by infiltrative growth, rapid progression, and poor prognosis. In some patients, intratumoral hemorrhage occurs and may reflect vascular instability caused by abnormal tumor angiogenesis. Evidence suggests that preoperative hemorrhage is associated with worse clinical outcomes in patients with HGG.

Case Report: We report the case of a 38 year old male who presented with progressively worsening headaches over the course of three months, accompanied by weakness on the right side of his body. A neurological examination revealed right-sided hemiparesis with a motor strength rating of 4/5. A non-contrast head CT scan showed a calcified mass located in the left parietal lobe, leading to a differential diagnosis of oligodendroglioma. Further assessment with a contrast-enhanced MRI revealed an intra-axial lesion in the left parietal region that exhibited intratumoral hemorrhage and ipsilateral cerebral edema. The patient subsequently underwent a craniotomy and tumor resection, and histopathological examination confirmed the diagnosis of high-grade glioma.

Discussion: Intratumoral hemorrhage in HGG cases is associated with high cell proliferation rates and abnormal angiogenesis, resulting in fragile and easily ruptured blood vessels. This can accelerate neurological decline and reflect the more aggressive biological nature of the tumor. Various cohort studies have reported that the presence of intratumoral hemorrhage correlates with poorer clinical outcomes and may serve as an independent prognostic factor in adult gliomas. Therefore, the presence of a hemorrhagic component in an intracranial mass warrants clinical attention as it may indicate malignant potential in neurological practice.

Conclusion: Intratumoral bleeding in high-grade glioma not only indicates the presence of a tumor, but also provides a clear sign that the tumor is more dangerous and more difficult to control. Therefore, we must view it as a biological signal that requires immediate action.

Keywords: High-Grade Glioma, Intratumoral Hemorrhage, Aggressiveness, Prognostic factor

INTRAOPERATIVE BRAIN MAPPING FOR MOTOR CORTEX PRESERVATION IN FIBROBLASTIC MENINGIOMA RESECTION MIMICKING GLIOBLASTOMA

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Introduction: Meningiomas are generally benign tumours; however, the presence of extensive perifocal oedema may radiologically mimic glioblastoma. Tumours located in eloquent brain areas carry a high risk of postoperative neurological deficits. Therefore, accurate intraoperative brain mapping strategies are essential to prevent neurological impairment, which may significantly reduce patients' quality of life.

Case Illustration: A 66-year-old woman presented with chronic headache and mild cognitive impairment. Brain MRI revealed a right frontal lobe mass with extensive oedema and a 0.89 cm midline shift, initially suspected to be glioblastoma. The patient underwent tumour resection under the guidance of Intraoperative Neurophysiological Monitoring (IONM). Brain mapping using Somatosensory Evoked Potentials (SSEP) was employed to accurately identify the central sulcus and primary motor cortex, while Motor Evoked Potentials (MEP) were utilized to assess the integrity of the corticospinal tract. Postoperative evaluation demonstrated optimal recovery without any new focal neurological deficits, confirming the effectiveness of the mapping protocol. Final histopathological examination confirmed Fibroblastic Meningioma (WHO Grade I).

Discussion: The integration of SSEP and MEP functioned as a real-time early warning system against mechanical or ischemic injury to the corticospinal tract. This technique enabled continuous monitoring of at-risk neurological structures throughout surgery. Gross total resection (Simpson Grade I) was successfully achieved while strictly preserving the functional cortex.

Conclusion: Intraoperative brain mapping using SSEP and MEP is a crucial modality in guiding gross total resection of motor-area meningiomas. This approach effectively prevents postoperative neurological deficits and ensures favourable long-term functional outcomes.

LEPTOMENINGEAL METASTASES FROM UROTHELIAL CARCINOMA OF THE BLADDER : A RARE CASE REPORT

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Background: Urothelial carcinoma of the bladder constitutes the majority of bladder carcinomas and usually gives metastases to lymph nodes, liver, lung, bones, adrenal gland and intestine. Brain metastases are relatively infrequent, but are often seen during chemotherapy in the advanced stage of bladder carcinoma, reported incidences 1–8%. Leptomeningeal metastases are a very rare entity, reported only in case reports in bladder carcinoma.

Case Presentation: A 58-year-old male patient came to Royal Prima General Hospital with sudden unresponsive and restlessness since 1 day ago. The patient previously complained of severe headache, dizziness, weakness, and vomiting. History of hematuria for the past year. The patient has a history of high-grade invasive urothelial carcinoma of the urinary bladder and has not received chemotherapy previously. General status examination was normal. Neurological examination revealed decreased consciousness and left lateralization. Head CT scan with contrast showed a hypodense lesion with well-defined borders in the left thalamus with perilesional edema and hypodense lesions in the bilateral temporo-occipital lobes with leptomeningeal enhancement suggestive of metastases, and chronic infarction of the right thalamus. The patient was given citicoline, mecobalamin, and dexamethasone. The patient was planned to be referred to H. Adam Malik Hospital to receive chemotherapy.

Discussion: Leptomeningeal metastases is an uncommon urothelial carcinoma complication. Diagnosis of leptomeningeal metastases is based on contrast enhancement MRI and the detection of carcinomatous

cells by the cytological examination of the cerebrospinal fluid. Treatment of leptomeningeal metastases based on factors including histology, prognosis, presence of bulky neurological disorders, and state of the primary cancer.

Conclusion: Leptomeningeal metastases continues to remain one of the most challenging complications of cancer in terms of diagnostic complexity, poor prognosis, often devastating impact on quality of life, and mixed response to standard cytotoxic or targeted therapies.

Keywords: Leptomeningeal Metastases, Urothelial Carcinoma, Unresponsive, Hematuria, Severe Headache

MALIGNANT INTRACRANIAL SOLITARY FIBROUS TUMOR MIMICKING MENINGIOMA: A RARE CASE REPORT

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Background: Solitary fibrous tumor (SFT) is a rare primary intracranial mesenchymal neoplasm, accounting for less than 1% of all brain tumors. Previously categorized as Hemangiopericytoma, SFTs typically arise from the meninges and may closely resemble meningiomas on neuroimaging, often leading to preoperative misdiagnosis.

Case Presentation: A 46-year-old man presented with a two-month history of progressive speech disturbance, characterized by impaired comprehension and inappropriate verbal responses, followed by severe headache one week prior to admission. Neurological examination revealed right-sided hemiparesis. Contrast-enhanced head CT demonstrated a large intra-axial mass in the left cerebral hemisphere with significant vasogenic edema, compression of the lateral ventricle, and leftward midline shift. The initial radiological impression suggested meningioma. Histopathological analysis confirmed a malignant solitary fibrous tumor with infiltrative growth into adjacent glial tissue. The patient had previously undergone ventriculoperitoneal (VP) shunt placement at another hospital. He subsequently underwent craniectomy at our institution.

Discussion: Solitary fibrous tumor is an uncommon tumor that often presents with nonspecific neurological symptoms and radiological features resembling meningioma or other intracranial neoplasms. The overlapping imaging characteristics may lead to misdiagnosis prior to surgery. Solitary fibrous tumor carries a significant risk of local recurrence regardless of histological grade. Therefore, prolonged follow-up is essential and highlights the need to accurately differentiate it from its closest mimic, meningioma. In this case, the definitive diagnosis was established through histopathological findings and supported by immunohistochemical examination which is a key diagnostic marker for SFT.

Conclusion: Solitary fibrous tumor (SFT) is a rare intracranial mesenchymal tumor that can mimic meningioma on imaging, making preoperative diagnosis challenging. In this case, radiological findings initially suggested meningioma. Definitive diagnosis of SFT relies on histopathological and immunohistochemical examination. Complete surgical resection is the main treatment, and long-term follow-up is required due to the risk of recurrence.

Keywords: Solitary Fibrous Tumor, Meningioma

MALONDIALDEHYDE LEVELS IN PATIENTS WITH PRIMARY BRAIN TUMORS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background: Oxidative stress has been increasingly recognized as a contributing factor in the pathogenesis of primary brain tumors. Malondialdehyde (MDA), a stable end product of lipid peroxidation, is widely used as a biomarker of oxidative damage. However, the magnitude

and consistency of circulating MDA alterations in patients with primary brain tumors remain unclear.

Objective: To evaluate circulating MDA levels in patients with primary brain tumors compared with healthy controls.

Methods: A systematic review and meta-analysis were conducted in accordance with PRISMA 2020 guidelines. PubMed, ScienceDirect, and Google Scholar were searched from inception to January 2026. Case-control studies reporting MDA levels in serum, plasma, and erythrocytes in patients with primary brain tumors and healthy controls were included. Pooled effect sizes were calculated using standardized mean differences (SMD) with 95% confidence intervals (CI) under a random-effects model. Heterogeneity was assessed using the I^2 statistic. Sensitivity analysis was performed using the leave-one-out approach. Study quality was evaluated using the Newcastle–Ottawa Scale (NOS). Statistical analyses were done using the Review Manager (RevMan) version 5.4.

Results: From 1061 studies identified, three case-control studies comprising 119 patients with primary brain tumors and 59 healthy controls met inclusion criteria. Pooled analysis demonstrated higher circulating MDA levels in patients with primary brain tumors (SMD = 2.11; 95% CI 0.76–3.47; $p = 0.002$). The magnitude of the pooled effect size indicated a large difference between groups. Substantial heterogeneity was observed ($I^2 = 91\%$). Sensitivity analysis confirmed consistent direction of association.

Conclusion: Circulating MDA levels are higher in patients with primary brain tumors than in healthy controls, suggesting a potential role of oxidative stress in brain tumor pathophysiology. Larger prospective studies are warranted to confirm these findings and further elucidate the clinical relevance of circulating oxidative stress biomarkers in primary brain tumors.

Keywords: Lipid Peroxidation, Malondialdehyde, Oxidative Stress, Primary Brain Tumor

MULTIPLE MENINGIOMAS IN A PATIENT WITH SYSTEMIC LUPUS ERYTHEMATOSUS: A RARE CASE

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Background: Multiple meningiomas are defined as the presence of two or more spatially distinct intracranial tumors and account for approximately 1–10% of all meningioma cases. Although most World Health Organization (WHO) grade I meningiomas are histologically benign, surgical treatment carries potential risks, including postoperative intracerebral hemorrhage. In patients with systemic lupus erythematosus (SLE), immune-mediated vasculopathy, endothelial dysfunction, and coagulation abnormalities may adversely affect perioperative outcomes.

Case Presentation: A 56-year-old woman presented with progressive behavioral changes, chronic headache, left-sided weakness, cranial nerve deficits, and focal to bilateral tonic clonic seizures. The patient had active SLE presenting with constitutional and mucocutaneous manifestations, with preserved hematological function. Brain magnetic resonance imaging demonstrated multiple extra-axial enhancing masses in the right temporal and parasellar regions, consistent with multiple meningiomas. The neurological manifestations were clinically attributed to tumor related mass effect rather than acute neuropsychiatric SLE activity. Microsurgical resection achieved gross total removal of the temporal tumor and subtotal resection of the cavernous sinus lesion. The immediate postoperative condition was stable. However, within hours, the patient developed sudden neurological deterioration, anisocoria, and refractory hypotension, suggesting intracerebral hemorrhage. Despite aggressive neurocritical management and resuscitative measures, she died within 24 hours after surgery. Histopathological examination confirmed a transitional meningioma, WHO grade I.

Discussion: In patients with systemic lupus erythematosus (SLE), the disease does not necessarily worsen the initial manifestations of multiple meningiomas. However, SLE may be associated with cerebral vasculopathy, inflammatory microangiopathy, endothelial injury, and hemostatic imbalance even without overt neuropsychiatric involvement there by increasing vascular fragility and the risk of severe postoperative hemorrhage.

Conclusion: The success of multiple meningioma management is strongly influenced by tumor mass effect and the presence of autoimmune related vasculopathy. Comprehensive preoperative vascular evaluation and meticulous multidisciplinary perioperative planning are essential to reduce mortality.

Keywords: multiple meningioma, systemic lupus erythematosus, postoperative complication

MYASTHENIA GRAVIS SEBAGAI MANIFESTASI AWAL KARSINOMA THIMUS: SEBUAH LAPORAN KASUS

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Background: Myasthenia gravis (MG) is a common autoimmune neuromuscular disease associated with thymoma, but its association with thymic carcinoma is rare (estimated incidence 1-5%). Biological differences between these entities lead to variations in post-thymectomy responses. This case describes MG as an early manifestation of thymic carcinoma, highlighting diagnostic challenges and a clinical course that deviates from the classic thymoma-associated MG paradigm.

Case Presentation: A 41-year-old woman presented with ptosis, limb weakness, and fluctuating dyspnea (MGFA Class IIb). Electromyography confirmed MG. A chest CT scan revealed an anterior mediastinal mass suggestive of thymoma, leading to a thymectomy. However, histopathology confirmed thymic carcinoma. Postoperatively, the patient showed minimal clinical improvement, with persistent ptosis and intermittent shortness of breath. The patient subsequently initiated chemotherapy according to oncology protocols.

Discussion: MG in thymic carcinoma exhibits distinct characteristics, particularly a suboptimal response to surgery. The lack of significant improvement in this case confirms that the post-thymectomy remission paradigm for thymoma cannot be universally applied to thymic carcinoma. This case is unique as MG serves not only as an autoimmune condition but as a critical clinical marker for aggressive thymic malignancy. It highlights the limitations of thymectomy as the sole determinant of outcomes in this specific context.

Conclusion. This case confirms that myasthenia gravis can be a rare but significant early manifestation of thymic carcinoma with a therapeutic response that is not always consistent with the classic concept of MG associated with thymoma. This finding reminds us that in some patients, myasthenia gravis is not the end of the diagnosis, but rather an early manifestation of a more aggressive thymic malignancy.

Keywords: Myasthenia gravis, thymic carcinoma, thymectomy, early manifestations, case report

PATTERNS, TIMING, AND PREDICTORS OF POST-RADIOTHERAPY COGNITIVE DECLINE IN ADULTS WITH BRAIN TUMORS: A SYSTEMATIC REVIEW AND META-ANALYSIS OF RANDOMIZED CONTROLLED TRIALS

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Background: Cognitive decline is a major survivorship concern after cranial radiotherapy in adults with brain tumors, but randomized evidence is dispersed across heterogeneous trials, endpoints, and follow-up schedules.

Objective: To synthesize randomized controlled trial (RCT) evidence on the patterns, timing, and predictors of cognitive decline after cranial radiotherapy in adults with primary brain tumors or brain metastases.

Methods: We conducted a systematic review and meta-analysis in accordance with PRISMA 2020. PubMed/MEDLINE, Scopus, and ScienceDirect were searched from inception to the final search date, with backward/forward citation tracking. Eligible studies were English-language RCTs (including companion analyses of randomized cohorts) reporting longitudinal cognitive outcomes with baseline and post-treatment assessment. Two reviewers independently screened and extracted data. Outcomes were grouped as time-to-cognitive decline/failure (hazard ratios [HRs]), fixed-timepoint cognitive deterioration (risk ratios [RRs]), or continuous cognitive change. Random-

effects meta-analyses were performed when studies were sufficiently comparable; otherwise, findings were narratively synthesized.

Results: Fifteen randomized study entries were included, predominantly in brain metastases. Cognitive-sparing strategies (including SRS without WBRT, hippocampal-avoidance WBRT, memantine-based neuroprotection) were associated with reduced cognitive decline versus comparators. In pooled time-to-event analyses (3 comparisons), cognitive-sparing approaches lowered the hazard of cognitive decline/failure (HR 0.65, 95% CI 0.49–0.88; $I^2=74.4\%$). In pooled fixed-timepoint analyses (2 comparisons), they reduced the risk of cognitive deterioration (RR 0.66, 95% CI 0.56–0.78; $I^2=0\%$). Domain-specific effects were most consistent for memory, executive function, processing speed, and verbal fluency, typically emerging within 3–6 months. MMSE-based results were mixed and less sensitive. Evidence for primary brain tumors was limited and heterogeneous.

Conclusion: Randomized evidence supports cognitive-sparing and neuroprotective cranial radiotherapy strategies for reducing neurocognitive decline, especially in brain metastases. Treatment-related exposure (WBRT volume/technique and neuroprotection) appears to be the most actionable predictor of cognitive outcomes.

Keywords: Pediatric medulloblastoma, Acute hydrocephalus, Late childhood, Ventriculoperitoneal shunt

PCNSL MIMICKING GLIOBLASTOMA IN AN IMMUNOCOMPETENT FEMALE: A DIAGNOSTIC AND THERAPEUTIC CHALLENGE

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Background: Primary Central Nervous System Lymphoma (PCNSL) in immunocompetent patients generally manifests as a mass with homogeneous contrast enhancement. However, 10-15% of cases show atypical features such as central necrosis and ring enhancement resembling glioblastoma multiforme (GBM). This radiological mimicry phenomenon poses a diagnostic challenge because the surgical management of these two entities is very different.

Case Presentation: A 56-year-old woman arrived at the emergency department with decreased consciousness and progressive chronic weakness of the right limbs. Head MRI shows a lobulated mass (6.6x7.0x5.6 cm) in the left frontal lobe extending to the basal ganglia with extensive central necrosis and irregular ring enhancement, findings that lead to a working diagnosis of high-grade glioma. The patient then underwent a tumor removal craniotomy. Postoperative histopathology showed atypical lymphoid cells with an angiocentric pattern, consistent with diffuse large B-cell lymphoma. Postoperatively, the clinical condition improved and the therapy was switched from the glioma protocol to high-dose methotrexate-based chemotherapy.

Discussion: This case highlights the diagnostic challenges of necrotic PCNSL. Unlike GBM, which requires maximal safe resection, PCNSL is diffusely infiltrative, where extensive resection does not improve survival and instead poses a risk of adding neurological deficits. Intraoperative frozen section examination is crucial to differentiate glioma from lymphoma to prevent unnecessary resection. Delaying pre-biopsy steroids is also vital to prevent the vanishing tumor phenomenon that obscures the diagnosis.

Conclusion: Clinicians should maintain a high index of suspicion for PCNSL in necrotic intracranial masses involving deep structures. The use of intraoperative frozen section is highly recommended to ensure diagnostic accuracy and appropriate therapy selection.

Keywords: primary CNS lymphoma, glioblastoma mimicry, immunocompetent, frozen section

PEDIATRIC MEDULLOBLASTOMA PRESENTING WITH ACUTE HYDROCEPHALUS IN LATE CHILDHOOD: A CASE REPORT

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Background: Medulloblastoma is a malignant embryonal tumor of the central nervous system that commonly occurs in children and is typically

located in the posterior fossa. This tumor may cause acute obstructive hydrocephalus due to obstruction of cerebrospinal fluid (CSF) flow, constituting a neurological emergency.

Case Presentation: A 14 year 7 month old boy presented to the Emergency Department with decreased level of consciousness. Two weeks earlier, the patient experienced recurrent vomiting, diplopia, and several episodes of syncope. He also reported a two-month history of progressively worsening headache. Physical examination revealed a Glasgow Coma Scale (GCS) score of E3M4V4 with stable vital signs. Neurological examination demonstrated sixth cranial nerve (CN VI) palsy. Contrast-enhanced head computed tomography (CT) revealed a posterior fossa tumor consistent with medulloblastoma accompanied by obstructive hydrocephalus at the level of the fourth ventricle. An emergent ventriculoperitoneal (VP) shunt was placed for intracranial pressure stabilization. The patient showed significant clinical improvement following VP shunt insertion.

Discussion: Medulloblastoma represents approximately 15–20% of all intracranial tumors in children and shows a male predominance, with a male-to-female ratio of approximately 1.5–2:1. Although it most commonly affects younger children, presentation in late childhood is less common. Medulloblastoma commonly leads to obstructive hydrocephalus due to blockage of the fourth ventricle. Acute obstructive hydrocephalus represents a neurological emergency caused by elevated intracranial pressure and carries a high risk of brainstem herniation.

Conclusion: Medulloblastoma is a malignant pediatric tumor that commonly presents with acute obstructive hydrocephalus and increased intracranial pressure. Rapid neurological deterioration may occur if the condition is not promptly recognized. This case highlights that early diagnosis, timely neuroimaging, and urgent cerebrospinal fluid drainage are critical to prevent life-threatening brainstem herniation and to optimize clinical outcomes.

Keywords: Pediatric medulloblastoma, Acute hydrocephalus, Late childhood, Ventriculoperitoneal shunt

PERSISTEN TRIGEMINAL NEURALGIA SECONDARY TO A CEREBELLOPONTINE ANGLE MASS SUGGESTIVE OF VESTIBULAR SCHWANNOMA: A CASE REPORT

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Background: Secondary trigeminal neuralgia due to lesions in the cerebellopontine angle (CPA) is uncommon. Although Vestibular Schwannoma is the most frequent CPA tumor, presentation with persistent trigeminal neuralgia in the absence of significant auditory symptoms is atypical. This report aims to describe a unique case of CPA mass suggestive of vestibular schwannoma presenting predominantly as refractory facial pain, and to systematically review similar reported cases to clarify pathophysiology and management options.

Case Illustration: A 41-year-old woman presented with a one-year history of right-sided paroxysmal facial pain consistent with trigeminal neuralgia. Neurological examination revealed mild right peripheral-type facial nerve paresis, with paresthesia in the trigeminal nerve branches of V1, V2, and V3. Contrast-enhanced brain MRI demonstrated a CPA mass suggestive of vestibular schwannoma compressing the right cerebellar hemisphere, pons, and the right cisternal portion of the trigeminal nerve. The diagnosis of secondary trigeminal neuralgia was established, and the patient were scheduled for elective craniectomy for tumor removal.

Discussion: This case is notable for the predominance of typical Trigeminal Neuralgia without significant audiovestibular deficits. Analysis of the ten included case reports indicates that vestibular schwannoma may mimic primary trigeminal neuralgia through direct compression of the trigeminal nerve root entry zone or secondary neurovascular mechanisms and frequently may lead to misdiagnosis as odontogenic or temporomandibular disorders, delaying definitive management. This case reinforces the importance of early neuroimaging in atypical or refractory trigeminal neuralgia to exclude structural CPA lesions and guide timely surgical intervention.

Conclusion: Accurate diagnosis of secondary trigeminal neuralgia caused by intracranial masses, particularly vestibular schwannoma, remains a clinical challenge with significant implications for management strategy and functional prognosis.

Keywords: cerebellopontine angle, trigeminal neuralgia, vestibular schwannoma

PROGRESSIVE CENTRAL VERTIGO AS THE INITIAL MANIFESTATION OF SPORADIC CEREBELLAR HEMANGIOBLASTOMA: A RARE CASE REPORT WITH FAVORABLE OUTCOME

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Background: Hemangioblastomas are rare, highly vascularized neoplasms of the (CNS WHO grade I), accounting for approximately 1.5–2.5% of all intracranial tumors and up to 7–12% of posterior fossa tumors in adults. When presenting primarily as central vertigo, they may mimic peripheral vestibular disorders, making accurate differentiation essential to prevent misdiagnosis and delayed treatment.

Case Presentation: A 45-year-old man presented with one month of progressive vertigo. Neurological examination demonstrated bidirectional nystagmus, positive test of skew, negative head impulse test, wide-based gait, and a positive Romberg test with a rightward falling tendency. Contrast-enhanced head CT revealed a solitary solid-cystic intra-axial lesion in the right cerebellar hemisphere with avid contrast enhancement, causing non-communicating hydrocephalus. The patient underwent suboccipital craniotomy with complete tumor resection. Histopathological examination confirmed hemangioblastoma (CNS WHO grade I). One-month postoperative gadolinium-enhanced brain showed satisfactory resection. Clinically, vertigo and balance improved markedly at four-week follow-up.

Discussion: Cerebellar hemangioblastoma may manifest predominantly as progressive central vertigo and gait instability, initially resembling peripheral vestibulopathy. In this case, structured neurological examination, including the HINTS protocol, was crucial in identifying a central etiology. Early surgical resection resulted in favorable neurological outcomes and rapid symptomatic improvement.

Conclusion: Cerebellar hemangioblastoma should be considered in patients presenting with progressive central vertigo and gait instability, even in the absence of early focal deficits. Systematic clinical evaluation combined with appropriate neuroimaging enables timely diagnosis with favorable outcomes.

Keywords: Central vertigo, Cerebellar hemangioblastoma, Posterior fossa tumor

PRIMARY INTRAOSSEOUS OSTEOLYTIC MENINGIOMA MIMICKING SKULL OSTEOSARCOMA: A RARE CASE REPORT

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Background: Primary intraosseous meningioma is a rare extradural tumour. These tumours typically grow slowly, are painless, and with no symptoms. Their definition is often confused with intracranial non-dural meningiomas or another type of tumour. In this report, we describe a case of primary intraosseous meningioma (PIM) in the calvaria and explore the potential correlation between pathological classification and imaging features. Our aim is to enhance understanding of PIM and improve preoperative diagnosis.

Case Illustrations: A 47-year-old woman presented with a painless mass on the left side of her head, which began approximately 6 months ago and has gradually increased in size. A contrast-enhanced computed tomography (CT) scan of the head revealed a periosteal reaction, which

damaged the bone structure and showed contrast enhancement, calcification, and heterogeneity associated with a malignant neoplasm. These findings are consistent with calvarial metastasis or primary osteosarcoma. The patient underwent craniectomy and tumour resection. Postoperatively, neurological status was normal, and Patient was discharged with no symptoms. Pathological examination classified the case as an atypical meningioma (WHO grade II).

Case Discussion: Primary intraosseous meningioma presenting with osteolytic skull lesion and soft-tissue component is rare case. CT with contrast imaging of a patient with frontal scalp swelling showed an osteolytic intracalvarial lesion with an extradural soft-tissue component. Following wide surgical resection, the histological revealed an intraosseous atypical meningioma with eosinophilic vacuolated tumor cells on a myxoid background, Mitosis activity is very high. The tumor grows infiltratively between connective tissue and bone tissue.

Conclusion: PIM is a rare but important differential diagnosis for osteosclerotic lesions of the skull, especially in women. PIM mimicking osteosarcoma and metastatic masses should also be considered in the differential diagnosis of masses in the calvarial bone.

Keywords: Primary Intraosseous Meningioma, Atypical Meningioma, rare extradural tumor

RELAPSE SINONASAL RHABDOMYOSARCOMA PRESENTING AS INTRACRANIAL INFILTRATION VERSUS LEPTOMENINGEAL METASTASIS

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Background: Parameningeal sinonasal rhabdomyosarcoma (RMS) carries an increased risk of central nervous system involvement due to proximity to the skull base. While direct intracranial extension is well recognized, true leptomeningeal metastasis (LM) is rare and represents dissemination within the cerebrospinal fluid (CSF) compartment. Distinguishing direct invasion from neuraxial dissemination has important diagnostic and therapeutic implications.

Case Presentation: An 18-year-old male with previously treated parameningeal embryonal RMS achieved complete radiological response after chemotherapy and intensity-modulated radiotherapy. Six months later, he developed progressive paraparesis followed by multiple cranial neuropathies. Contrast-enhanced MRI showed recurrent ethmoidal tumor infiltrating the bilateral frontal lobes with perifocal edema, multifocal intracranial nodular enhancement, and cervical intradural extramedullary lesions. Systemic evaluation revealed no distant metastasis. CSF cytology was not performed. Nevertheless, multifocal leptomeningeal enhancement and cervical intradural extramedullary lesions fulfilled radiological criteria for probable LM.

Discussion: Clinicoradiological findings support two distinct mechanisms rather than a single process. Paraparesis preceded cranial neuropathies, indicating early spinal neuraxis involvement before intracranial progression. Imaging demonstrated cervical intradural extramedullary lesions alongside frontal lobe infiltration. Direct dural invasion explains focal intracranial disease and cranial neuropathies, whereas multifocal spinal intradural lesions remote from the primary site suggest CSF dissemination following breach of the arachnoid- CSF barrier. Early relapse (<12 months) indicates aggressive tumor biology and possible subclinical CSF spread before remission. Therapeutic decisions are complex, as relapse regimens prioritize systemic control with limited CSF penetration, and radiotherapy is restricted by prior dose. Second-line gemcitabine-docetaxel was planned, with CNS activity potentially dependent on disease-related barrier disruption.

Conclusion: In relapsed parameningeal RMS, new multifocal neurological deficits should prompt evaluation for both intracranial infiltration and LM. Recognizing their coexistence is crucial, as LM confers distinct prognostic and therapeutic implications.

Keywords: Rhabdomyosarcoma, Parameningeal tumor, Intracranial infiltration, Leptomeningeal metastasis

SUCCESSFUL RESECTION AFTER TWO FAILED SURGERIES: THE ROLE OF PREOPERATIVE EMBOLIZATION IN HYPERVASCULAR MENINGIOMA

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Background: Meningioma is a common primary intracranial tumor typically managed with surgical resection. In hypervascular cases, intraoperative bleeding can limit resection and increase perioperative morbidity. Although preoperative embolization reduces tumor vascularity, its role after recurrent resection failure is rarely reported.

Case Presentation: A 39-year-old woman with a history of three resections for left frontotemporal meningioma presented with progressive headache and visual disturbance. MRI showed a large extra-axial lesion with significant mass effect and midline shift. Preoperative DSA revealed a highly vascular tumor. Selective embolization of feeders from the external carotid artery achieved near-total reduction of tumor blush while preserving internal carotid artery patency. The patient then underwent definitive surgical resection at the previously operated site, with stable postoperative neurological outcomes and no major complications.

Discussion: This case underscores preoperative embolization as a salvage strategy in hypervascular meningiomas after failed resections. By reducing tumor perfusion, embolization enhances surgical safety, decreases intraoperative blood loss, facilitates tumor removal, and increases the likelihood of total resection. Careful vascular mapping and multidisciplinary collaboration are essential for successful outcomes.

Conclusion: Preoperative embolization is a promising adjunct in the management of highly vascular meningiomas. Targeted devascularization guided by precise angiography can reduce surgical risk, improve intraoperative safety, and support successful resection while maintaining critical intracranial circulation.

Keywords: Meningioma surgical failure, Preoperative embolization, Highly vascular meningioma

THE FINE LINE BETWEEN SECONDARY HEADACHE AND CANCER PAIN IN BRAIN TUMOR: CLINICAL APPROACH AND MANAGEMENT

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Background: Cerebellopontine angle (CPA) tumors account for approximately 5–10% of all intracranial tumors, while chondrosarcoma is rarer entity (<1%). Chondrosarcoma is invasive malignant bone neoplasm, causing destruction of skull base and compression of surrounding neurovascular structures. One of main clinical manifestations of CPA tumors is headache that must be differentiated between secondary headache or cancer pain.

Case Presentation: a 65-year-old man with progressive left-sided headache accompanied by left-sided hearing loss, paresis of 7th and 12th cranial nerves, left facial hemihypesthesia and cerebellar symptoms. Head CT scan and MRI revealed lytic lesion with chondroid calcification in left petroclival region, compressing the brainstem and CPA structures, consistent with diagnosis of chondrosarcoma. The tumor was inoperable therefore underwent stereotactic radiotherapy for tumor control. He developed severe mixed-type pain in the left sided of head characterized by sharp pain, numbness and burning with numeric rating scale 8. Blood pressure is normal. The headache only improved slightly after given a high dose of dexamethasone. After re-examination, the headache was assessed as cancer pain and improved after treated with intravenous opioid.

Discussion: Headache in CPA tumor can arise through different mechanisms including secondary headache due to indirect processes such as increased intracranial pressure or cancer pain due to direct mechanisms such as tumor infiltration of the cranial nerves, bone destruction and nociceptor activation. It is important to know the cause of the headache, because the medications for each are different. Chondrosarcoma can infiltrate skull base and cranial nerves caused cancer pain, so headache in this case must be treated with intravenous opioid and adjuvants.

Conclusion: Chondrosarcoma of CPA may present with overlapping headache mechanisms that blur the distinction between secondary headache and cancer pain. Early recognition can help improving quality of life in patient with inoperable skull base tumors.

Keywords: Chondrosarcoma, CPA tumor, Secondary headache, Cancer pain

TRACTOGRAPHY AND NEUROCOGNITIVE CLUES UNMASK GRADE III OLIGODENDROGLIOMA MIMICKING LOW-GRADE GLIOMA

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Background: Distinguishing low- from high-grade glioma is challenging when symptoms are indolent and conventional MRI lacks overt aggressive features; network-based assessment (targeted neurocognitive testing plus tractography) may reveal occult white-matter involvement.

Case Presentation: A 29-year-old man presented with recurrent seizures (1.5-year evolution) and chronic headaches. MRI showed a large left frontal lesion with calcification, minimal enhancement, and disproportionately mild mass effect, raising suspicion for low-grade glioma. Neuropsychological testing revealed mild executive and phonemic fluency slowing; EEG showed left frontotemporal slowing. Tractography demonstrated frontal aslant tract displacement with partial disruption, superior longitudinal fasciculus displacement with anterior infiltration, and arcuate fasciculus displacement. Resection confirmed anaplastic oligodendroglioma (CNS WHO grade 3) with IDH mutation, 1p/19q codeletion, and MGMT methylation. He completed concurrent chemoradiotherapy and is on adjuvant temozolomide, remaining seizure-free with cognition unchanged from baseline.

Discussion: This case highlights clinico-radiologic–molecular discordance in which a WHO grade 3 oligodendroglioma mimicked low-grade behavior, including minimal mass effect despite large tumor burden. In infiltrative gliomas, tumor margins may be difficult to distinguish from normal brain, making maximal safe resection challenging. Tractography provided critical anatomic context in the left frontal region, delineating at-risk white-matter pathways and aligning with subtle executive–fluency impairment (“network phenotype”), thereby supporting timely definitive diagnosis and cognition-preserving multimodal management.

Conclusion: In young adults with frontal tumors that appear and behave like low-grade glioma, early neurocognitive testing plus tractography can help detect higher-grade network involvement and reduce the risk of undertreatment while prioritizing long-term function.

Keywords: tractography, executive dysfunction, oligodendroglioma, low-grade mimic

NEUROONKOLOGI, NEUROUTERVENSI, NEUROVASKULER

ENDOVASCULAR EMBOLIZATION OF GLOMUS JUGULARE TUMOR IN MINIMIZING INTRAOPERATIVE BLEEDING RISK

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Background: Jugular paraganglioma, or glomus jugulare tumor, is a rare skull base neoplasm accounting for only 0.03% of all systemic neoplasms with a marked female predilection (ratio 3–6:1). Although histopathologically benign, its extreme vascular density and extensive systemic collateralization pose significant technical hurdles during resection due to the risk of massive hemorrhage. This case report evaluates the effectiveness of endovascular embolization in modifying tumor hemodynamic to enhance surgical safety.

Case Presentation: A 44-year-old female presented with pulsatile tinnitus, progressive hearing loss and right-sided otorrhea for two months. Neuroimaging confirmed a hypervascular mass eroding the jugular foramen and invading the tympanic cavity and petrous bone. Digital Subtraction Angiography (DSA) identified a complex neovascular network from various branches of the right External Carotid Artery (ECA). Superselective embolization was performed using liquid embolic agents to occlude the feeder arteries of the inferior tympanic, petrous, and anterior auricular branches, achieving significant reduction in tumor blush without new neurological deficits. Surgical resection was performed 24 hours post-embolization, with controlled intraoperative blood loss of 200–250 ml. Post-operatively, the patient showed excellent clinical response with no signs of neurological deficits or new cranial nerve palsies.

Discussion: The focus of this case is how preoperative hemodynamic modification facilitates maximum tumor resection while achieving cranial nerve preservation. The 24-hour interval post-embolization provides optimal ischemia and mass stabilization before extirpation. Although anatomical challenges such as tortuous vessels left minimum residual vascular supply, the procedure successfully transformed a high-risk hypervascular lesion into a stable mass safer for surgical manipulation.

Conclusion: Preoperative endovascular intervention is a crucial procedure in the multidisciplinary management of hypervascular skull base tumors. Precise vascular mapping and optimal surgical timing effectively reduce bleeding risks and maintain the integrity of cranial nerve functions.

Keywords: Glomus Jugulare, Preoperative Embolization, Endovascular Intervention, Paraganglioma, Intraoperative Bleeding

NEUROONKOLOGI, NEUROTRAUMA, NEUROFISIOLOGI

NEUROGENIC SYMPATHETIC SENSITIZATION AND PROPRIOCEPTIVE DISSOCIATION FOLLOWING ACCF: CASE REPORT OF POSTOPERATIVE AUTONOMIC DYSREGULATION

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Background: Anterior Cervical Corpectomy and Fusion (ACCF) is a standard procedure for multi-level cervical myelopathy and spinal instability. While aimed at decompression, extensive surgical manipulation in the high cervical region (C2–C6) can trigger rare autonomic dysregulation. This case highlights postoperative neurogenic sympathetic sensitization and proprioceptive dissociation following extensive spine surgery.

Case Presentation: A 55-year-old female presented with chronic progressive tetraparesis and a Spinal Instability Neoplastic Score (SINS) of 11. She underwent a multi-level ACCF (C2–C6). Postoperatively, the

patient developed worsened tetraparesis and profound proprioceptive dissociation, characterized by a persistent sensation of "falling" despite immobility. This was accompanied by severe insomnia and palpitations. Clinical monitoring showed a progressive daily increase in sympathetic activity, including persistent tachycardia, tachypnea, and hypertension. Objective autonomic signs included generalized hyperhidrosis and isochoric pupillary midriasis with sluggish light reflexes.

Discussion: The constellation of tachycardia, hyperhidrosis, and midriasis without emotional triggers suggests a neurogenic origin rather than primary anxiety. The surgical proximity to the cervical sympathetic chain and disruption of descending inhibitory pathways likely induced "sympathetic storming." Furthermore, the falling sensation indicates dorsal column-medial lemniscus pathway disruption, where lost afferent input exacerbates autonomic stress through central sensitization feedback loops.

Conclusion: Neurogenic sympathetic sensitization is a significant complication of Anterior Cervical Corpectomy and Fusion (ACCF) that mimics acute anxiety but requires distinct management. Objective markers, specifically midriasis, hyperhidrosis, and proprioceptive distortion are crucial for diagnosis. Early recognition is vital to prevent cardiovascular complications and initiate appropriate neuromodulatory therapy.

Keywords: ACCF, Sympathetic Sensitization, Proprioceptive Dissociation, Autonomic Dysregulation, Midriasis

NEURODEGENERATIF

SUSPECTED PROGRESSIVE SUPRANUCLEAR PALSY PRESENTING AS PARKINSONISM: A CASE REPORT

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Background: Progressive supranuclear Palsy (PSP) is a rare 4-repeat tauopathy and belongs to the spectrum of atypical Parkinsonian syndromes with heterogeneous clinical manifestations. Its early symptoms often resemble idiopathic Parkinson's disease, leading to delays in establishing the diagnosis.

Case: A 62-year-old man with balance impairment for four years and a history of recurrent backward falls. Neurological examination revealed slight right hemiparesis, spasticity, minimal tremor, bilateral N.VI palsy, downward gaze palsy, left central N. VII palsy, right central N.VII palsy, N. IX-X palsy, dysarthria, dysphagia, right-dominant limb ataxia, and mild dysidiadochokinesia. Brain MRI demonstrated midbrain atrophy with a hummingbird sign. Brain MRI-MRA-MRV showed no evidence of acute or chronic infarction, hemorrhage, or significant vascular stenosis. Laboratory examination and transcranial Doppler were within normal limits.

Discussion: Progressive supranuclear palsy (PSP) is a neurodegenerative disorder that is frequently misdiagnosed because its early phase may mimic Parkinson's disease. Symptoms such as bradykinesia, rigidity, and gait disturbance often lead to an initial diagnosis of Parkinson's disease before the characteristic features of PSP emerge with disease progression. Oculomotor dysfunction, particularly downward gaze palsy, is a hallmark clinical feature of PSP. PSP is characterized by axial rigidity involving the neck, back, and trunk, resulting in hyperextension and a tendency to fall backward. In contrast, Parkinson's disease typically presents with rigidity predominantly affecting the limbs and a stooped, forward-flexed posture.

Conclusion: This case highlights that progressive supranuclear palsy is a rare neurodegenerative disorder that may resemble Parkinson's disease in its early stage. Early recognition of recurrent backward falls, supranuclear vertical gaze palsy, and confirmation of midbrain atrophy on MRI are crucial for establishing an accurate diagnosis and avoiding delays in appropriate management

Keywords: Progressive supranuclear palsy, balance impairment, Parkinsonism, neurodegenerative disorder

NEUROREHABILITASI

COMPARATIVE SHORT- AND LONG-TERM EFFICACY OF NEUROSTIMULATION MODALITIES FOR ALZHEIMER'S DISEASE: A SYSTEMATIC REVIEW AND NETWORK META-ANALYSIS

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Background: Ischemic stroke is a major cause of cognitive impairment, affecting memory, attention, executive function, and visuospatial, which significantly influence quality of life and rehabilitation outcomes. Transcranial Direct Current Stimulation (tDCS) is a non-invasive neuromodulation technique that modulates neuronal excitability in cortical areas. The dorsolateral prefrontal cortex (DLPFC), a key region in cognitive network, is a commonly targeted stimulation site. Quantitative Electroencephalography (qEEG) demonstrates increased slow-wave and decreased fast-wave activity following stroke. Delta Alpha Ratio (DAR) is considered a biomarker of post-stroke cognitive impairment, where higher DAR values correlate with poorer cognitive function.

Objective: To evaluate the effect of tDCS on cognitive function assessed by Indonesian version of Montreal Cognitive Assessment (MoCA-INA) and neurophysiological changes measured by Delta Alpha Ratio (DAR) in ischemic stroke patients with cognitive impairment.

Methods: This experimental study used a pre-test and post-test design conducted from December to January 2026. The subjects were 10 patients with first attack ischemic stroke (≤ 6 months onset) aged 18–68 years who met the inclusion and exclusion criteria. Cognitive function was assessed using MoCA-INA, and brain activity was measured using DAR from qEEG. tDCS was delivered at 2 miliampere (mA) for 20 minutes per session, totaling 10 sessions over two weeks, with the anode placed over the left DLPFC (F3) and the cathode over the right DLPFC (F4). Statistical analyses included Wilcoxon and paired t-tests.

Results: The mean MoCA-INA score increased significantly from 20.70 to 26.50 ($p = 0.005$). Significant improvements were observed in visuospatial/executive ($p = 0.033$), delayed recall ($p = 0.007$), and orientation domains ($p = 0.038$). The mean DAR decreased significantly from 1.40 to 0.92 ($p = 0.005$).

Conclusion: tDCS significantly improved cognitive performance and reduced DAR in ischemic stroke patients with cognitive impairment, suggesting its potential as an adjunctive therapy for cognitive rehabilitation.

THE EFFECT OF rTMS ON COGNITIVE FUNCTION IMPROVEMENT IN POST-ISCHEMIC STROKE PATIENTS

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Background: Ischemic stroke is a leading cause of disability in neurology. One common form of disability resulting from it is cognitive impairment. In addition to conventional rehabilitation, repetitive Transcranial Magnetic Stimulation (rTMS) has emerged as a non-invasive therapeutic modality with the potential to improve cognitive function through neuromodulation mechanisms. Evaluating changes in cognitive function following rTMS therapy using the Indonesian version of the Montreal Cognitive Assessment (MoCA-INA) is important for assessing the therapeutic response to rTMS.

Objective: To assess the effect of rTMS on cognitive impairment (based on the MoCA-INA score) before and after rTMS therapy in post-ischemic stroke patients.

Methods: This is an observational study with a cross-sectional design involving post-ischemic stroke patients who underwent rTMS therapy. Samples were obtained using consecutive sampling according to the inclusion criteria (stroke onset of 1–6 months) and were taken from the patient registry records of the Neurology Outpatient Clinic at M. Djamil

Hospital, Padang, for the period of August 2023 to February 2026. Cognitive impairment was assessed using the MoCA-INA before and after rTMS. The analysis of improvement in cognitive impairment was performed using the Friedman test.

Results: Before rTMS therapy, the distribution of cognitive impairment was dominated by mild impairment (59.4%), followed by moderate-to-severe impairment (40.6%). After rTMS therapy, 43.8% of the samples fell into the normal category, mild impairment decreased to 31.3%, and moderate-to-severe impairment decreased to 25%. The mean MoCA-INA score before rTMS was 18.52 ± 5.22 . The mean MoCA-INA score after rTMS was 21.91 ± 5.97 ; this value increased by 3.39 points, which was statistically significant with a p-value of < 0.001 .

Conclusion: An improvement in cognitive function was found in post-ischemic stroke patients following rTMS therapy at the Neurology Clinic of M. Djamil Hospital in Padang.

Keywords: cognitive, MoCA-INA, rTMS, ischemic stroke

NEUROREHABILITASI, NEURORESTORASI

MULTILEVEL NEUROMODULATION IN POST-STROKE DYSPHAGIA: COMBINED TMS WITH NMT AND QEEG CORRELATES

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Background: Post-stroke dysphagia (PSD) is associated with disruption of corticobulbar and distributed swallowing networks, contributing to morbidity and prolonged disability. Repetitive transcranial magnetic stimulation (rTMS) and intermittent theta burst stimulation (iTBS) have demonstrated efficacy in improving swallowing outcomes in randomized trials and meta-analyses through modulation of cortical excitability and interhemispheric balance. Peripheral sensory facilitation may further enhance neuroplasticity via bottom-up mechanisms within the same sensorimotor network.

Case Presentation: A 74-year-old male developed PSD following right intracerebral hemorrhage involving the corona radiata and thalamus on 7 April 2025 (NIHSS 20). Dysphagia was present at onset (GUSS 12) and partially improved by three months (GUSS 16) but remained functionally limiting. In July 2025, iTBS was initiated as primary neuromodulatory therapy and delivered to left M1, right M2, and right dorsolateral prefrontal cortex (600 pulses/session, 100% resting motor threshold) for 20 sessions over two months. Infra-hyoid neuromuscular taping (no tension) was applied adjunctively in four cycles. No conventional swallowing therapy or medication changes occurred. Following completion, swallowing function improved further (GUSS 16 → 19), enabling progression to semi-solid intake and sustained oral feeding.

Discussion: Baseline quantitative EEG demonstrated increased occipital delta (left-dominant), elevated left frontocentral theta, and excessive temporoparietal beta/high-beta activity, consistent with altered cortical dynamics in PSD. Follow-up QEEG showed relative normalization trends temporally associated with late-phase functional gain. Although spontaneous recovery contributed to early improvement, additional improvement during the intervention period alongside electrophysiological modulation aligns with evidence that cortical stimulation facilitates network-level reorganization in swallowing control.

Conclusion: iTBS-based TMS with adjunctive infra-hyoid taping was associated with late-phase functional improvement in persistent PSD accompanied by QEEG modulation. These findings support further controlled neuromodulation studies integrating electrophysiological biomarkers.

Keywords: Post stroke dysphagia, Transcranial Magnetic Stimulation, Neuro Muscular Tapping, Case report

NEUROTRAUMA

A DEADLY MIMIC: SEVERE HYPERCAPNIA PRESENTING AS TYPE II DECOMPRESSION SICKNESS AFTER COMPRESSOR DIVING

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Background: Decompression sickness (DCS) is a key diagnosis in post-dive emergencies. However, in compressor-assisted diving, Carbon Dioxide (CO₂) exposure or CO₂ retention may cause severe hypercapnia with neurological and respiratory manifestations that can mimic type II DCS.

Case Presentation: A 26-year-old man presented to the emergency department with acute dyspnea several hours after a 3-hour compressor dive to an estimated depth of 15 meters. Symptoms were accompanied by muscle twitching. Upon arrival, the patient was compos mentis (GCS 15) with no focal neurological deficits and had tachypnea (Respiratory Rate 30x/min), severe hypoxemia (SpO₂ 76% on room air improving to 97% on a non-rebreathing mask at 15 L/min), and tachycardia (Heart Rate 157x/min). Physical examination revealed diffuse reddish-blue discoloration of all extremities. Chest radiography demonstrated pulmonary edema. Suspected type II DCS was diagnosed and hyperbaric oxygen therapy (HBOT) was planned. However, before initiation he developed a generalized seizure lasting approximately 30 seconds, followed by sudden coma (GCS 3) and cardiac arrest, leading to death.

Discussion: Severe hypercapnia caused by CO₂ poisoning in compressor diving can mimic type II DCS and present with acute neurological and cardiopulmonary manifestations. In this case, early predominant hypoxemia with pulmonary edema and cyanosis, followed by fasciculations and abrupt seizure-coma without preceding focal deficits, was more consistent with severe hypercapnia than with classic neurological DCS. Elevated CO₂ induces hypercapnic hypoxia and cerebral vasodilation, increasing neuronal excitability, which may rapidly progress to seizures and coma. Misdiagnosis may be fatal because high-concentration oxygen is routinely administered for suspected DCS, whereas in severe hypercapnia, it may worsen neurological deterioration and confound clinical assessment.

Conclusion: In compressor divers with acute neurological deterioration (seizure or coma) and respiratory failure, severe hypercapnia should be prioritized as a major differential diagnosis that can mimic type II DCS.

Keywords: Decompression sickness, Hypercapnia, Carbon dioxide poisoning, Compressor diving, Seizure

A RARE CASE OF SUBDURAL EMPYEMA AS A SEVERE INTRACRANIAL COMPLICATION OF MAXILLARY SINUSITIS

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Background: Maxillary sinusitis is generally a mild infection responsive to conservative treatment. However, in certain cases, the infection may spread intracranially and lead to severe complications such as subdural empyema. This condition represents a neurological emergency that can rapidly progress to seizures, decreased consciousness, and neurological deterioration, with significant morbidity and mortality if not promptly managed.

Case Presentation: A 34-year-old male was referred with progressive decreased level of consciousness. Seven days before referral, he experienced foul-smelling greenish discharge from the right nostril, followed four days later by headache and high-grade fever. His condition worsened with incoherent speech and two episodes of generalized tonic-clonic seizures lasting less than five minutes, with a 30-minute interictal interval. Persistent decreased consciousness followed for two days. On examination, the Glasgow Coma Scale was E3V5M6 with stable vital

signs. Neurological assessment revealed positive neck stiffness without cranial nerve deficits. Motor strength was 5/5 bilaterally, deep tendon reflexes were +2 and symmetrical, and pathological reflexes were absent. Laboratory findings showed leukocytosis ($13,290/\text{mm}^3$), thrombocytosis ($521,000/\text{mm}^3$), neutrophilia (77.6%), lymphopenia (14.2%), an elevated neutrophil-to-lymphocyte ratio (5.46), and mild anemia. The patient was diagnosed with symptomatic epilepsy secondary to suspected right frontoparietotemporal subdural empyema originating from right maxillary sinusitis. Treatment included intravenous broad-spectrum antibiotics, anticonvulsants, corticosteroids, and multidisciplinary supportive care.

Discussion: Subdural empyema is a rare and life-threatening intracranial complication of sinusitis. The combination of sinus infection, fever, headache, neck stiffness, and seizures should raise suspicion for intracranial spread. Early recognition and prompt intervention are essential to prevent neurological deterioration.

Conclusion: Sinusitis may progress to severe intracranial complications. High clinical vigilance and aggressive management are crucial to improve outcomes in patients presenting with progressive neurological symptoms.

Keywords: Subdural Empyema, Maxillary Sinusitis, Intracranial Infection, Seizures, Altered Consciousness

COILING IN HIGH-FLOW CAROTID CAVERNOUS FISTULA RELAPSES AFTER HEAD TRAUMA: A RARE CASE

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Background: Carotid Cavernous Fistula (CCF) is an abnormal connection between the cavernous sinus and the internal carotid artery. CCF is a rare condition and is closely associated with head trauma. The global prevalence is 0.37/100,000 people/year, with 70–75% occurring due to head trauma and 25–30% spontaneously due to vascular abnormalities such as aneurysms. RSCM recorded 44 cases between 2014 and 2021, 95% of which were due to head trauma. This report emphasizes the importance of comprehensive diagnosis and management of CCF following head trauma.

Case Presentation: This article reports on a 27-year-old male with pain around the left eye, redness, protrusion, decreased sharpness of vision in the left eye, and headache following head trauma. Physical examination revealed NPRS 6–7, VOS 6/60, scleral injection, conjunctival injection, chemosis, and proptosis of the left eye. DSA examination showed high-flow CCF in the LICA. Based on the medical history, physical examination, and supporting tests, the diagnosis of high-flow CCF relapse was supported. Serial coiling was performed; after the first procedure, NPRS improved to 2–3, and the frequency of pain decreased. The second procedure showed improved blood flow to the left MCA and ACA. These results align with the therapeutic goals of fistula occlusion and improved ICA blood flow.

Discussion: The patient's orbital symptoms and post-traumatic headache are consistent with high-flow CCF, which may cause orbital venous congestion and cerebral perfusion impairment due to the steal phenomenon. Coiling is a treatment option aimed at fistula occlusion and restoration of ICA blood flow. This patient underwent serial coiling according to the RSMS service standards.

Conclusion: This case underscores the importance of diagnosing CCF in head trauma patients with dominant orbital symptoms and highlights the role of coiling as a primary treatment for high-flow CCF.

Keywords: Carotid Cavernous Fistula, Periorbital Pain, Occlusion, Head Trauma, Coiling

DIAGNOSTIC CHALLENGES IN FALX INTERHEMISPHERIC SUBDURAL HEMATOMA POST TRAUMATIC BRAIN INJURY: A CASE REPORT

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Background: Falx Interhemispheric Subdural Hematoma (FISH) is a rare subtype of subdural hematoma that occurs between the cerebral hemispheres along with falx cerebri. FISH are poorly characterized clinically and their exact incidence is unknown. It represents less than 0.5% of all subdural hematomas and is frequently misdiagnosed due to its rarity and nonspecific clinical presentation.

Case Illustrations: We present a case of 54-year-old male presenting headache following a head injury sustained from car accident. The patient experienced presyncope, nausea and dizziness. A noncontrast computed tomography (CT) scan of the head revealed FISH. On fourteen day after the trauma we managed conservatively with mannitol therapy without surgical intervention. Twelve hours after start mannitol therapy the patient showed marked improvement of the neurologic deficit. One month after the trauma, he showed no neurological deficits.

Case Discussion: Although rare, this case report highlights the importance of considering FISH in the differential diagnosis of patients presenting with headache, dizziness, and presyncope, particularly in the setting of minor head trauma.

Conclusion: This case report underlines the importance of maintaining a high index of suspicion for Falx Interhemispheric Subdural Hematoma (FISH) in patients presenting with nonspecific neurological symptoms such as headache, dizziness, and presyncope, particularly following minor head trauma. Timely identification and appropriate conservative management can lead to positive outcomes, as demonstrated in our case.

Keywords: Falx Interhemispheric Subdural Hematoma, traumatic brain injury, headache

GOOD CLINICAL OUTCOMES IN TRAUMATIC EDH WITH AMNESIA WITHOUT OPERATIVE MANAGEMENT: A CASE REPORT

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Background: Traumatic epidural hematoma (EDH) is traditionally considered a neurosurgical emergency due to the risk of rapid neurological deterioration. Surgical intervention is generally guided by established criteria, including hematoma volume, thickness, midline shift, and neurological status. However, clinical presentation does not always correlate proportionally with radiological findings, and selected patients may be managed conservatively under strict monitoring.

Case Presentation: A 29-year-old male presented with decreased level of consciousness after a motorcycle accident. Initial Glasgow Coma Scale (GCS) was 11 with symmetric, reactive pupils. Non-contrast head computed tomography revealed a small left temporal epidural hematoma (approximately 2.44 cm^3) without midline shift, accompanied by an acute-on-chronic left parietal subdural hematoma and temporal bone fracture. Despite the limited radiological burden, the patient exhibited post-traumatic amnesia and developed an early generalized seizure during hospitalization. As operative thresholds were not met, conservative management with close neurological observation, osmotherapy, and antiepileptic therapy was initiated.

Discussion: This case demonstrates a clinical–radiological dissociation, where significant neurological manifestations occurred despite a small-volume EDH without mass effect. Potential mechanisms include localized cortical compression, temporal lobe network dysfunction, and cortical irritability associated with concomitant hemorrhage. Careful integration of imaging findings with dynamic neurological assessment was essential in guiding non-operative management.

Conclusion: Small epidural hematomas may present with substantial neurological impairment despite limited radiological severity. Individualized decision-making and vigilant monitoring can result in favorable short-term outcomes under conservative management in appropriately selected patients.

Keywords: Epidural Hematoma, Traumatic Brain Injury, Post-Traumatic Amnesia, Conservative Management

INFLAMMATION-ASSOCIATED INDIRECT CAROTID CAVERNOUS FISTULA RESPONSIVE TO INTRAVENOUS METHYLPREDNISOLONE: A CASE REPORT

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Background: Carotid-cavernous fistula (CCF) is an intracranial vascular disorder characterized by an abnormal communication between the carotid arterial system and the cavernous sinus. The indirect (dural) type generally develops spontaneously and is frequently associated with hemodynamic alterations or vascular fragility. Cavernous sinus thrombosis (CST) is a serious condition that may trigger local inflammatory responses, venous congestion, and endothelial dysfunction, potentially contributing to vascular abnormalities.

Case Report: A 54-year-old female with right eye proptosis accompanied by redness, throbbing pain, and progressive visual impairment without diplopia. Ophthalmologic examination of the right eye revealed proptosis (+), visual acuity (VOD) 20/150, hyperemic conjunctiva, and delayed direct light reflex without relative afferent pupillary defect. Cranial nerve examination showed right-sided paresis of cranial nerves III, IV, and VI. Digital subtraction angiography (DSA) demonstrated an indirect low-flow arteriovenous shunt supplied by the right ascending pharyngeal artery (APA), right accessory meningeal artery (AMA), right sphenopalatine artery (SphA), draining into the cavernous sinus. The patient was treated with intravenous methylprednisolone 125 mg every 12 hours for 7 days as the main anti-inflammatory therapy. During treatment, significant clinical improvement was observed, particularly a reduction in proptosis and ocular symptoms.

Discussion: This case illustrates a low-flow indirect (dural) CCF with multiple arterial supplies from branches of both the external and internal carotid arteries without a history of trauma. DSA findings were consistent with Barrow type D classification. Corticosteroids may suppress inflammatory responses, stabilize endothelial membranes, and reduce vascular permeability and tissue edema. In this context, inflammation control may be a key factor and may reduce the need for invasive procedures such as embolization.

Conclusion: Inflammation may play an important role in development of indirect CCF secondary to CST. Early administration of high-dose corticosteroids may represent an effective therapeutic alternative in selected cases and potentially reduce the need for invasive interventions.

Keywords: carotid-cavernous fistula, cavernous sinus thrombosis, inflammation, methylprednisolone, dural arteriovenous fistula

SUCCESSFUL TRAUMATIC DIRECT CAROTID CAVERNOUS FISTULA MANAGED WITH COILING AND EXTERNAL CAROTID ARTERY COMPRESSION

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Background: Alzheimer's Disease (AD) is a neurodegenerative disorder with significant burden among older adults and limited effective treatment options. An emerging treatment modality for AD is non-invasive brain stimulation (NIBS), which has previously been evaluated on several randomized controlled trials. However, these studies are done with varying NIBS modalities and protocols, providing disorganized evidence. Previous meta-analyses have separately evaluated specific NIBS modalities and their immediate or short-term efficacy. A network meta-analysis is needed to evaluate the comparative efficacy of these different modalities, specifically in the long-term context.

Objective: Systematically review the existing literature and perform network meta-analysis to compare the efficacy of different non-invasive neurostimulation modalities in Alzheimer's Disease.

Methods: A systematic review and network meta-analysis (NMA) of randomized controlled trials was performed to evaluate the efficacy of

NIBS modalities in adults with mild to moderate AD. Literature search was performed in PubMed, Cochrane, and Scopus. Eligible studies reported the outcomes of Alzheimer's Disease Assessment Scale-Cognitive Subscale (ADAS-Cog), Mini Mental Status Examination (MMSE), or Montreal Cognitive Assessment (MoCA), at timepoints of under three months (short-term) or over three months (long-term) after stimulation. Risk of bias was assessed using the Risk of Bias-2 tool. A Bayesian network meta-analysis was conducted to estimate relative treatment effects and rank interventions using surface under the cumulative ranking curve (SUCRA). PROSPERO registration: CRD420261281745.

Results: Literature search initially retrieved 641 studies. Twenty-four studies involving 1225 participants were included in the final analysis. Fourteen studies reported the ADAS-Cog and MMSE outcomes, while five reported the MoCA outcome. NMA showed that for the outcome of ADAS-Cog, High-Frequency repetitive Transcranial Magnetic Stimulation (HFrTMS) resulted in significant improvement compared to sham stimulation in the short term (Mean Difference [MD] -3.5; 95% Credible Interval (CrI), -5.7, -1.3; SUCRA 85.3%), which persisted in the long term (MD -2.2; 95% CrI -4.6, -0.24; SUCRA 90.1%). HFrTMS also showed similar improvements in MMSE both for the short (MD 2.2; 95% CrI 0.31, 4.1; SUCRA 62.2%) and long term (MD 2.4 95% CrI 0.62, 4.2; SUCRA 63.1%). Other modalities did not show significant improvement compared to sham stimulation. Fewer studies reported the MoCA outcome and no significant difference between any NIBS modality and sham stimulation was found.

Conclusion: High-frequency rTMS improves cognition in mild to moderate Alzheimer's Disease compared to sham stimulation, with effects that persisted over three months after treatment. Fewer studies on other NIBS modalities have been published and quantitative analysis showed varying but not statistically significant improvements compared to sham stimulation. More studies are needed to evaluate and compare NIBS and conventional Alzheimer's Disease management, as well as the effects of different combination therapies.

Keywords: Alzheimer's Disease, cognitive, neurostimulation, network meta-analysis

TARGETING PATHOLOGIC VASCULAR SUPPLY IN SUBDURAL HYGROMA THROUGH MIDDLE MENINGEAL ARTERY EMBOLIZATION

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Introduction: Subdural hygroma is a recognized complication of traumatic brain injury that may lead to seizures, neurological deficits, and recurrence after treatment. Recently, middle meningeal artery (MMA) embolization has emerged as a minimally invasive therapeutic option and may serve as an alternative or adjunct to conventional surgical management.

Case Description: A 56-year-old man with congenital mutism presented with a severe progressive headache for ten days following a fall from a staircase, with worsening symptoms during the last five days. The headache was accompanied by two episodes of seizures. On examination, vital signs were stable with a Glasgow Coma Scale score of E4M6Vx. Cranial nerve examination, motor strength, and physiological reflexes were within normal limits, and no pathological reflexes were identified. Laboratory findings revealed leukocytosis (14,300/ μ L). A non-contrast head CT scan demonstrated a left frontoparietal subdural hygroma. Digital subtraction angiography was subsequently performed, followed by successful endovascular embolization of the middle meningeal artery. The procedure resulted in significant clinical improvement with resolution of seizures and progressive clinical recovery.

Discussion: The pathogenesis of subdural hygroma involves inflammatory processes and pathological angiogenesis within the neomembrane lining the subdural space, which is primarily supplied by branches of the middle meningeal artery. Persistent vascular supply to fragile neovessels may promote recurrent microhemorrhages and inflammatory mediator release, leading to cortical irritation and seizure activity. Targeting this vascular supply through middle meningeal artery embolization may interrupt this pathological cycle.

Conclusion: Middle meningeal artery embolization may represent a promising minimally invasive therapeutic strategy for subdural hygroma associated with seizures by reducing pathological vascular supply,

promoting lesion resolution, and potentially lowering the risk of recurrence.

Keywords: Subdural Hygroma, Middle Meningeal Artery Embolization, Traumatic Brain Injury, Seizures

TRAUMATIC OPTIC NEUROPATHY AND CEREBRAL SINUS VENOUS THROMBOSIS FOLLOWING HEAD TRAUMA: A RARE CASE REPORT

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Background: Traumatic Optic Neuropathy (TON) is a rare complication of head trauma, with an incidence of approximately 0.5–5% in closed craniofacial injuries. The primary mechanism involves axonal injury caused by acceleration–deceleration forces transmitted to the intracranial segment of the optic nerve. Cerebral Venous Sinus Thrombosis (CVST), including transverse sinus thrombosis, may also occur following trauma as a result of endothelial injury and activation of the coagulation cascade.

Case Presentation: A 25-year-old male was referred from the eye clinic with complaints of left monocular visual loss, which occurred after a fall from a height of 1.5 meters, resulting in left frontal-orbital impact. The patient also reported persistent throbbing headache localized to the left side of the head. On examination, the Glasgow Coma Scale (GCS) score was 15. Visual acuity was 6/6 in the Oculi Dextra (OD) and No Light Perception (NLP) in the Oculi Sinistra (OS), with a positive Relative Afferent Pupillary Defect (RAPD). Funduscopic examination was unremarkable. Hematologic and coagulation laboratory studies were within normal limits. Orbital MRI demonstrated a T2/FLAIR hyperintense lesion in the left optic nerve, consistent with post-traumatic optic neuritis. MR venography revealed left transverse sinus thrombosis with partial stenosis, which was confirmed by Digital Subtraction Angiography showing impaired venous flow in the left transverse and cavernous sinuses. Visual Evoked Potential showed no waveform in the left eye. Corticosteroid therapy was initiated 15 days after trauma, and anticoagulation therapy was started one month post-trauma. Headache symptoms improved; however, visual loss persisted.

Discussion: Acceleration–deceleration trauma may result in intracranial axonal injury of the optic nerve, accompanied by secondary edema and ischemia. The optic disc may initially appear normal on funduscopic examination because the lesion is located retrobulbar. Trauma-induced vascular injury can also precipitate venous sinus thrombosis through endothelial dysfunction and a prothrombotic state. Transverse sinus thrombosis may lead to regional venous congestion, potentially exacerbating optic nerve perfusion impairment.

Conclusion: In cases of post-traumatic optic neuropathy accompanied by persistent headache, comprehensive neuroimaging evaluation should be considered due to the possibility of concomitant venous sinus thrombosis, which may influence diagnostic approach and visual prognosis.

Keywords: Traumatic Optic Neuropathy (TON), Cerebral Venous Sinus Thrombosis (CVST), Head Trauma

NEUROTRAUMA, EPILEPSI

A CASE OF NONCONVULSIVE STATUS EPILEPTICUS IN SEVERE TRAUMATIC BRAIN INJURY: THE ROLE OF ELECTROENCEPHALOGRAPHY IN OPTIMIZING PATIENT OUTCOMES

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Background: Nonconvulsive status epilepticus (NCSE) is an important yet underrecognized complication in severe traumatic brain injury (TBI), often presenting as persistent impaired consciousness without overt motor seizures. Early electroencephalographic evaluation is essential for detection.

Case Presentation: An 18-year-old male sustained severe TBI following a high-energy motor vehicle accident, resulting in contusio cerebri, traumatic subarachnoid hemorrhage, and multiple skull fractures. Despite respiratory and hemodynamic stabilization and absence of clinical seizures, his consciousness remained markedly depressed. Serial imaging showed no progression, and transcranial Doppler indicated preserved cerebral perfusion. EEG revealed rhythmic delta activity <2.5 Hz with diffuse background slowing, consistent with possible NCSE based on Salzburg criteria. Optimization of levetiracetam (~30 mg/kg/day) led to noticeable improvement in arousal, motor responses and EEG follow-up findings.

Discussion: The discordance between the patient's persistent impaired consciousness and stable radiological and hemodynamic findings pointed to a functional cause, with NCSE being a key consideration in severe TBI. Unlike delirium which presents with fluctuating inattention and generalized EEG slowing or non-specific depressed consciousness from metabolic or structural injury, NCSE reflects ongoing ictal activity that lacks motor signs and can only be confirmed with EEG. This distinction is critical because unrecognized NCSE increases cerebral metabolic demand and contributes to secondary brain injury. Early EEG evaluation is therefore essential to identify NCSE as a reversible mechanism of prolonged coma and to guide timely antiseizure therapy.

Conclusion: NCSE should be considered in severe TBI patients with unexplained or stagnant consciousness. Early EEG and timely antiseizure treatment can improve neurological outcomes and represent a critical component of neurocritical care management.

Keywords: traumatic brain injury, NCSE, EEG, impaired consciousness, neurocritical care

NEUROTRAUMA, NEUROINTERVENSI

DELAYED PRESENTATION OF POST-TRAUMATIC CAROTID-CAVERNOUS FISTULA: A CASE REPORT

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Background: Carotid–cavernous fistula (CCF) is a rare vascular complication of head trauma, with an incidence of about 0.2%. Although it usually occurs soon after injury, delayed presentation of up to one month may occur and can cause serious visual and neurological morbidity, even in young and otherwise healthy patients.

Case Presentation: An 18-year-old male presented with recurrent headache and progressive right-sided proptosis for two months. He had mild head trauma three months earlier, with ocular symptoms starting one month after injury. Associated symptoms included conjunctival redness, periorbital pain, and blurred vision. Examination revealed marked right proptosis, conjunctival congestion, reduced visual acuity, and an audible periorbital bruit, without focal neurological deficits. Computed tomography angiography (CTA) demonstrated dilatation of the right superior ophthalmic vein, suggesting CCF. Digital subtraction angiography (DSA) confirmed a fistulous connection involving the cavernous segment of the right internal carotid artery. The patient underwent successful endovascular coil embolization.

Discussion: CCF is an abnormal arteriovenous shunt between the carotid arterial system and the cavernous sinus, causing orbital venous hypertension and impaired venous drainage. Traumatic CCF most commonly results from rupture of the cavernous segment of the internal carotid artery. Delayed symptom onset, as in this case, has been reported. Typical features include progressive proptosis, conjunctival arterialization, orbital bruit, headache, and visual impairment. The

periorbital bruit was an important diagnostic clue. DSA remains the gold standard for diagnosis and treatment planning. Endovascular embolization is the treatment of choice. In patients without a clear history of cranial trauma, differential diagnoses should include conditions presenting with unilateral proptosis and red eye, such as glaucoma, orbital hemangioma, orbital cellulitis, retrobulbar hemorrhage, and orbital tumors.

Conclusion: CCF should be suspected in patients with head trauma who develop progressive unilateral ocular symptoms or headache. Early vascular imaging and prompt endovascular treatment are essential to prevent permanent visual loss and neurological complications.

Keywords: intrathecal antibiotic, multidrug resistant gram-negative bacteria, nosocomial, ventriculitis

NEUROTRAUMA, NEUROINTERVENSI, NEUROVASKULER

CEREBRAL SALT WASTING ASSOCIATED WITH TRAUMATIC SUBDURAL HEMATOMA STABILIZED AFTER BILATERAL MMA EMBOLIZATION

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Background: Cerebral salt wasting (CSW) is an uncommon but critical cause of hyponatremia in patients with intracranial pathology. Differentiating CSW from syndrome of inappropriate antidiuretic hormone secretion (SIADH) is essential, as management strategies are fundamentally different. Traumatic brain injury and subdural hematoma (SDH) may precipitate natriuresis through neurohumoral dysregulation. We report a case of severe hyponatremia consistent with CSW in a patient with traumatic intracranial hemorrhage and bilateral SDH who demonstrated clinical improvement following bilateral middle meningeal artery (MMA) embolization.

Case Presentation: A 61-year-old man presented with decreased consciousness and agitation one day prior to admission, preceded by a fall with occipital head trauma two days earlier. Initial laboratory evaluation revealed severe hyponatremia (Na 114 mmol/L). Non-contrast head CT demonstrated bilateral frontal intracerebral hemorrhage, left temporal hemorrhage, bilateral subarachnoid and subdural hemorrhage, brain edema, and right occipital fracture. Digital subtraction angiography showed cotton-wool-like contrast staining from bilateral MMAs supplying the subdural membrane. Bilateral MMA embolization was performed with near-total obliteration of abnormal vascular supply and preserved internal carotid artery patency. Serum sodium improved to 125 mmol/L within five days, accompanied by stabilization of neurological status and no radiologic progression

Discussion: CSW is characterized by renal salt loss and hypovolemia secondary to intracranial insult, likely mediated by natriuretic peptides and sympathetic dysfunction. In this case, the presence of traumatic hemorrhage with evolving SDH and severe hyponatremia suggested CSW rather than SIADH. Bilateral MMA embolization, by reducing pathologic vascular supply and inflammatory membrane activity, may have contributed to stabilization of intracranial dynamics and systemic neurohumoral imbalance.

Conclusion: CSW should be considered in traumatic SDH patients with profound hyponatremia. Bilateral MMA embolization may offer dual benefits-controlling SDH progression and potentially facilitating metabolic stabilization.

Keywords: cerebral salt wasting, subdural hematoma, middle meningeal artery embolization, hyponatremia, traumatic brain injury

NEUROVASKULER

CASE REPORT: CEREBELLAR ABSCESS WITH ACUTE HYDROCEPHALUS IN IMMUNOCOMPETENT PATIENT AT PROF.DR.R.D KANDOU GENERAL HOSPITAL

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Introduction: Cerebellar abscess is a focal intracerebral abscess that developed into a well developed encapsulated pus. Incidence of cerebellar abscess is about 49 cases per 100.000 in developing countries. Mortality rate in cerebellar abscess vary from 30-55%. The treatment for cerebellar abscess need to be comprehensive with concise diagnosis. Empirical antibiotics with broad spectrum polimicrobes are usually given with cerebellar abscess. Minimally invasive surgery, molecular biology has broadened survival rate in cerebellar abscess.

Case report: Male, 30 yrs old, came to hospital with chronic headache with dull characteristics since 3 month before admission. Patient said that he had no extremity weakness but had difficulty in maintaining balance and gait. Patient was admitted in hospital with gradual unconsciousness for 1 week and regained consciousness. Patient had right dismetria and unable to undergo finger to nose and finger to finger test. Chest X ray showed pneumonia findings. Brain CT scan with contrast showed multiple well demarcated hypodense lesion (1.8cmx 1.7cm x 0.6cm) at right cerebellum with perifocal edema and non communicating hydrocephalus. The aerobic sputum culture and sensitivity test found *klebsiella pneumonia* with extended spectrum beta lactamase. Patient was admitted to hospital with clinical improvement. Patient was readmitted to hospital 3 months later with unconciusness and treated at ICU. Patient had empirical antibiotic ceftriaxone and metronidazole. Pasien also had extraventricular drain but no clinical improvement.

Discussion: This patient had chronic headache with right dismetria and fever which are the typical characteristic of cerebellar abscess. The clinical manifestation may correlated with increased intracranial pressure such as chronic progressive headache (>50%), unconsciousness, projectile vomit and papilledema. other focal cerebral manifestation included generalized seizure, altered mental status and focal neurologic deficit. The etiologies are usually direct spread from infected sinus, mastoiditis, dental infection and surgery procedure. In immunocompetent patient, abscess had 40-50% spread via hematogenically and 30-40% through cerebrospinal fluid (CSF). Although the pus culture had negative result. It is suspected that this bacteria spread via hematogenously. CT Scan showed cerebellar abscess had solitary brain lesion (51%). ring enhancement (94.2%) in frontal (47.6%), parietal lobe (27.2%) and cerebellum (21.4%). Differential diagnosis included other space occupying lesion such as glioma or metastatic brain disease, bacterial meningitis, crptococcus and dural septic sinus thrombosis. Cerebellar abscess are difficult to undergo excision procedure because of the adjacent location near the brain stem. Antimicrobial therapy should cover both gram-negative and gram-positive bacteria. It is recommended that all patients with brain abscesses receive an extended-spectrum cephalosporin in combination with metronidazole as empiric treatment It is advised that intravenous antibiotics should be continued for at least 6-8 weeks, followed by 2-3 months of oral antibiotics after the termination of intravenous therapy. In immunocompromised patients, the duration of parenteral treatment for brain abscesses should be longer than immunocompetent patients ranged from 12 weeks to 1 year. Surgical intervention, either through stereotactic aspiration or open craniotomy, Surgical approach depend on several factors, including the size, location, and multiplicity of the abscesses and the patient's clinical status. Abscess drainage is often necessary and achieved through CT-guided stereotactic aspiration or surgical drainage, which is considered optimal therapy for most solitary abscesses that are surgically accessible, particularly those larger than 2 cm in diameter.

Keywords: Early diagnosis, reasonable surgical intervention, and adequate duration of treatment with effective antibiotics are critical for treating brain absces

CHARACTERIZATION OF VENOUS ROUTE PATTERNS IN CVST PATIENTS: AN ANGIOGRAPHY-BASED STUDY

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Background: Cerebral venous sinus thrombosis (cvst) is an uncommon cerebrovascular disorder caused by thrombosis of the intracranial venous sinuses or cortical veins. Clinical manifestations vary widely, ranging from isolated headache to severe neurological deficits. Accurate identification of the affected venous sinus and venous drainage pattern is essential for diagnosis and management. Digital subtraction angiography (dsa) remains the gold standard for detailed evaluation of cerebral venous circulation.

Case presentation: We report two female patients with cvst who underwent digital subtraction angiography. The first case involved a 40-year-old woman presenting with progressive headache and vertigo. Initial imaging suggested transverse sinus thrombosis. Dsa demonstrated thrombosis of the superior sagittal sinus and left transverse sinus, indicating extensive involvement of the intracranial venous system. The second case involved a 45-year-old woman presenting with progressive visual deterioration, including complete vision loss in the right eye and worsening vision in the left eye accompanied by pulsatile headache. Dsa findings demonstrated impaired venous drainage involving the right cavernous sinus, consistent with cavernous sinus thrombosis.

Discussion: These cases demonstrate the heterogeneous clinical presentation of cvst and the variability in venous sinus involvement. The first patient presented with nonspecific symptoms such as headache, whereas the second patient developed severe visual impairment due to cavernous sinus involvement. Dsa provided detailed visualization of venous sinus occlusion and abnormal venous drainage pathways, which are crucial for confirming the diagnosis and determining appropriate therapeutic strategies.

Conclusion: Cvst may involve different intracranial venous sinuses and present with diverse clinical manifestations. Digital subtraction angiography plays a crucial role in confirming the diagnosis and identifying the pattern of venous sinus involvement, which is important for guiding clinical management.

Keywords: cerebral venous sinus thrombosis, digital subtraction angiography, superior sagittal sinus thrombosis, cavernous sinus thrombosis

DISCONNECTION SYNDROME PRESENTING AS PURE ALEXIA IN VERTEBROBASILAR CIRCULATION ISCHEMIC STROKE: A CASE REPORT

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Background: Posterior circulation ischemic stroke may present with atypical neuropsychological symptoms, including pure alexia. Pure alexia, or alexia without agraphia, is a disconnection syndrome characterized by the inability to read despite preserved vision, writing, and language comprehension. It usually results from lesions in the dominant occipitotemporal region or disruption of visual pathways to language centers.

Case Presentation: A 51-year-old man presented with sudden right-sided weakness for one week, accompanied by difficulty reading. He reported that he could see letters clearly but was unable to recognize written words, including his own handwriting. Writing, speech, and comprehension were intact. The patient had a history of uncontrolled hypertension and prior ischemic stroke. Physical examination revealed right hemiparesis with otherwise normal higher cortical functions. Non-contrast head CT demonstrated an infarction in the left occipitotemporal lobe. Digital subtraction angiography showed stenosis of the distal branch of the left vertebral artery. The diagnosis was right hemiparesis and pure alexia due to vertebrobasilar circulation infarction.

Discussion: Pure alexia results from disruption of the connection between the visual cortex and language centers in the dominant hemisphere. In this case, stenosis of the left vertebral artery reduced perfusion to the left posterior cerebral artery territory, leading to infarction of the left occipitotemporal region. The lesion affected visual association pathways and the fusiform gyrus, preventing transmission of visual information to language areas. As a result, the patient could perceive letters but could not interpret written words. Uncontrolled hypertension and prior stroke likely contributed to vertebrobasilar atherosclerosis.

Conclusion: Pure alexia is a rare manifestation of posterior circulation stroke. Early recognition of this distinctive presentation and appropriate vascular evaluation are essential for accurate diagnosis, optimal treatment, and long-term neuropsychological rehabilitation.

Keywords: Pure alexia, posterior stroke; vertebral stenosis, occipital infarction, disconnection syndrome

GIANT CAVERNOMA FRONTOTEMPORAL WITH COGNITIVE IMPAIRMENT: CLINICAL PRESENTATION AND DIAGNOSTIC APPROACH

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Background: Cerebral cavernous malformation (CCM) is a vascular lesion with an incidence of approximately 0.5–0.7%. Clinical manifestations vary, including seizures, focal neurological deficits, increased intracranial pressure, or incidental detection. Giant CCM associated with cognitive impairment is rarely reported and often shows atypical radiological features that can mimic neoplasms, creating diagnostic difficulty. A careful clinical approach is essential, emphasising MRI sequences sensitive to hemosiderin for accurate lesion identification and characterisation, and for guiding appropriate treatment planning.

Case presentation: We report a 58-year-old man with progressive cognitive impairment affecting executive function, memory, and attention, limiting daily activities. Headaches had been present for two years prior to the complaints. Neurological examination showed cognitive deficits without motor deficits. Screening demonstrated impaired orientation, attention, executive function, and memory, suggesting frontotemporal involvement. Brain MRI revealed a right frontotemporal mass consistent with a giant cerebral cavernoma.

Discussion: Giant CCM frontotemporal can manifest as cognitive decline, unlike typical CCM symptoms such as seizures (40-80%), focal neurological deficits (25-50%), and headache (10-30%). In giant lesions, mass effect disrupts frontotemporal association networks, including frontostriatal and frontolimbic circuits. Surrounding oedema can expand the dysfunctional region, worsening impairment. Fragile CCM capillary walls permit recurrent microbleeds, irritating the cortex and triggering neurovascular inflammation that disturbs ion balance and neurotransmitter homeostasis. MRI is essential for diagnosis, showing heterogeneous T1, T2, and FLAIR signals, as well as GRE with blooming artefacts. Management is individualised, and surgical resection is considered for symptomatic lesions with recurrent haemorrhage or seizures, while conservative treatment suits asymptomatic cases.

Conclusion: Giant CCM frontotemporal lesions cause progressive cognitive decline through mass effect, oedema, and microbleeds, which may be overlooked because they differ from more prevalent clinical presentations. The identification of blooming and heterogeneous characteristics is essential for establishing the diagnosis and differentiating it from neoplastic lesions using multiparametric MRI, particularly hemosiderin-sensitive sequences.

Keywords: Giant cavernoma, cognitive impairment

IPILATERAL GAZE Palsy REVEALING FOVILLE SYNDROME: A CLINICAL TIMELINE CASE REPORT

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Background: Brainstem stroke often requires precise clinical localization because neurological findings may precede definitive imaging. Foville syndrome is a pontine brainstem syndrome characterized by ipsilateral cranial nerve deficits, contralateral hemiparesis, and gaze disturbance. Among these features, ipsilateral gaze palsy represents an important but potentially underrecognized localizing sign that can facilitate early identification of pontine pathology.

Case Presentation: We report a 53-year-old man presenting with sudden onset left-sided weakness accompanied by right facial weakness, dysarthria, dysphagia, and impaired horizontal gaze toward the right. Neurological examination revealed alternating hemiparesis with right abducens and facial nerve palsies and ipsilateral gaze palsy, suggesting localization to the dorsal paramedian pons within the Foville spectrum. Brain MRI confirmed infarction involving the right pons. The patient received antiplatelet therapy, vascular risk factor management, and multidisciplinary rehabilitation. The clinical course was documented through a structured timeline demonstrating stabilization of neurological deficits followed by gradual functional improvement and recovery of independent ambulation at discharge.

Discussion: This case highlights the diagnostic value of ocular motor examination in brainstem stroke. Ipsilateral gaze palsy reflects disruption of pontine gaze pathways and refines lesion localization beyond isolated cranial nerve palsy. Documenting the temporal evolution of deficits provides additional insight into disease trajectory and recovery patterns in focal pontine infarction.

Conclusion: Ipsilateral gaze palsy can serve as a key clinical indicator facilitating recognition of Foville syndrome through localization-driven assessment. Incorporating structured clinical timelines alongside neurological examination enhances understanding of progression and recovery in pontine stroke.

Keywords: Foville syndrome, Posterior circulation stroke, Brainstem localization, Ipsilateral gaze palsy, Vertebrobasilar infarction

NEW-ONSET STATUS EPILEPTICUS ASSOCIATED WITH SEVERE UNCONTROLLED DIABETES IN A YOUNG ADULT

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Background: Status epilepticus (SE) is a neurological emergency most commonly associated with structural, infectious, or autoimmune etiologies. Metabolic disturbances, including severe hyperglycemia, are increasingly recognized as potential precipitants of seizures, although generalized SE as an initial manifestation of uncontrolled diabetes remains uncommon. This report highlights the relationship between chronic severe hyperglycemia and new-onset SE in a young adult without structural brain abnormalities.

Case Presentation: A 21-year-old woman with a three-year history of diabetes mellitus presented with recurrent generalized tonic-clonic seizures and impaired consciousness, consistent with status epilepticus. Laboratory evaluation revealed persistent hyperglycemia with markedly elevated glycated hemoglobin (16.8%), indicating longstanding poor glycemic control. Neuroimaging showed no acute intracranial pathology. The patient received standard antiseizure therapy alongside intensive metabolic management with insulin and supportive care. Seizure activity resolved, and neurological status gradually returned to baseline during hospitalization. The patient was discharged seizure-free with ongoing diabetes management and maintenance antiseizure therapy.

Discussion: Hyperglycemia-related seizures are traditionally described as focal events; however, prolonged metabolic dysregulation may predispose patients to more severe presentations, including SE. Chronic glucotoxicity, microvascular dysfunction, and neuroinflammatory processes may contribute to increased neuronal excitability even in the absence of structural lesions. This case underscores the importance of

considering uncontrolled diabetes as an etiological factor in first-episode SE, particularly in young individuals.

Conclusion: New-onset status epilepticus may represent an early neurological manifestation of severe uncontrolled diabetes, even in young patients without identifiable structural brain lesions. Therefore, early metabolic evaluation and simultaneous management of seizure activity and glycemic dysregulation are essential to improve clinical outcomes and prevent recurrence.

Keywords: status epilepticus, hyperglycemia, diabetes mellitus, metabolic seizure, young adult

REGENATIVE MEDICINE

RISK FACTORS OF GROIN HEMATOMA FOLLOWING CEREBRAL DIGITAL SUBTRACTION ANGIOGRAPHY VIA TRANSFEMORAL APPROACH

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Introduction: Digital subtraction angiography (DSA) remains the standard for diagnosing cerebrovascular abnormalities. However, it carries potential complications, with groin hematoma being the most common access-site complication in 2.49% of cases. Several factors associated with increased risk, including obesity, uncontrolled hypertension and dual antiplatelet (DAPT) therapy. Despite that, the relative contribution of each factor to the incidence of groin hematoma remains unclear.

Objective: To determine clinical and procedural factors that independently predict the occurrence of groin hematoma after cerebral digital subtraction angiography.

Methods: A retrospective cohort study of patients with cerebrovascular pathology who underwent transfemoral cerebral DSA at Moewardi General Hospital, between September and December 2025. The primary outcome was groin hematoma during hospitalization. Predictors were evaluated using Fisher's exact/Mann-Whitney U tests and multivariable logistic regression estimated adjusted odds ratios.

Results: Among 50 patients undergoing cerebral DSA, 6 (12.0%) developed groin hematoma during hospitalization. The mean age was 58.2 ± 11.0 years, and 52.0% were female (26/50). Patients with hematoma were older than those without hematoma, although the difference was not statistically significant (66.5 ± 11.2 vs 57.1 ± 10.6 years). In bivariate analyses, Systolic Blood Pressure (SBP) ≥ 180 mmHg was more frequent in the hematoma group (83.3% vs 15.9%; $p=0.002$), and Body Mass Index (BMI) was higher (median 30.5 vs 25.6 kg/m²; $p=0.010$). DAPT was also more common among patients with hematoma (66.7% vs 20.5%; $p=0.033$). In multivariable logistic regression adjusting for BMI ≥ 30 kg/m² (Model 2), SBP ≥ 180 mmHg remained independently associated with groin hematoma (OR 39.47, 95% CI 1.58–984.96; $p=0.025$), whereas BMI ≥ 30 kg/m² was not ($p=0.723$).

Conclusions: After adjustment for obesity, severe pre-procedural hypertension (SBP ≥ 180 mmHg) remained independently associated with groin hematoma following transfemoral cerebral DSA. Given the small number of events and wide confidence intervals, larger studies needed to validate these findings.

Keywords: Digital Subtraction Angiography, Hypertension, Postprocedural complications

STROKE, NEUROVASKULAR

A DIAGNOSTIC TRAP IN NEUROCITICAL CARE: MALIGNANT STROKE IN A YOUNG PATIENT WITH ATRIAL MYXOMA AND TAKOTSUBO CARDIOMYOPATHY

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Background: Acute ischemic stroke in young adults is uncommon and may present with atypical, non-neurological symptoms, leading to diagnostic delay. Rare cardioembolic sources such as left atrial myxoma often remain clinically silent until catastrophic cerebral infarction occurs. Concomitant Takotsubo cardiomyopathy represents an acute neurocardiac interaction that may further complicate neurocritical care management by creating competing cerebral and cardiovascular priorities.

Case Presentation: An 18-year-old female presented with acute abdominal pain, nausea, and vomiting. Shortly thereafter, she developed sudden deterioration of consciousness with right-sided motor lateralization. Non-contrast cranial computed tomography revealed a large hypodense lesion involving more than one-third of the left cerebral hemisphere, consistent with malignant ischemic infarction. Transthoracic echocardiography demonstrated a left atrial myxoma as the presumed cardioembolic source and severe left ventricular systolic dysfunction compatible with Takotsubo cardiomyopathy. In the absence of a dedicated neurointensive care unit, the patient was managed in a general intensive care unit using neurocritical care principles, including frequent neurological assessment, close monitoring for malignant cerebral edema, and cautious hemodynamic titration to preserve cerebral perfusion in the setting of cardiogenic instability. Despite maximal supportive and neuroprotective management, the patient developed progressive neurological and cardiovascular deterioration and died after 30 days of hospitalization.

Discussion: This case represents a diagnostic trap in which atypical systemic symptoms in a young patient delayed early neurological suspicion. The coexistence of malignant ischemic stroke and Takotsubo cardiomyopathy illustrates a complex neurocardiac interaction that posed significant neurocritical care challenges, particularly in balancing cerebral perfusion and secondary brain injury prevention in the setting of severe cardiac dysfunction.

Conclusion: Atypical presentations in young patients should prompt early consideration of rare cardioembolic stroke etiologies. Malignant ischemic stroke complicated by acute neurocardiac dysfunction requires early neurocritical care-level management and multidisciplinary coordination, especially in centers without dedicated neurointensive care units.

ACTIVATED PARTIAL THROMBOPLASTIN TIME AS A PREDICTOR OF HYPERDENSE THROMBUS ON NON-CONTRAST CT IN ACUTE CEREBRAL VENOUS SINUS THROMBOSIS

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Background: Cerebral venous sinus thrombosis (CVST) is a rare but potentially serious cerebrovascular disorder that requires prompt diagnosis and treatment. Non-contrast computed tomography (CT) can demonstrate increased thrombus attenuation measured in Hounsfield Units (HU), reflecting clot composition. Activated partial thromboplastin time (APTT), a marker of intrinsic coagulation activity, may influence thrombus formation dynamics. However, the relationship between APTT and thrombus density in CVST remains unclear.

Objective: To evaluate the association between activated partial thromboplastin time and thrombus density measured on non-contrast CT in patients with acute cerebral venous sinus thrombosis.

Methods: This retrospective cohort study included adult patients diagnosed with acute CVST at a tertiary referral center between January 1,

2022 and December 31, 2023. Patients who underwent non-contrast CT within 7 days of symptom onset and had APTT measured within 24 hours of imaging were included. Thrombus density was quantified using standardized region-of-interest measurements in Hounsfield Units. Correlation between APTT and HU was assessed using Spearman's rank test. Receiver operating characteristic (ROC) analysis was performed to determine the optimal APTT cutoff for predicting higher thrombus density (HU $\geq$ 70).

Results: A total of 93 patients were included. Spearman analysis demonstrated a moderate negative correlation between APTT and thrombus density ($r = -0.408$, $p < 0.001$). ROC analysis identified an optimal APTT cutoff of ≤ 21.6 seconds for predicting higher thrombus density, with a sensitivity of 72.9%, specificity of 91.1%, and an area under the curve of 0.769 ($p < 0.001$).

Conclusions: Shorter APTT values are associated with higher thrombus density in acute CVST. Integration of coagulation parameters with quantitative CT assessment may enhance early evaluation and clinical decision-making in patients with cerebral venous sinus thrombosis.

Keywords: Cerebral venous sinus thrombosis, Activated partial thromboplastin time, Hounsfield unit, Thrombus density, Coagulation biomarkers

ACUTE STROKE MANAGEMENT WITHOUT NEUROIMAGING IN A RESOURCE-LIMITED HOSPITAL: A QUALITATIVE STUDY OF SYSTEM-LEVEL CHALLENGES

Background: Current acute stroke guidelines emphasize rapid neuroimaging, particularly non-contrast CT, to enable time-sensitive treatments such as thrombolysis and thrombectomy. However, many hospitals in Indonesia still operate without CT or MRI facilities. In these settings, clinicians often rely on clinical examination while navigating structural, administrative, and sociocultural constraints. As a result, real-world stroke care may differ from guideline-based recommendations developed in high-resource healthcare environments.

Objective: To explore system-level factors influencing acute stroke management in hospitals without neuroimaging and to understand how contextual limitations affect clinical decision-making and referral processes.

Methods: An exploratory qualitative study was conducted at a resource-limited private hospital without CT or MRI facilities. Participants included emergency physicians, nurses, and family members of acute stroke patients selected through purposive sampling. Semi-structured interviews were conducted and analyzed using thematic analysis.

Results: Five key themes influenced clinical decisions and referral practices: reliance on clinical judgment under diagnostic uncertainty, insurance-related administrative barriers, logistical constraints such as limited ambulance availability and staffing shortages, sociocultural factors affecting family consent for transfer, and adaptive strategies developed by clinicians. Together, these factors frequently shaped whether and when patients were referred despite recognition of stroke as a time-sensitive emergency.

Conclusion: In hospitals without neuroimaging, stroke management relies heavily on clinical assessment while referral decisions are influenced by administrative procedures, logistical limitations, and family dynamics. Addressing these system-level barriers may improve referral timeliness and support more effective stroke care in resource-limited settings.

Keywords: Acute stroke, Referral systems, Diagnostic uncertainty, Resource-limited settings, Health system barriers

ANALYSIS OF FACTORS ASSOCIATED WITH THE SEVERITY OF HEMORRHAGIC STROKE AT M. DJAMIL HOSPITAL, PADANG

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Background: Hemorrhagic stroke is a major cause of mortality and disability with high fatality in the acute phase. Early assessment of stroke severity is essential to guide management strategies and estimate

prognosis. Clinical, radiological, and biomarker factors are thought to be associated with the severity of hemorrhagic stroke.

Objectives: To analyze factors associated with the severity of hemorrhagic stroke at RS M. Djamil Padang.

Methods: This analytical observational study used a cross-sectional design involving patients with hemorrhagic stroke admitted to RS M. Djamil Padang. Stroke severity was assessed using the National Institutes of Health Stroke Scale (NIHSS) on admission. Independent variables included age, sex, smoking history, comorbidities, initial Glasgow Coma Scale (GCS) score, Intracerebral Hemorrhage (ICH) score, admission blood pressure, admission random blood glucose level, hemorrhage location and volume, and serum glial fibrillary acidic protein (GFAP) level. Statistical analyses were performed using IBM SPSS version 25.

Results: A total of 70 patients were included. The mean NIHSS score on admission was 11.17 ± 5.98 (median 12.5). NIHSS score showed significant positive correlations with GFAP level ($r = 0.412$; $p < 0.001$), hemorrhage volume ($r = 0.467$; $p < 0.001$), and ICH score ($r = 0.656$; $p < 0.001$), and a strong negative correlation with initial GCS score ($r = -0.744$; $p < 0.001$). Age, sex, smoking history, comorbidities, admission blood pressure, random blood glucose level, and hemorrhage location were not significantly associated with NIHSS score ($p > 0.05$). In multivariate analysis, only the initial GCS score remained independently associated with hemorrhagic stroke severity ($\beta = -0.497$; $p < 0.001$).

Conclusion: Acute hemorrhagic stroke severity is associated with initial GCS score, hemorrhage volume, ICH score, and GFAP level in bivariate analyses; however, only the initial GCS score independently predicts stroke severity. Early assessment of consciousness level is a key indicator of clinical severity in hemorrhagic stroke.

Keywords: hemorrhagic stroke, severity, NIHSS

ASSOCIATION BETWEEN OBSTRUCTIVE SLEEP APNEA AND COGNITIVE IMPAIRMENT AFTER STROKE: A SYSTEMATIC REVIEW

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Background: Cognitive impairment is a common and disabling consequence of stroke. Obstructive sleep apnea (OSA), highly prevalent among stroke survivors, has been linked to cognitive dysfunction in non-stroke populations. However, its role in post-stroke cognitive impairment remains unclear.

Objective: To evaluate the association between obstructive sleep apnea and cognitive impairment in adult patients with ischemic or hemorrhagic stroke.

Methods: A systematic search of PubMed, Cochrane Library, and ScienceDirect was conducted using predefined keywords related to stroke, obstructive sleep apnea, and cognitive outcomes. Observational studies involving adult stroke patients with OSA diagnosed by polysomnography, apnea-hypopnea index, or clinical criteria and reporting validated cognitive assessments were included. Data were synthesized narratively due to methodological heterogeneity.

Results: Three studies met the inclusion criteria. Across acute, subacute, and chronic stroke populations, OSA was consistently associated with worse cognitive performance. Moderate-to-severe OSA demonstrated a dose-response relationship with global cognitive impairment and domain-specific memory dysfunction. Nocturnal hypoxemia and reduced sleep efficiency were independently correlated with cognitive decline.

Discussion: Intermittent hypoxia, sleep fragmentation, and impaired cerebral autoregulation may contribute to exacerbated neuronal vulnerability following stroke. Although evidence remains limited, findings suggest that OSA may represent a modifiable factor influencing post-stroke cognitive outcomes.

Conclusion: OSA is associated with increased risk of cognitive impairment in stroke survivors. Further prospective and interventional

studies are required to determine whether treatment of OSA improves cognitive recovery.

Keywords: stroke, obstructive sleep apnea, cognitive impairment, post-stroke cognitive impairment, polysomnography

ASSOCIATION BETWEEN SERUM ELECTROLYTE LEVELS AND CLINICAL OUTCOMES IN PATIENTS WITH SPONTANEOUS INTRACEREBRAL HEMORRHAGE

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Background: Spontaneous intracerebral haemorrhage (sICH) is a type of haemorrhagic stroke caused by the non-traumatic rupture of blood vessels within the brain parenchyma. It accounts for approximately 10–20% of all stroke cases and is associated with high morbidity and mortality. Electrolyte imbalances are frequently observed during the acute phase of sICH and are believed to be closely related to disease severity and patient prognosis; however, the available evidence in the literature remains inconsistent.

Objective: This systematic review aims to evaluate the association between serum electrolyte levels (such as sodium, potassium, calcium, and chloride) at admission and clinical outcomes in patients with sICH.

Methods: This review was conducted in accordance with the PRISMA 2020 guidelines. A comprehensive literature search was performed across PubMed, Scopus, Web of Science, and Google Scholar to identify studies published within the past 5–10 years. Eligible studies included adult patients with sICH that reported admission serum electrolyte levels (sodium, calcium, magnesium, phosphorus, or potassium) and clinical outcomes such as hematoma expansion, mortality, or functional status. The methodological quality of the included observational studies was assessed using the Newcastle–Ottawa Scale (NOS).

Results: Serum electrolyte disturbances are associated with poorer clinical outcomes in patients with sICH, including increased mortality and neurological deterioration. Early evaluation and correction of electrolyte abnormalities during the acute phase may improve prognosis; however, further research is required to establish a causal relationship.

Conclusions: A total of 791 articles were identified through database searches and additional sources. After duplicate removal and screening, 23 studies met the inclusion criteria. Overall, serum electrolyte disturbances at hospital admission or during the acute treatment phase were associated with poorer clinical outcomes in patients with spontaneous intracerebral haemorrhage. These findings suggest that serum electrolyte abnormalities may serve as important prognostic indicators in sICH.

Keywords: Serum electrolyte, Spontaneous intracerebral haemorrhage, clinical outcome

ATHEROGENIC INDEX OF PLASMA PROFILE IN PATIENTS WITH ACUTE ISCHEMIC STROKE

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Background: Acute ischemic stroke is a major cause of mortality and long-term disability. Atherogenic dyslipidemia (high triglycerides and low high-density lipoprotein cholesterol [HDL-C]) contributes to atherosclerosis, but risk may be underestimated when only single lipid parameters are used. Atherogenic Index of Plasma (AIP), calculated as $\log_{10}(\text{triglycerides} [\text{TG}]/\text{HDL-C})$, has increasingly been studied as a composite lipid marker related to stroke risk and outcomes, yet local evidence from Eastern Indonesia remains limited.

Objective: To describe the AIP profile among patients with acute ischemic stroke at RSUP Wahidin Sudirohusodo.

Methods: A retrospective descriptive study was conducted using medical records of first-ever acute ischemic stroke patients treated at RSUP Wahidin Sudirohusodo from January 2023 to July 2025. Diagnosis was

established clinically and with non-contrast brain imaging. TG and HDL-C measured within 24 hours of symptom onset were used to calculate AIP, then categorized as low, intermediate, or high. Stroke severity was assessed using the National Institutes of Health Stroke Scale (NIHSS). Data were analyzed descriptively, including cross-tabulations of AIP by sex, age group, and NIHSS category.

Results: A total of 202 patients met the inclusion criteria. The cohort was predominantly male and largely comprised patients aged 56–65 years and older than 65 years. Stroke severity at admission was most commonly moderate by NIHSS. High AIP was the most frequent category, followed by low AIP, while intermediate AIP was least common. Descriptively, high AIP appeared more frequent in males, older patients, and those with severe to very severe NIHSS.

Conclusions: The AIP profile in acute ischemic stroke patients at RSUP Wahidin was dominated by the high category. These findings provide local baseline data and support future analytic/prospective studies examining AIP in relation to stroke subtype, clinical outcomes, and secondary prevention strategies.

Keywords: Acute ischemic stroke, Atherogenic Index of Plasma, atherogenic dyslipidemia, triglycerides, HDL cholesterol

BEYOND CLASSICAL BRAINSTEM SYNDROMES: AN UNUSUAL PRESENTATION OF ACUTE PONTINE INFARCTION – A CASE REPORT

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Background: Pontine infarction is traditionally associated with crossed brainstem syndromes due to the close anatomical proximity of cranial nerve nuclei and corticospinal tracts. However, small-vessel infarcts may selectively involve specific pontine structures, producing atypical or incomplete neurological patterns that challenge classical localization. Early recognition of such atypical presentations is crucial for timely diagnosis and management.

Case Presentation: A 45-year-old male presented with acute onset vertigo, nausea, and progressive left sided weakness. Neurological examination revealed right lower motor neuron facial palsy and left hemiparesis (Medical Research Council grade 4/5), without gaze palsy, sensory deficits, limb ataxia, or bulbar involvement. Non-contrast brain CT demonstrated acute infarction in the left pons. CT angiography showed no significant large vessel stenosis, supporting a small-vessel perforator mechanism. The clinical findings did not correspond to classical pontine brainstem syndromes. The patient was treated with antiplatelet therapy consisting of an aspirin loading dose of 320 mg followed by maintenance aspirin 80 mg/day, along with supportive management. During hospitalization, vertigo and vomiting resolved, and partial improvement in motor strength was observed, although facial weakness persisted at discharge. The patient was scheduled for follow up at the Neurology polyclinic for clinical reassessment and optimization of secondary stroke prevention therapy.

Discussion: The atypical presentation reflects the compact and selective anatomical organization of the pons. Small-vessel perforator infarcts may selectively affect corticospinal tracts and facial nerve fibers while sparing adjacent pathways controlling gaze, sensation, and coordination. This explains the patient's hemiparesis and facial palsy without other classical signs. Such selective infarcts highlight the limitations of rigid syndromic classifications. Integration of careful clinical examination with neuroimaging is essential to identify atypical patterns, guide acute management, and plan rehabilitation.

Conclusion: Recognition of atypical pontine infarcts allows clinicians to initiate early treatment, guide rehabilitation effectively, and reduce the risk of delayed diagnosis and poor outcomes.

Keywords: Pontine infarction, Brainstem syndromes, Atypical presentation, Facial palsy, Hemiparesis

CASTELLI RISK INDEX-II (CRI-II) PROFILE IN PATIENTS WITH ACUTE ISCHEMIC STROKE

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Background: Stroke is the second leading cause of death worldwide and thus poses a substantial danger to human health. Identifying risk factors for stroke may be the most viable approach for reducing the burden of stroke. Lipid serum abnormality may increase the risk of ischemic stroke. Composite lipid ratios such as Castelli Risk Index-II (CRI-II) known as atherosclerosis indexes, are biomarkers that useful for evaluating cardiovascular risk.

Objective: To describe the profile of Castelli Risk Index-II (CRI-II) in acute ischemic stroke patient as one of the most common risk factor.

Methods: A descriptive cross-sectional study with a retrospective approach was conducted among inpatients at the Neurology Department of Wahidin Sudirohusodo Hospital, Makassar, during 2023-2024. A total of 560 acute ischemic stroke patient who met the inclusion criteria were collected for the laboratory data of lipid profile. The Castelli Risk Index-II is calculated by dividing the LDL-C level by the HDL-C in mg/dL. Descriptive statistics were used to summarize the distribution of demographic and clinical characteristics.

Results: Majority of acute ischemic strokes occurred in the age group >55 years, with nearly equal proportions between men and women. Median total cholesterol and LDL-C values for all samples were within the abnormal range. The median CRI-II was 3.8, and 50% of the sample had a CRI-II ratio indicating moderate risk for cardiovascular disease.

Conclusion: Majority of acute ischemic stroke patients showed abnormalities in lipid profiles with a median CRI-II of 3.8. (moderate risk for cardiovascular disease). Castelli Risk Index-II (CRI-II) parameters offer richer insights in quantifying risk information about plaque development in acute ischemic stroke.

Keywords: Castelli Risk Index-II, Acute Ischemic Stroke, Dyslipidemia, Lipid Ratio

CROSSED APHASIA FOLLOWING RIGHT HEMISPHERE ISCHEMIC STROKE IN A RIGHT-HANDED PATIENT: A CASE REPORT HIGHLIGHTING ATYPICAL LANGUAGE LATERALIZATION

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Background: Aphasia classically occurs due to lesions in the left cerebral hemisphere, which is the dominant center for language function, particularly in right-handed individuals. Therefore, language disturbances resulting from right hemisphere lesions represent a rare phenomenon known as crossed aphasia. This condition is not only infrequently reported but also challenges the classical paradigm of left hemisphere dominance in the organization of human language function.

Case Report: A 65-year-old right-handed man presented to the emergency department with sudden-onset speech difficulties approximately five hours prior. He exhibited non-fluent speech, word-finding difficulties, and impaired naming, while comprehension of simple conversation remained relatively preserved. There was no history of left-handedness, developmental language disorders, head trauma, or previous neurological disease. Neurological examination revealed expressive language deficits with anomia and relatively intact comprehension, consistent with expressive aphasia. Non-contrast CT scan of the head demonstrated hypodense areas in the right cerebral hemisphere involving the frontal, temporal, and parietal regions corresponding to the right middle cerebral artery distribution, without signs of intracranial hemorrhage.

Discussion: The correlation between the clinical presentation and radiological findings supports a diagnosis of crossed aphasia due to right hemisphere ischemic stroke in a right-handed patient. This phenomenon has been reported in only a small proportion of aphasia cases and reflects variation in cerebral language lateralization. Proposed mechanisms include atypical right hemisphere language dominance, bilateral representation of language, and reorganization of language networks via neuroplasticity. Lesions in the right perisylvian region, homologous to classical left hemisphere language centers, can result in language deficits

if this area functions as the dominant language center in certain individuals.

Conclusion: This case emphasizes that language lateralization in humans does not always follow the classical left hemisphere dominance pattern. Aphasia in right-handed patients with right hemisphere lesions suggests the possibility of atypical language organization. Recognition of crossed aphasia has important clinical implications for interpreting neurological symptoms and neuroimaging findings in stroke patients. Awareness of language lateralization variations is essential for accurate diagnosis and tailored rehabilitation strategies in patients with post-stroke language deficits.

Keywords: crossed aphasia, ischemic stroke, right hemisphere, language lateralization, aphasia

DESCRIPTION OF SYSTEMIC IMMUNE-INFLAMMATION INDEX AND ITS ASSOCIATION WITH VASCULAR RISK FACTORS IN CSVD

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Background: Cerebral small vessel disease (CSVD) is a pathological condition affecting the small vessels of the brain and represents a major cause of lacunar stroke, vascular cognitive impairment, and dementia in the elderly population. Systemic inflammation plays an important role in the pathogenesis of CSVD. The Systemic Immune-Inflammation Index (SII), calculated from platelet, neutrophil, and lymphocyte counts, has emerged as a potential biomarker reflecting systemic inflammatory status in cerebrovascular diseases.

Objective: This study aimed to describe the profile of the Systemic Immune-Inflammation Index (SII) and its association with vascular risk factors in patients with CSVD at Dr. Wahidin Sudirohusodo Central General Hospital during 2024–2025.

Methods: This study used an analytic observational design with a cross-sectional approach based on medical record data of CSVD patients. A total of 80 patients who met the inclusion criteria were included in the analysis. Data collected included demographic characteristics, vascular risk factors, and hematological parameters such as neutrophils, lymphocytes, and platelets used to calculate SII. Data were analyzed descriptively and through bivariate analysis using the Mann-Whitney U test and Kruskal-Wallis test.

Results: The mean age of the patients was 59.95 ± 11.33 years, ranging from 23 to 95 years, with the majority being male (55%). Hypertension was the most common vascular risk factor (58.8%), followed by diabetes mellitus (17.5%) and dyslipidemia (12.5%). The mean neutrophil, lymphocyte, and platelet counts were 5.70 ± 3.15 , 1.96 ± 0.80 , and 284.62 ± 101.91 , respectively. Statistical analysis showed no significant association between hypertension, diabetes mellitus, or dyslipidemia and SII values ($p > 0.05$). Furthermore, the number of vascular risk factors was not significantly associated with SII values ($p = 0.987$).

Conclusion: SII values in CSVD patients showed considerable variation; however, no significant association was found between SII and vascular risk factors in this study.

Keywords: CSVD, Systemic Immune-Inflammation Index, systemic inflammation, vascular risk factors

DISTRIBUTION OF CASTELLI RISK INDEX-I IN ACUTE ISCHEMIC STROKE: A TWO-YEAR DESCRIPTIVE STUDY AT A TERTIARY HOSPITAL

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Background: Dyslipidemia plays a crucial role in the development of atherosclerosis and ischemic stroke. Lipid ratios, such as the Castelli Risk Index-I (CRI-I), may provide a more comprehensive assessment of atherogenic burden compared with individual lipid parameters. However, data describing CRI-I distribution in acute ischemic stroke populations remain limited, particularly in real-world tertiary care settings.

Objective: To describe the distribution and characteristics of Castelli Risk Index-I among patients with acute ischemic stroke admitted to a tertiary referral hospital.

Methods: This retrospective descriptive study included adult patients with acute ischemic stroke admitted to Dr. Wahidin Sudirohusodo Hospital between January 2023 and December 2024. Demographic, clinical, and lipid profile data were extracted from electronic medical records. CRI-I was calculated as the ratio of total cholesterol to high-density lipoprotein cholesterol and categorized using gender-specific thresholds. Descriptive statistical analyses were performed to summarize the distribution of CRI-I.

Results: A total of 44 patients were identified, of whom 40 had complete lipid data and were included in the analysis. The mean CRI-I was 6.14 ± 1.96 , with a median of 5.94 (IQR 4.96–7.75) and values ranging from 2.43 to 10.32. Most patients (90%) demonstrated elevated CRI-I based on gender-specific thresholds. The overall distribution showed a predominance of higher CRI-I values, indicating a substantial atherogenic lipid burden in this cohort.

Conclusion: CRI-I was predominantly elevated among patients with acute ischemic stroke, suggesting that atherogenic dyslipidemia is common in this population. CRI-I may serve as a practical marker for characterizing vascular risk beyond conventional lipid parameters, warranting further studies to explore its prognostic and clinical implications.

Keywords: Acute ischemic stroke, Castelli Risk Index-I, Dyslipidemia, Lipid ratio, Atherogenic risk

EARLY NEUROLOGICAL DETERIORATION IN MINOR ISCHEMIC STROKE WITH LVO: INCIDENCE AND IMAGING PREDICTORS

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Introduction: Early neurological deterioration (END) in patients presenting with minor ischemic stroke and large vessel occlusion (LVO) poses a significant clinical challenge. Despite mild initial deficits, a subset of patients experiences rapid worsening, and the incidence and imaging predictors of END remain incompletely defined.

Objective: To estimate the 24-hour incidence of END in minor LVO ischemic stroke and to evaluate whether occlusion site independently predicts deterioration.

Methods: A systematic review of observational studies evaluating END in minor LVO ischemic stroke was conducted. Studies defining END as an increase in NIHSS ≥ 4 within 24 hours were pooled using a random-effects meta-analysis to estimate incidence. Leave-one-out sensitivity analysis was performed to assess robustness of the pooled estimate. Adjusted odds ratios (OR) for occlusion-site imaging predictors were synthesized using random-effects models.

Results: Ten studies were included in the systematic review. Seven studies ($n = 1,231$) using a uniform 24-hour END definition were pooled for incidence analysis. The pooled incidence of END was 23% (95% CI 15–33%), with substantial heterogeneity ($I^2 = 82.7\%$). Leave-one-out analysis demonstrated stable pooled estimates after sequential exclusion of individual studies. In imaging analyses, internal carotid artery (ICA) occlusion was not significantly associated with END (OR 1.67, 95% CI 0.80–3.51; $p = 0.171$). M1 occlusion demonstrated a similar non-significant association (OR 1.19, 95% CI 0.96–1.47; $p = 0.107$). Vertebrobasilar occlusion was likewise not significantly related to END risk (OR 1.92, 95% CI 0.80–4.65; $p = 0.145$).

Conclusion: The pooled 24-hour incidence of END in minor LVO ischemic stroke was 23% and remained consistent on sensitivity analysis. Occlusion site did not demonstrate a statistically significant independent association with END, suggesting that anatomical location alone may be insufficient for

risk stratification and that additional clinical and imaging factors should be considered.

Keywords: Early Neurological Deterioration, Ischemic stroke, Minor stroke, Large Vessel Occlusion

HYPOPERFUSION-RELATED ISCHEMIC STROKE AFTER CARDIAC ARREST AND CABG WITH CONCOMITANT ARTERIAL STENOSIS: CASE REPORT

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Background: Hypoperfusion-induced ischemic stroke is a serious neurological complication following cardiac arrest and major cardiac surgery. Systemic hypotension and impaired cerebral autoregulation may critically reduce cerebral blood flow, particularly in watershed territories. The presence of concomitant large-vessel stenosis further increases susceptibility to ischemic injury. We report a case of hypoperfusion-related ischemic stroke after cardiac arrest following coronary artery bypass grafting (CABG) in a patient with internal carotid artery (ICA) stenosis.

Case Presentation: A 52-year-old man with coronary artery disease underwent CABG and developed postoperative cardiac arrest lasting approximately five minutes, followed by successful resuscitation. Subsequently, he experienced progressive decreased consciousness and right-sided weakness. On admission, blood pressure was 140/50 mmHg with tachycardia. Neurological examination revealed a Glasgow Coma Scale score of E2V2M4 and right hemiparesis. Brain computed tomography showed hypodense lesions in the left anterior corona radiata and centrum semiovale, consistent with watershed infarction, along with lacunar infarctions in the left globus pallidus and putamen. Laboratory findings demonstrated metabolic acidosis with low bicarbonate and negative base excess, mild acute kidney injury, hypernatremia, anemia, and hypoalbuminemia, reflecting systemic hypoperfusion. Digital subtraction angiography revealed significant stenosis of the proximal-to-mid segment of the left ICA with heterogeneous contrast flow and focal luminal narrowing. The patient was diagnosed with hypoperfusion-induced ischemic stroke in the setting of cardiac arrest and concomitant ICA stenosis and was treated with optimal medical therapy.

Discussion: This case highlights the synergistic role of systemic hypoperfusion and pre-existing large-vessel stenosis in precipitating cerebral ischemia. Cardiac arrest leads to global cerebral hypoperfusion, while ICA stenosis further compromises perfusion in vulnerable border-zone regions.

Conclusion: Early recognition of hemodynamic instability and underlying cerebrovascular disease is essential to prevent secondary brain injury and optimize neurological outcomes after cardiac surgery.

Keywords: Hemodynamic ischemic stroke, Cerebral hypoperfusion, Post-cardiac arrest brain injury, Coronary artery bypass grafting (CABG), Large artery stenosis

IS TREATED HIV AN INDEPENDENT PROTHROMBOTIC STATE? ACUTE ISCHEMIC STROKE WITH INFLAMMATORY THROMBOCYTOSIS IN THE ABSENCE OF CLASSICAL RISK FACTORS

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Background: The epidemiology of stroke in people living with HIV (PLWH) is evolving. Despite effective antiretroviral therapy (ART), persistent immune activation and endothelial dysfunction may sustain cerebrovascular vulnerability. Increasing evidence suggests that treated HIV may represent a distinct neurovascular risk condition, independent of classical atherosclerotic mechanisms.

Case Presentation: A 65-year-old man with a one-year history of HIV infection on stable ART presented with acute-onset left hemiparesis and progressive speech impairment. Earlier the same day, he reported nausea and generalized weakness while remaining verbally intact. Within hours, he developed dense left-sided motor deficit, right central facial palsy, and reduced verbal fluency. He had no history of hypertension, diabetes mellitus, atrial fibrillation, structural heart disease, or prior cerebrovascular events, though he was a smoker. On examination, he was alert (GCS 15) and

hemodynamically stable (BP 145/89 mmHg). Neurological assessment demonstrated left hemiparesis (MRC 1/5), hypertonia, positive Hoffman and Babinski signs, and loss of ipsilateral deep tendon reflexes, consistent with an acute upper motor neuron lesion. Language profile was compatible with transcortical motor aphasia, suggesting right hemispheric cortical-subcortical network involvement. Laboratory studies revealed leukocytosis, marked thrombocytosis (520,000/ μ L), and elevated neutrophil-to-lymphocyte ratio (3.84), indicating systemic inflammatory activation. Electrocardiography showed sinus tachycardia without cardioembolic features. The working diagnosis was acute non-hemorrhagic cortical ischemic stroke in the context of treated HIV infection.

Discussion: In the absence of conventional vascular drivers, this case supports the hypothesis that chronic HIV-associated immune activation may promote neurovascular injury through endothelial dysfunction, platelet hyperactivity, and a prothrombotic shift. Inflammatory thrombocytosis and elevated NLR may reflect this pathobiological state. Unlike traditional atherosclerotic stroke, HIV-associated cerebrovascular disease may involve immune-mediated vascular dysregulation affecting cortical networks.

Conclusion: Treated HIV may function as an independent neurovascular risk condition. Stroke risk stratification in PLWH should integrate inflammatory biomarkers and vascular biology beyond classical algorithms. Understanding HIV-specific mechanisms is essential for targeted neuroprotective and preventive strategies in this aging population.

Keywords: HIV, ischemic stroke, inflammation, thrombocytosis, transcortical motor aphasia, neurovascular complications

INCIDENCE OF LEFT MIDDLE CEREBRAL ARTERY PULSATILITY INDEX ELEVATION IN ASYMPTOMATIC POPULATION: NOVEMBER - DECEMBER 2025

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Background: Increased Pulsatility Index (PI) measured by Transcranial Doppler (TCD) is an indicator of increased vascular stiffness and resistance, which can be influenced by various vascular risk factors such as hypertension (HT), diabetes (DM), hyperlipidemia (HL), and smoking habits. Middle cerebral artery (MCA) is the largest branch of anterior circulation and supplies a large area of brain. Disruption of the left MCA (LMCA) has significant clinical implications.

Objective: To determine the incidence of increased PI of LMCA in adult age group without clinical evidence of stroke.

Methods: This cross-sectional study utilized secondary data from the medical records of 71 adult. The data collected included demographic information (age, sex), vascular risk factors (hypertension, diabetes, hyperlipidemia, smoking), and pulsatility index (PI) of the left middle cerebral artery (LMCA). The correlation between vascular risk factors and PI LMCA values was analyzed using Spearman's correlation test, with a p-value of <0.05 considered statistically significant.

Results: A total of 19 (26,76%) of the sample were found to have increased PI LMCA values. Variations in vascular risk factors correlating with the PI of LMCA were found across different age groups. Hypertension showed a positive correlation with an increased PI of LMCA ($r=0.42$; $p=0.04$) in the 3rd decade age group. Hyperlipidemia and smoking correlated with a higher PI of LMCA ($r=0.38$, $p=0.048$; $r=0.41$, $p=0.035$, respectively) in the 4th decade age group. Diabetes and hypertension demonstrated a strong correlation with the PI of LMCA ($r=0.51$, $p=0.012$; $r=0.47$, $p=0.022$) in the 5th decade age group.

Conclusion: 26,76% of adults without clinical stroke exhibited an increased PI LMCA November - December 2025, with variations in vascular risk factors that correlate with PI LMCA across different age groups.

Keywords: Pulsatility Index, Middle Cerebral Artery

ISOLATED HOMONYMOUS HEMIANOPIA AS A MANIFESTATION OF STROKE IN A YOUNG ADULT: A CASE REPORT

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Background: Posterior circulation stroke in young adults is a relatively rare condition and can be challenging to diagnose, especially when the clinical manifestation is isolated to visual disturbances. Homonymous hemianopia (HH) may be the only symptom resulting from lesions in the retro chiasmal visual pathway and is often not immediately recognized as a sign of acute stroke, leading to delayed management.

Case Report: This case report describes a 33-year-old man who presented with sudden visual field loss since one month without other neurological deficits. Examination revealed left homonymous hemianopia without macular sparing. Contrast-enhanced brain MRI confirmed an infarct in the right occipital region extending to the right hippocampus and thalamus. Echocardiography demonstrated a secundum atrial septal defect (ASD), with patent foramen ovale (PFO) as a differential diagnosis, both considered potential embolic sources.

Discussion: Approximately 45% of HH cases are caused by occipital lobe lesions. Occlusion of the posterior cerebral artery (PCA) typically results in HH with macular sparing due to collateral supply from the middle cerebral artery; however, macular sparing was not observed in this patient. This may occur when the entire visual cortex is supplied by the PCA or when there is complete damage to the visual cortex. In young adult patients without classical vascular risk factors, ASD and PFO should be considered as potential aetiologies through a paradoxical embolism mechanism.

Conclusion: This case highlights that HH can be an isolated manifestation of posterior circulation stroke, particularly when the lesion is limited to the visual cortex. The atypical clinical presentation and young age may contribute to delays in diagnosis. Early identification and comprehensive etiological evaluation are essential to optimize management and prevent recurrence. In addition to medical therapy, rehabilitation plays an important role in improving daily functional outcomes.

Keywords: young adult stroke, posterior circulation infarct, visual field defect, homonymous hemianopia

ISCHEMIC STROKE SECONDARY TO CARDIAC MYXOMA OF THE MITRAL VALVE LEAFLET IN A FEMALE AGED 16 YEARS: A RARE CASE REPORT

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Background: Ischemic stroke in young individuals accounts for approximately 10–15% of all stroke cases, with cardioembolic mechanisms representing a major etiology. Primary cardiac tumors, particularly cardiac myxomas, are rare but important causes of cardioembolic stroke. Although cardiac myxomas have a low incidence in the general population (0.001–0.03%) and account for less than 1% of ischemic stroke cases, delayed diagnosis may lead to systemic embolization and multifocal cerebral infarction.

Case Presentation: We report a 17-year-old woman who presented with sudden symptoms of body stiffness and repetitive jerking movements in all four extremities. She had a history of weakness on the right side of her body and slurred speech, which improved within 24 hours at the age of 16. Neurological examination revealed right hemiparesis. Previous brain MRI showed left lentiform nucleus infarction, while the most recent CT scan revealed chronic infarction of the left lentiform nucleus, lacunar infarction of the corona radiata, and right lentiform nucleus infarction. Echocardiography results showed multiple septal masses on the anterior mitral valve, leading to a diagnosis of cardiac myxoma. The patient underwent cardiac tumor resection and showed significant neurological improvement postoperatively.

Discussion: Stroke in young people has various causes, including heart abnormalities, arterial dissection, hematological disorders, and vascular factors. Although rare, cardiac myxoma is an important cause of cardioembolism because it can cause multiple infarcts in various territories if diagnosed late. Early surgical resection effectively prevents recurrent embolization and can improve neurological outcomes, so it should be considered in cases of ischemic stroke in young people with cardiac myxoma as a triggering factor.

Conclusion: Cardiac myxoma should be considered in young stroke patients without conventional risk factors. Prompt cardiovascular evaluation and surgical management are crucial to prevent recurrence and optimize prognosis.

Keywords: Ischemic Stroke, Cardiac Myxoma, Young Patients

LARGE VESSEL OCCLUSION STROKE SECONDARY TO ATRIAL MYXOMA IN EARLY PREGNANCY: A RARE CASE REPORT

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Background: Cardiac myxoma is the most common primary cardiac tumor and an uncommon but important cause of cardioembolic stroke in young adults. Large vessel occlusion (LVO) secondary to myxoma may result in extensive territorial infarction. Management becomes particularly challenging when complicated by haemorrhagic transformation and unrecognized early pregnancy.

Case Presentation: A 34-year-old woman presented with acute decreased consciousness and right hemiparesis after months of intermittent paraesthesia. Brain MRI demonstrated extensive hyperacute-to-acute infarction involving the left frontal, parietal, and anterior temporal lobes, basal ganglia, and internal capsule with left middle cerebral artery (M1) occlusion (ASPECTS 0). Emergent mechanical thrombectomy was performed. Global aphasia precluded reliable history taking, and pregnancy status was unknown at presentation. Post-reperfusion imaging revealed cerebral edema with mild midline shift and subsequent haemorrhagic transformation. Echocardiography identified a 23x33 mm mobile left atrial mass attached to the interatrial septum near the fossa ovalis, consistent with atrial myxoma. During hospitalization, a 6-week intrauterine pregnancy complicated by subchorionic haemorrhage was incidentally diagnosed. The patient subsequently developed intrauterine fetal demise and underwent successful tumor resection.

Discussion: Cardiac myxomas predispose to systemic embolization through tumor fragmentation or thrombus formation on their irregular surface, promoted by turbulent intracardiac flow and platelet activation. Proximal vessel occlusion may result in catastrophic LVO, as observed in this case. Although mechanical thrombectomy is standard therapy for LVO, the presence of haemorrhagic transformation complicates surgical timing, particularly when cardiopulmonary bypass and systemic anticoagulation are required. The coexistence of early pregnancy further intensifies ethical and therapeutic considerations. This case underscores the importance of early cardiac evaluation in young cryptogenic stroke and systematic pregnancy screening when history is unobtainable.

Conclusion: Atrial myxoma should be considered in young patients with severe LVO without conventional risk factors, particularly when clinical features suggest prior embolic events.

Keywords: large vessel occlusion, ischemic stroke, cardiac myxoma, mechanical thrombectomy in pregnancy

MEDIAL MEDULLARY SYNDROME (DEJERINE SYNDROME): A RARE POSTERIOR CIRCULATION STROKE – A CASE REPORT

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Background: Medial medullary syndrome (Dejerine syndrome) is a rare form of posterior circulation stroke, accounting for approximately 1% of cerebral infarctions. The typical clinical manifestations include contralateral hemiparesis and ipsilateral hypoglossal nerve palsy. Due to its rarity and variable clinical presentation, case reporting is important to improve diagnostic accuracy and appropriate management.

Case Presentation: A 48-year-old man presented with sudden weakness of the right upper and lower limbs, preceded by throbbing headache, vomiting, dysphagia, slurred speech, and diplopia. He had a history of uncontrolled hypertension. Physical examination revealed compos mentis consciousness, left facial nerve paresis, and decreased motor strength in the right extremities without sensory deficits. Brain MRI demonstrated an acute infarction in the medial aspect of the left medulla oblongata. He received a loading dose of clopidogrel 300 mg and aspirin 325 mg, followed by clopidogrel 75 mg/day and aspirin 160 mg/day, atorvastatin 80 mg/day and cilostazol 50 mg twice daily. The patient showed clinical improvement and was discharged in stable condition.

Discussion: This case illustrates medial medullary syndrome as a rare form of posterior circulation stroke caused by occlusion of the anterior spinal artery or paramedian branches of the vertebral artery. Clinically, the patient presented with contralateral limb weakness consistent with corticospinal tract involvement, accompanied by brainstem symptoms such as dysphagia, dysarthria, and diplopia. Brain MRI confirmed an acute infarction in the medial aspect of the left medulla oblongata. Management followed acute ischemic stroke guidelines with dual antiplatelet therapy, high-intensity statin for plaque stabilization and antihypertensive therapy for secondary prevention.

Conclusion: Medial medullary syndrome is a rare form of brainstem stroke that can be recognized by the presence of contralateral hemiparesis and ipsilateral hypoglossal nerve deficits. Early MRI-based diagnosis and comprehensive management are essential to improve clinical outcomes and prevent recurrent vascular events.

Keywords: Moyamoya disease, Pediatric stroke, Diagnostic challenge, Structural brain abnormality, Cerebral vasculopathy

MOYAMOYA DISEASE PRESENTING AS STRUCTURAL BRAIN ABNORMALITY IN A CHILD: A DIAGNOSTIC CHALLENGE

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Background: Moyamoya disease is a progressive cerebrovascular arteriopathy and an important cause of pediatric ischemic stroke. In children, its clinical presentation may be heterogeneous and occasionally misleading, particularly when structural brain abnormalities are identified on initial imaging. Such findings may obscure the underlying vascular pathology and delay appropriate diagnosis.

Case Presentation: A 7-year-old girl with a history of prematurity and previously diagnosed hydrocephalus presented with prolonged focal status epilepticus followed by persistent left-sided weakness. Initial non-contrast computed tomography revealed right frontal hypodensity, bilateral frontal hypoplasia, and ventriculomegaly, raising consideration of congenital or developmental brain abnormality with possible superimposed infarction. Despite supportive management and seizure control, the patient developed progressive motor deterioration involving all four extremities. Laboratory evaluation did not identify metabolic, infectious, or coagulation abnormalities explaining the neurological deficits. Subsequent vascular imaging demonstrated bilateral stenosis of the terminal internal carotid arteries with prominent basal collateral formation, establishing the diagnosis of Moyamoya disease.

Discussion: This case illustrates how structural brain abnormalities may confound early diagnostic reasoning in children with acute neurological deficits. The coexistence of prematurity-related imaging findings and evolving focal deficits created a diagnostic dilemma. Clinical features such as sudden hemiparesis, prolonged focal seizure, and progressive neurological decline were inconsistent with a static structural lesion and suggested an underlying vasculopathy. Reliance solely on non-contrast CT contributed to delayed recognition of the vascular etiology.

Conclusion: Moyamoya disease should be considered in children presenting with acute or progressive focal deficits, even in the presence of structural brain abnormalities. Early vascular evaluation is essential to avoid diagnostic delay and reduce the risk of recurrent ischemic injury.

Keywords: Moyamoya disease, Pediatric stroke, Diagnostic challenge, Structural brain abnormality, Cerebral vasculopathy

NEUROFILAMENT LIGHT CHAIN AS A PROGNOSTIC BIOMARKER FOR POST-STROKE COGNITIVE IMPAIRMENT: A SYSTEMATIC REVIEW OF PROSPECTIVE COHORT STUDIES

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Background: Post-stroke cognitive impairment (PSCI) is a common complication affecting a substantial proportion of stroke survivors and is associated with reduced functional independence, poorer rehabilitation outcomes, and increased caregiver burden. Early identification of patients at risk remains challenging. Neurofilament Light Chain (NfL), a marker of neuroaxonal injury, has emerged as a potential blood-based biomarker in neurological disorders. **Objective:** To systematically evaluate prospective evidence on NfL as a predictor of cognitive impairment following ischemic or hemorrhagic stroke.

Methods: A systematic review was conducted in accordance with PRISMA Guidelines. PubMed, Cochrane Library, and ScienceDirect were searched for prospective cohort studies assessing plasma or serum NfL levels and subsequent cognitive outcomes in adult stroke patients. Eligible studies evaluated cognitive outcomes using validated assessment tools during follow-up. Due to methodological heterogeneity across studies, findings were synthesized narratively due to methodological heterogeneity.

Results: Seven prospective cohort studies involving 2,907 stroke patients were included. Most studies measured NfL within 24–48 hours after stroke onset and assessed cognitive outcomes between 3 and 12 months. Across studies, elevated baseline NfL levels were consistently associated with an increased risk of PSCI and lower cognitive scores. In multivariable analyses, NfL remained independently predictive after adjustment for age, stroke severity, and infarct volume. Reported discriminative performance ranged from AUC 0.672 to 0.865, indicating moderate to good predictive ability.

Conclusion: Blood-based NfL measurement is consistently associated with post-stroke cognitive impairment. These findings support circulating NfL as a promising biomarker for early risk stratification of PSCI in stroke survivors.

Keywords: neurofilament light chain, post-stroke cognitive impairment, stroke, biomarker

PLATELET COUNT AND PARENCHYMAL CT ATTENUATION IN ACUTE ISCHEMIC STROKE: INSIGHTS INTO HEMATOLOGIC INFLUENCE ON QUANTITATIVE BRAIN DENSITY

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Background: Non-contrast head computed tomography (CT) is the primary imaging modality for the evaluation of acute ischemic stroke and allows quantitative assessment of tissue density through Hounsfield Unit (HU) measurements. While platelet count plays a central role in thrombus formation and stroke pathophysiology, its association with quantitative parenchymal density on CT has not been clearly established.

Objective: To determine the correlation between platelet count and mean Hounsfield Unit values on non-contrast head CT in patients with acute ischemic stroke.

Methods: This retrospective cohort study was conducted at RS. Wahidin Sudirohusodo from January 2023 to December 2024. A total of 88 patients with acute ischemic stroke who underwent non-contrast head CT and had available admission platelet count data were included. Mean HU values were measured within the infarcted brain parenchyma using a standardized region-of-interest approach. Platelet counts were obtained at hospital admission. Correlation analysis was performed using Spearman's rank correlation test, with statistical significance defined as $p < 0.05$.

Results: The mean age of patients was 57.08 ± 9.12 years, and 58.0% were male. The median platelet count was $252 \times 10^3/\mu\text{L}$ (range 151–456 $\times 10^3/\mu\text{L}$), and the median HU value measured in the infarcted brain parenchyma was 20 HU (range 14–28 HU). Spearman's analysis demonstrated a weak but statistically significant positive correlation between platelet count and HU values ($r = 0.206$, $p = 0.001$).

Conclusion: The analysis revealed a weak but statistically significant positive correlation between platelet count and parenchymal HU values on non-contrast CT among patients with acute ischemic stroke. While the strength of the association was limited, the findings indicate a potential relationship between systemic hematologic factors and quantitative imaging features of ischemic brain tissue. Further prospective studies are required to determine the clinical significance of this association.

Keywords: Acute ischemic stroke, Platelet count, Hounsfield Unit, Non-contrast CT, Brain parenchymal density

PRIMARY INTRAVENTRICULAR HEMORRHAGE IN 56 YEAR OLD MALE: A CASE REPORT

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Background: Primary intraventricular hemorrhage (PIVH) is a rare subtype of intracranial hemorrhage in adults. PIVH is reported to account for 3.1%–9% of all types of intracranial hemorrhage (ICH). The etiology of adult PIVH is variable and often remains idiopathic. In some cases, underlying cerebrovascular abnormalities can be found, such as intracranial aneurysm, arteriovenous malformation, and moyamoya disease. Management of PIVH focuses on cessation of bleeding, reducing intracranial pressure and treating associated hydrocephalus.

Case Presentation: A 56-year-old male presented with sudden loss of consciousness two hours prior to admission. He had complained of severe headache and projectile vomiting before loss of consciousness. There was no prior history of Diabetes Mellitus or hypertension. On examination, the Glasgow Coma Scale (GCS) score was 7 (E1M4V2) and blood pressure was 214/108 mmHg with normal temperature. Neurological examination revealed rigidity without hemiparesis. Non-contrast brain computed tomography (CT) showed hyperdense lesions within the bilateral lateral ventricle, third ventricle and fourth ventricle. Which suggests that this is an intraventricular hemorrhage of primary type.

Discussion: The diagnosis of PIVH in this case was established based on clinical presentation and CT imaging findings. The sudden onset of decreased consciousness suggested a vascular etiology. Recommended supportive medical treatments include neuroprotective agent and antihypertensive agents. PIVH is frequently associated with hydrocephalus, which may require placement of an external ventricular drain (EVD) to remove cerebrospinal fluid and reduce intracranial pressure.

Conclusion: Primary intraventricular hemorrhage in adults is a rare condition and is often idiopathic, particularly in elderly patients. Early recognition and appropriate management are crucial to improve clinical outcomes.

Keywords: Primary Intraventricular Hemorrhage (PIVH), Hydrocephalus, External Ventricular Drain (EVD)

PROFILE OF NLR, PLR, AND VASCULAR RISK FACTORS IN CEREBRAL SMALL VESSEL DISEASE PATIENTS

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Background: Cerebral Small Vessel Disease (CSVD) is a pathological condition affecting the small vessels of the brain and is a major cause of lacunar stroke, vascular cognitive impairment, and dementia in the elderly population. Systemic inflammation plays an important role in the pathogenesis of CSVD. The Neutrophil–Lymphocyte Ratio (NLR) and Platelet–Lymphocyte Ratio (PLR) are simple inflammatory biomarkers derived from routine blood tests and may serve as indicators of inflammatory processes in vascular diseases.

Objective: This study aimed to describe the profile of NLR and PLR and their association with vascular risk factors in patients with CSVD at Dr. Wahidin Sudirohusodo Central General Hospital during 2024–2025.

Methods: This study used a descriptive observational design with a cross-sectional approach using medical record data of CSVD patients. A total of 82 patients who met the inclusion criteria were included in the analysis. Data collected included demographic characteristics, vascular risk factors, and hematological parameters such as neutrophils, lymphocytes, and platelets to calculate NLR and PLR values. Data were analyzed descriptively and through bivariate analysis using the Mann–Whitney U test and Kruskal–Wallis test.

Results: The mean age of the patients was 56.3 ± 10.7 years, ranging from 40 to 79 years, with the majority being male (56.1%). Hypertension was the most common vascular risk factor (57.3%), followed by diabetes mellitus (17.1%) and dyslipidemia (13.4%). The mean NLR value was 3.76 ± 3.85 , while the mean PLR value was 173.21 ± 103.76 . Statistical analysis showed no significant association between vascular risk factors or the number of risk factors and NLR and PLR values ($p > 0.05$).

Conclusion: NLR and PLR values in CSVD patients showed wide variation, but no significant association was found between these biomarkers and vascular risk factors.

Keywords: CSVD, NLR, PLR, systemic inflammation, vascular risk factors

PROGNOSTIC SIGNIFICANCE OF THE HALP SCORE IN ACUTE ISCHEMIC STROKE: A SYSTEMATIC REVIEW

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Background: Acute ischemic stroke (AIS) remains a leading cause of mortality and long-term disability worldwide. Reliable and accessible prognostic biomarkers are essential for early risk stratification. The Hemoglobin, Albumin, Lymphocyte, and Platelet (HALP) score integrates nutritional and inflammatory parameters and has emerged as a potential prognostic indicator in AIS.

Objective: To systematically evaluate the prognostic significance of the HALP score in patients with AIS.

Methods: A systematic review was conducted following PRISMA 2020 guidelines. PubMed, Scopus, Web of Science, and Google Scholar were searched for studies published from 2021 to 2026. Seven studies included prospective cohort, retrospective, and cross-sectional designs with sample sizes ranging from 100 to 3,603 patients. Eligible studies enrolled adult AIS patients, reported HALP score, and assessed mortality, functional outcome (mRS), hemorrhagic transformation, or post-stroke infection. Case reports, editorials, and studies with $n < 50$ were excluded. Reviewers independently performed screening, data extraction, and risk-of-bias assessment. Narrative synthesis was applied due to outcome and methodological heterogeneity.

Results: Across included studies, lower HALP scores were consistently associated with increased mortality and poorer functional outcomes. Higher HALP levels were associated with reduced long-term mortality (HR approximately 0.34–0.35) and lower odds of unfavorable functional outcome (mRS 3–6). Lower HALP was also linked to increased risk of post-

stroke infection and hemorrhagic transformation following intravenous thrombolysis. HALP demonstrated moderate discriminative performance (AUC range 0.61–0.78) and remained significant after multivariable adjustment in several studies.

Conclusion: Lower HALP scores are associated with adverse clinical outcomes in AIS. Given its derivation from routine laboratory parameters, HALP may serve as a practical and cost-effective adjunct for early prognostic assessment. Further prospective studies are warranted to confirm its clinical utility.

Keywords: HALP score, acute ischemic stroke, prognosis, mortality, functional outcome

PROGRESSIVE HEMIPARESIS WITH CLINICAL IMPROVEMENT IN CEREBRAL SMALL VESSEL DISEASE WITH MULTIPLE ARTERIAL STENOSES

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Background: Cerebral small vessel disease (CSVD) is a common cause of lacunar stroke and chronic neurological disability in elderly patients with vascular risk factors. Although CSVD primarily affects small penetrating arteries, advanced imaging may reveal concomitant distal arterial stenoses, reflecting overlapping vascular pathology.

Case Presentation: A 64-year-old man presented with progressive right-sided weakness that initially developed four years earlier and worsened one month prior to admission. The weakness was accompanied by mild dysarthria and right central facial and hypoglossal paresis. He had a history of poorly controlled hypertension and previous ischemic stroke without residual deficits. Neurological examination showed right hemiparesis (MRC 4/5) with preserved sensory and cortical functions. Brain MRI demonstrated extensive white matter hyperintensities (Fazekas grade III) and multiple lacunar infarctions involving the centrum semiovale, corona radiata, thalamus, basal ganglia, pons, and left cerebellar hemisphere, consistent with advanced CSVD. Digital subtraction angiography (DSA) revealed multiple stenoses in the distal branches of bilateral middle cerebral arteries and vertebral arteries, indicating superimposed intracranial atherosclerotic changes. The patient received antiplatelet therapy, statin, antihypertensive treatment, and supportive neuroprotective agents. His neurological status remained stable during hospitalization.

Discussion: This case highlights progressive right hemiparesis as a manifestation of severe CSVD with high white matter burden. Chronic hypertension likely induced lipohyalinosis and endothelial dysfunction, resulting in recurrent subcortical ischemia. The DSA findings of multiple distal arterial stenoses emphasize the potential overlap between small vessel disease and distal intracranial large artery atherosclerosis.

Conclusion: Progressive focal deficits in elderly hypertensive patients should raise suspicion for advanced CSVD. DSA may uncover additional distal arterial stenoses that contribute to chronic cerebral hypoperfusion. Optimal vascular risk control remains essential to prevent further neurological deterioration.

Keywords: cerebral small vessel disease, hemiparesis, white matter hyperintensities, hypertension, digital subtraction angiography

RISK FACTORS OF GROIN HEMATOMA FOLLOWING CEREBRAL DIGITAL SUBTRACTION ANGIOGRAPHY VIA TRANSFEMORAL APPROACH

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Introduction: Digital subtraction angiography (DSA) remains the standard for diagnosing cerebrovascular abnormalities. However, it carries potential complications, with groin hematoma being the most common

access-site complication in 2.49% of cases. Several factors associated with increased risk, including obesity, uncontrolled hypertension and dual antiplatelet (DAPT) therapy. Despite that, the relative contribution of each factor to the incidence of groin hematoma remains unclear.

Objective: To determine clinical and procedural factors that independently predict the occurrence of groin hematoma after cerebral digital subtraction angiography.

Method: A retrospective cohort study of patients with cerebrovascular pathology who underwent transfemoral cerebral DSA at Moewardi General Hospital, between September and December 2025. The primary outcome was groin hematoma during hospitalization. Predictors were evaluated using Fisher's exact/Mann-Whitney U tests and multivariable logistic regression estimated adjusted odds ratios.

Result: Among 50 patients undergoing cerebral DSA, 6 (12.0%) developed groin hematoma during hospitalization. The mean age was 58.2 ± 11.0 years, and 52.0% were female (26/50). Patients with hematoma were older than those without hematoma, although the difference was not statistically significant (66.5 ± 11.2 vs 57.1 ± 10.6 years). In bivariate analyses, Systolic Blood Pressure (SBP) ≥ 180 mmHg was more frequent in the hematoma group (83.3% vs 15.9%; $p=0.002$), and Body Mass Index (BMI) was higher (median 30.5 vs 25.6 kg/m²; $p=0.010$). DAPT was also more common among patients with hematoma (66.7% vs 20.5%; $p=0.033$). In multivariable logistic regression adjusting for BMI ≥ 30 kg/m² (Model 2), SBP ≥ 180 mmHg remained independently associated with groin hematoma (OR 39.47, 95% CI 1.58–984.96; $p=0.025$), whereas BMI ≥ 30 kg/m² was not ($p=0.723$).

Conclusion: After adjustment for obesity, severe pre-procedural hypertension (SBP ≥ 180 mmHg) remained independently associated with groin hematoma following transfemoral cerebral DSA. Given the small number of events and wide confidence intervals, larger studies needed to validate these findings.

Keywords: Digital Subtraction Angiography, Hypertension, Postprocedural complications

SPONTANEOUS CLINICAL IMPROVEMENT AND ANGIOGRAPHIC RESOLUTION OF INDIRECT CAROTID CAVERNOUS FISTULA: CASE REPORT

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Background: Dural carotid-cavernous fistula (CCF) is a low-flow arteriovenous shunt between meningeal branches of the carotid arteries and the cavernous sinus. It commonly presents with periorbital pain, proptosis, conjunctival injection, and elevated intraocular pressure due to orbital venous hypertension. Some dural CCFs may resolve spontaneously, making the correlation between clinical improvement and angiographic findings important for management.

Case Presentation: A 68-year-old woman presented to RSUP Haji Adam Malik Medan with a one-year history of progressive left periorbital pain, proptosis, and conjunctival redness. She had no history of head trauma or prior ocular injury. Ophthalmologic evaluation revealed elevated intraocular pressure (IOP) in the left eye. Digital Subtraction Angiography (DSA) performed in February 2025 demonstrated early filling of the left cavernous sinus consistent with a low-flow dural CCF, without evidence of cortical venous reflux. Given the mild and stable clinical presentation, the patient was managed conservatively with serial clinical and radiologic monitoring. Over time, the patient reported gradual improvement in pain, redness, and proptosis. A follow-up DSA in early February 2026 showed complete disappearance of early cavernous sinus filling and abnormal venous drainage, indicating spontaneous angiographic resolution. These findings correlated directly with the patient's clinical improvement and normalization of IOP.

Discussion: Spontaneous resolution of dural CCF is likely related to progressive thrombosis within the cavernous sinus compartments or closure of arteriovenous microshunts. The absence of cortical venous reflux may contribute to the relatively benign clinical course, allowing conservative management. The case highlights the importance of

correlating clinical evolution with angiographic findings to guide individualized treatment decisions.

Conclusion: This case demonstrates that dural CCF in elderly patients can resolve spontaneously, with parallel clinical improvement and angiographic normalization. Serial DSA monitoring provides a rational approach for selected low-risk patients, potentially avoiding unnecessary endovascular intervention.

Keywords: Indirect Carotid Cavernous Fistula, Spontaneous Resolution, Digital Subtraction Angiography (DSA), Clinical Improvement, Conservative Management

STROKE IN A 19-YEAR OLD YOUNG ADULT: A CASE REPORT

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Background: Stroke recognized as a leading cause of the global disease burden, has become an increasingly significant public health concern. As we know Stroke in adolescents and young adults are uncommon, the etiology can be challenging puzzle to solve. Nevertheless, it is crucial to differentiate stroke mimics, conditions that exhibit neurological symptoms similar to stroke.

Case Presentation: A 19th y.o male with stroke symptom came to emergency unit. The patient was found lying on the floor unconscious-unaware with chair pressed against his neck in a locked room. When the patient was found, there were marks on his neck. The exact chronology of events is unknown. He had no history of seizures or previous illness. On physical examination, we found GCS 11 with right lateralization. The patient was very weak and somnolent with global afasia. On MRI examination, there were hyperintense lesions and hypointense as well as slight hyperintense on T2 and Flair, in the right and left frontal precentral gyrus and part of the temporal. On EEG, Continuous slow activity general reactive was found.

Discussion: Stroke in young adults is often caused by cardiac problem or life-style disease. Stroke like symptoms or stroke mimic can caused by many problems, such as hypoxia. Blunt neck trauma can directly compress or shut down major arteries (common carotid artery) that supply blood to the brain. The brain can become hypoxic if blood vessels are compromised, leading to a cascade of events similar to an ischemic stroke, where neurons are deprived of necessary nutrients and oxygen.

Conclusion: Stroke at a young age can be caused by many factors, one of which is long-term hypoxia. The prologed hypoxia was leading to permanent brain damage.

Keywords: Stroke-Like Symptoms Mimicked by Hypoxia, Vascular Compression, Young-Adult Stroke

SUBARACHNOID HEMORRHAGE DUE TO CEREBRAL SINUS VENOUS THROMBOSIS

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Background: Subarachnoid hemorrhage (SAH) secondary to cerebral sinus venous thrombosis (CSVT) is infrequent. It presents diagnostic and therapeutic challenges because its management differs from that SAH caused by aneurysmal rupture.

Case Presentation: A 41-year-old man presented with status epilepticus and decreased consciousness, preceded by a sudden, severe headache. The headache had persisted for one week and acutely worsened to a visual analog scale (VAS) score of 9–10. He was an active smoker, consumed alcohol, and had a history of head trauma one year earlier. Examination revealed a Glasgow Coma Scale (GCS) score of E2VxM3 and blood pressure of 263/170 mmHg, positive neck stiffness and left-sided lateralization. Laboratory investigations showed an elevated D-dimer level. Non-contrast head computed tomography (CT) demonstrated SAH diffuse bilaterally predominant posterior territory and bilateral occipital oedema related to venous hypertension and congestion of the bilateral transverse sinuses. Digital subtraction angiography (DSA) revealed a thrombus in the mid-portion of the superior sagittal sinus. Anticoagulant therapy was initiated with continuous intravenous heparin for five days,

followed by oral warfarin. The patient regained full consciousness and showed clinical improvement during treatment.

Discussion: Headache is the most common symptom of CSVT (90%) and may rarely present with extremely severe intensity suggestive of SAH (<5%). Other symptoms include seizures (20-40%), focal neurological deficits (20-50%), papilledema and diplopia (6-14%). The mechanism involves secondary venous hypertension due to thrombosis, leading to rupture of cortical veins with subsequent extension of hemorrhage into the subarachnoid space. Anticoagulation remains the first-line therapy even in the presence of intracranial hemorrhage.

Conclusion: CSVT should be considered in the differential diagnosis of SAH, particularly in cases without evidence of aneurysm. Increased clinical awareness and early initiation of anticoagulant therapy may optimize clinical outcomes and patient prognosis.

Keywords: Subarachnoid hemorrhage, cerebral venous sinus thrombosis, anticoagulant therapy

THE COMPREHENSIVE SYSTEMATIC REVIEW OF SAFETY PROFILE COMPARISON BETWEEN TENECTEPLASE AND ALTEPLASE IN ACUTE ISCHEMIC STROKE

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Background: The choice of thrombolytic therapy for acute ischemic stroke (AIS) requires balancing clinical benefit with safety. Alteplase has long been the standard treatment, while tenecteplase has emerged as an alternative with practical advantages, particularly single-bolus administration. A comprehensive and updated comparison of their safety profiles is necessary to inform evidence-based clinical decision-making.

Methods: This systematic review synthesized evidence from 80 sources, including randomized controlled trials, systematic reviews, meta-analyses, and observational studies comparing tenecteplase and alteplase in adult AIS patients. Eligible studies directly compared both agents and reported safety outcomes. Extracted data included study design, patient characteristics, tenecteplase dosing, and safety endpoints such as symptomatic intracranial hemorrhage (sICH), any intracranial hemorrhage (ICH), mortality, and other bleeding events.

Results: Tenecteplase at a dose of 0.25 mg/kg demonstrated a safety profile comparable to standard-dose alteplase (0.9 mg/kg). Pooled analyses showed no significant differences in sICH (e.g., RR 1.12, 95% CI 0.79–1.59), any ICH, or 90-day mortality (e.g., OR 0.97, 95% CI 0.81–1.16). In contrast, a clear dose-dependent effect was observed, with the 0.4 mg/kg dose of tenecteplase associated with significantly higher risks of sICH, any ICH, and mortality. Safety outcomes were generally consistent across subgroups, although a potential increased risk was noted in patients pre-treated with direct oral anticoagulants. Mechanistic data suggest less systemic fibrinogen depletion with tenecteplase, supporting its favorable safety profile at appropriate dosing.

Conclusion: Tenecteplase at 0.25 mg/kg has a safety profile comparable to alteplase in AIS treated within 4.5 hours and represents a safe, practical alternative. The 0.4 mg/kg dose should be avoided. Further studies are needed in specific high-risk subpopulations.

Keywords: Tenecteplase, Alteplase, Acute Ischemic Stroke, Safety, Systematic Review, Intracranial Hemorrhage, Thrombolysis

TNF-ALPHA DAN NITRIC OXIDE SERUM PADA STROKE ISKEMIK AKUT: HUBUNGAN DENGAN UKURAN INFARK OTAK

Muhammad Ikhsan Ramadhan¹, Ashari Bahar²

Background: Acute ischemic stroke is associated with inflammatory and oxidative stress responses that contribute to neuronal injury and infarct expansion. Tumor necrosis factor-alpha (TNF-α) acts as a key pro-inflammatory cytokine, while nitric oxide (NO) plays a dual role as both a neuroprotective and neurotoxic mediator depending on its concentration. Evaluating the relationship between these biomarkers and infarct size may provide insight into stroke pathophysiology and prognosis.

Objective: To analyze the association between serum TNF-α and nitric oxide levels and infarct size in patients with acute ischemic stroke.

Methods: This study is an observational analytic study with a cross-sectional design. The study was conducted at Dr. Wahidin Sudirohusodo

General Hospital Makassar and affiliated teaching hospitals. A total of 30 patients with acute ischemic stroke onset 1–7 days were enrolled using consecutive sampling. Serum TNF- α and nitric oxide levels were measured at hospital admission using enzyme-linked immunosorbent assay (ELISA). Infarct size was assessed using non-contrast head CT scan and calculated manually using the Broderick formula. Statistical analysis was performed to evaluate the association between serum TNF- α levels, nitric oxide levels, and infarct size.

Results: Higher serum TNF- α and nitric oxide levels are associated with larger infarct size in patients with acute ischemic stroke.

Conclusions: This study is demonstrate an association between increased serum TNF- α and nitric oxide levels and infarct size in acute ischemic stroke. These biomarkers may have potential value as indicators of infarct severity and may contribute to future prognostic assessment and therapeutic strategies.

Keywords: acute ischemic stroke, TNF-alpha, nitric oxide, infarct size, inflammation

THUNDERCLAP HEADACHE DUE TO RUPTURED LEFT MIDDLE CEREBRAL ARTERY ANEURYSM MANAGED BY ENDOVASCULAR COILING: A CASE REPORT

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Introduction: Aneurysmal subarachnoid hemorrhage (SAH) is a critical neurological emergency requiring rapid diagnosis and definitive intervention to prevent catastrophic rebleeding.¹ A hallmark clinical presentation is the “thunderclap” headache (reaching peak intensity within ≤ 1 minute), which signifies an acute vascular event.² Digital subtraction angiography (DSA) remains the gold standard for identifying the source and facilitating treatment planning.³ Endovascular coiling has emerged as a primary treatment modality due to its efficacy and minimally invasive nature, even in complex locations such as the middle cerebral artery (MCA) bifurcation.^{4,5}

Case Description: A 61-year-old female presented with sudden loss of consciousness preceded by a “thunderclap” headache and projectile vomiting. Physical examination revealed a somnolent state (GCS E3M5V3), severe hypertension (195/107 mmHg), and positive meningeal signs. Initial CT scans confirmed SAH and cerebral edema. DSA revealed a ruptured saccular aneurysm at the left MCA bifurcation (4.90 mm x 2.77 mm, neck 2.31 mm). The clinical course was complicated by Hospital-Acquired Pneumonia and protein-energy malnutrition, managed through a multidisciplinary approach. Following stabilization, endovascular coiling was performed successfully under an ASA IV classification.

Discussion: Aneurysms at the MCA bifurcation present unique anatomical challenges for endovascular access. In this case, the acute onset of high-intensity headache was a crucial diagnostic indicator.² Management required rigorous blood pressure regulation and intracranial pressure control.⁵ Endovascular coiling provided effective occlusion of the aneurysm, preventing rebleeding and leading to significant neurological recovery.^{1,6}

Conclusion: Endovascular coiling for ruptured MCA bifurcation aneurysms demonstrates excellent efficacy. Success relies on early symptom recognition and precise DSA mapping to reduce morbidity in SAH patients.

Keywords: Subarachnoid hemorrhage, MCA aneurysm, endovascular coiling, thunderclap headache

WHEN AUTOIMMUNITY TARGETS THE BRAIN: CASE REPORT OF ACUTE ISCHEMIC STROKE IN SLE

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Introduction: Neuropsychiatric lupus refers to the complications of systemic lupus erythematosus (SLE) involving the central nervous system, arising through multifactorial mechanisms including immune-mediated neuronal injury and vascular damage such as thrombus

formation and microangiopathy. The spectrum of neuropsychiatric lupus is broad; however, this case focuses on the manifestation of acute ischemic stroke mediated by autoimmune dysregulation.

Case Report: A 30-year-old female presented to the Emergency Department with a sudden-onset right-sided facial deviation, inability to speak with preserved comprehension, and left-sided hemiparesis of 5 hours duration. Physical examination revealed right-sided mouth deviation, leftward tongue deviation, left extremity paralysis, and a positive Babinski sign on the left lower limb. The patient had been receiving treatment for SLE for two years with no other conventional vascular risk factors. Non-contrast head CT scan demonstrated bilateral cerebral infarction, predominantly on the right side. She was diagnosed with acute ischemic stroke and managed pharmacologically with aspirin, citicoline, mecobalamin, and high-dose methylprednisolone. Following 10 days of hospitalization, significant clinical improvement was observed.

Discussion: Patients with SLE carry a substantially elevated risk of thrombus formation compared to the general population, particularly at a young age. Immune system dysregulation in SLE is initiated by autoantibody production and immune complex formation. Immune complexes deposited on endothelial cells trigger complement activation and induce inflammation, resulting in endothelial dysfunction and disruption of tight junctions, thereby facilitating microthrombosis. Endothelial dysfunction may also increase blood–brain barrier permeability, amplifying local inflammatory responses and vascular injury, ultimately leading to ischemic lesions.

Conclusion: In cases of acute ischemic stroke occurring in young women, autoimmune etiology should be considered as a potential underlying cause, particularly in the absence of classical vascular risk factors. Prompt diagnosis and appropriate acute management are expected to reduce morbidity and mortality in patients with autoimmune-induced acute ischemic stroke.

Keywords: neuropsychiatric lupus, systemic lupus erythematosus (SLE), acute ischemic stroke

YOUNG INTRACEREBRAL HEMORRHAGE ASSOCIATED WITH ANTICOAGULANT THERAPY IN RHEUMATIC MULTIVALVULAR HEART DISEASE

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Background: Intracerebral hemorrhage (ICH) in young patients is uncommon and often reflects heterogeneous etiologies beyond traditional vascular risk factors. Structural cardiac disease, particularly rheumatic multivalvular heart disease requiring long-term anticoagulation, introduces a complex interplay between thromboembolic prevention and hemorrhagic risk. Evidence guiding management in this setting remains limited.

Case Presentation: We report an 18-year-old male who presented with acute left-sided weakness and dysarthria. Neuroimaging revealed a right parietal intracerebral hemorrhage. The patient had a recent diagnosis of rheumatic multivalvular heart disease and was receiving oral anticoagulant therapy for thromboembolic prevention. Laboratory evaluation demonstrated mild anemia and slightly elevated coagulation parameters without supratherapeutic anticoagulation. Cardiac imaging confirmed significant multivalvular involvement. Anticoagulant therapy was withheld, coagulation support was administered, and multidisciplinary management including cardiology consultation and early rehabilitation was initiated. The patient showed gradual neurological improvement with residual mild hemiparesis at discharge.

Discussion: Young ICH occurring during anticoagulant therapy represents a significant clinical challenge, particularly in patients with structurally high cardioembolic risk. This case highlights that hemorrhagic stroke may occur even without markedly elevated coagulation indices, suggesting multifactorial mechanisms involving vascular vulnerability and systemic conditions. The central therapeutic dilemma involves balancing prevention of cardioembolic events against the risk of recurrent intracranial bleeding, with limited evidence guiding the timing of anticoagulation reinitiation in rheumatic valvular disease.

Conclusion: Intracerebral hemorrhage in young patients with rheumatic multivalvular heart disease underscores the need for individualized, multidisciplinary decision-making. Careful risk stratification and dynamic reassessment of anticoagulation strategy are essential to optimize neurological recovery while minimizing future cerebrovascular complications.

Keywords: intracerebral hemorrhage, young stroke, rheumatic heart disease, anticoagulant therapy, multivalvular heart disease

STROKE, NEUROVASKULAR, NEUROLOGI ANAK

LARGE VESSEL OCCLUSION STROKE IN PEDIATRIC DOWN SYNDROME: A CASE REPORT IN RURAL AREA

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Background: Pediatric Large Vessel Occlusion (LVO) is a rare condition, with an estimated incidence of approximately 0.24 per 100,000 per year. Children with Down syndrome have a higher risk of ischemic stroke due to congenital vascular abnormalities and cerebral arteriopathy. Optimal management, including the role of mechanical thrombectomy, remains controversial. This report aims to identify risk factors, strategies for recurrence prevention, and functional recovery in a case from Kupang, East Nusa Tenggara.

Case Presentation: A 9-year-old girl with down syndrome presented with sudden right-sided weakness occurring during activity, three days prior to emergency admission. Neurological examination revealed alert consciousness, right central facial and hypoglossal nerve palsy, motor aphasia and right hemiplegia. The Pediatric NIH Stroke Scale (PedNIHSS) score was 15 and the Pediatric Modified Rankin Scale (Ped-mRS) score was 4. Non-contrast head CT scan demonstrated an acute infarction in the left frontotemporoparietal cortex with approximately 0.5 cm midline shift and cerebral edema. The patient received acute ischemic stroke management with comprehensive conservative treatment and intensive medical rehabilitation. Clinical improvement was observed during hospitalization. At 6-month follow-up, PedNIHSS improved to 6 and Ped-mRS to 2.

Discussion: Pediatric LVO stroke in children with down syndrome is rarely reported, and condition-specific evidence remains limited. According to the 2019 guidelines from the American Heart Association/American Stroke Association, pediatric stroke management emphasizes medical stabilization, prevention of complications, and multidisciplinary rehabilitation. In resource-limited settings, a comprehensive and sustained conservative approach may still achieve meaningful clinical and functional outcomes.

Conclusion: This case highlights the diagnostic and therapeutic challenges of pediatric LVO stroke in Down syndrome. Multidisciplinary management with medical therapy and rehabilitation can result in significant clinical and functional improvement within six months.

Keywords: pediatric ischemic stroke, Down syndrome, large vessel occlusion

STROKE, NEUROVASKULAR, NEUROIMUNOLOGI

ESTABLISHING THE DIAGNOSIS OF BILATERAL INTERNAL CAROTID FIBROMUSCULAR DYSPLASIA THROUGH MULTIMODAL IMAGING: A CASE REPORT

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Background: Fibromuscular dysplasia (FMD) is a non-atherosclerotic, non-inflammatory arteriopathy that primarily affects medium-sized arteries, most commonly the renal and internal carotid arteries. Cerebrovascular involvement may present with ischemic stroke and is frequently underrecognized due to overlap with atherosclerosis, vasculitis, and arterial dissection. Multimodal vascular imaging plays a crucial role in establishing an accurate diagnosis.

Case Presentation: A 49-year-old woman presented with chronic headache and a prior left hemispheric ischemic stroke resulting in residual right-sided weakness. She had no conventional vascular risk factors. Laboratory investigations revealed no evidence of active systemic inflammation. Brain magnetic resonance imaging (MRI) demonstrated an infarction in the left centrum semiovale. Magnetic resonance angiography (MRA) showed segmental narrowing of the left internal carotid artery. Definitive evaluation with digital subtraction angiography (DSA) revealed bilateral segmental stenosis alternating with focal dilatation in the proximal internal carotid arteries, producing the classic "string-of-beads" appearance consistent with multifocal FMD. The patient was managed conservatively with antiplatelet therapy and remained clinically stable during follow-up.

Discussion: This case illustrates the diagnostic challenge of cerebrovascular FMD and emphasizes the complementary roles of parenchymal imaging, non-invasive angiography, and catheter-based angiography. While MRI and MRA provided initial evidence of ischemia and arterial narrowing, DSA enabled definitive morphological characterization and differentiation from atherosclerotic and inflammatory arteriopathies.

Conclusion: Multimodal imaging is essential for accurate diagnosis of bilateral internal carotid FMD. Early recognition through stepwise vascular evaluation facilitates appropriate management and may prevent misclassification in patients with atypical cerebrovascular presentations.

Keywords: Fibromuscular dysplasia, Internal carotid artery, Multimodal imaging, Digital subtraction angiography, Ischemic stroke

STROKE, NEUROVASKULAR, NEUROLINTERVENSI, NEUROVASKULER

ASPECTS-BASED COLLATERAL STATUS AS A PREDICTOR OF OUTCOMES AFTER THROMBOLYSIS IN ACUTE ISCHEMIC STROKE

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Background: Acute ischemic stroke remains a leading cause of disability and mortality worldwide. Collateral circulation plays a key role in maintaining cerebral perfusion and determining outcomes in acute ischemic stroke. Assessment of collateral status often requires Computed Tomography Angiography (CTA), which may not be routinely available in many clinical settings, particularly in resource-limited

hospitals. The Alberta Stroke Program Early CT Score (ASPECTS) derived from non-contrast CT may serve as a simple and widely accessible surrogate marker for collateral circulation.

Objective: To evaluate the association between ASPECTS-based collateral status and early neurological improvement as well as 90-day functional outcomes in patients with acute ischemic stroke treated with intravenous thrombolysis.

Methods: A multicenter cross-sectional study was conducted at four tertiary referral hospitals between June 2024 and September 2025. Consecutive acute ischemic stroke patients treated with intravenous thrombolysis were included. Collateral status was classified using ASPECTS as poor (<7) or good (≥7). Early neurological improvement was assessed using the 24-hour National Institutes of Health Stroke Scale (NIHSS <6 vs ≥6), while functional outcome was evaluated using the modified Rankin Scale (mRS) at 90 days (0–2 vs 3–6). Statistical analysis used chi-square or Fisher's exact tests. The study protocol was approved by the Ethics Committee (ApprovalNo.KET-1192/ UN2.F1/ETIK/PPM.00.02/2024).

Results: A total of 111 patients were included and followed for 90 days, with good collateral status identified in 91 (82.0%). Favorable functional outcome (mRS 0–2) occurred in 85.7% of patients with good collaterals compared with 50.0% in those with poor collaterals ($p = 0.001$). Early neurological improvement was also more common in the good collateral group (53.8% vs 15.0%; $p = 0.002$). Patients with good collateral status had a 6.6-fold higher likelihood of early neurological improvement (OR 6.61; 95% CI 1.81–24.13).

Conclusions: ASPECTS-based collateral assessment on non-contrast CT is significantly associated with early neurological improvement and favorable 90-day functional outcomes following intravenous thrombolysis. This simple non-contrast CT-based assessment may serve as a practical tool for early prognostic assessment in acute ischemic stroke management.

Keywords: ASPECTS, collateral circulation, ischemic stroke, thrombolysis, outcome

STROKE, NEUROVASKULAR, NEUROTRAUMA

TRAUMATIC THALAMIC HEMORRHAGE FROM LENTICULOSTRIATE ARTERY RUPTURE AFTER HEAD INJURY: A CASE REPORT

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Background: Traumatic intracerebral hemorrhage involving deep brain structures such as the thalamus is relatively rare compared with cortical hemorrhage. High-energy acceleration–deceleration trauma may produce shearing forces that damage small perforating vessels, including the lenticulostriate arteries, resulting in deep intracerebral hemorrhage. Early recognition through neuroimaging is essential because these lesions may mimic spontaneous hemorrhagic stroke or vascular malformations

Case Presentation: A 17-year-old male presented with severe headache and right-sided weakness following a motorcycle accident without helmet use. The patient collided with a parked truck and experienced loss of consciousness for approximately 12 hours. After regaining consciousness, he reported persistent severe headache, slowed responses, and weakness with numbness on the right side of the body. Neurological examination showed a Glasgow Coma Scale score of 15 with right central facial paresis, right hemiparesis (motor strength 4/5), hyperreflexia, and right hemihypoesthesia. Left-sided otorrhea and frontal cephalhematoma were also noted. Non-contrast head CT scan demonstrated a hyperdense lesion in the left thalamus consistent with intracerebral hemorrhage, accompanied by subarachnoid hemorrhage

and cerebral edema without midline shift. CT angiography revealed rupture of the left lenticulostriate artery without evidence of aneurysm or arteriovenous malformation. The patient received conservative treatment.

Discussion: Traumatic thalamic hemorrhage is uncommon and typically results from shearing injury to deep perforating arteries during acceleration–deceleration trauma. The lenticulostriate arteries are particularly vulnerable due to their small caliber and direct origin from major cerebral vessels. Clinical manifestations commonly include contralateral motor and sensory deficits. CT and CT angiography are crucial to identify the bleeding source and exclude underlying vascular abnormalities.

Conclusion: Traumatic rupture of the lenticulostriate artery can cause thalamic hemorrhage following high-energy head trauma. Early neuroimaging evaluation and appropriate supportive management are essential to prevent secondary brain injury and optimize neurological outcomes.

Keywords: traumatic brain injury, thalamic hemorrhage, lenticulostriate artery, subarachnoid hemorrhage, adolescent

STROKE, NEUROVASKULAR, NEUROVASKULER

INTRACRANIAL ARTERY DOLICHOECTASIA (IADE) IN STROKE: A CASE SERIES

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Introduction: Intracranial artery dolichoectasia (IADE) is a rare vascular malformation characterized by dilation and/or tortuosity of one or more intracranial arteries. IADE affects less than 1% of the general population. IADE frequently causes neurological complications such as stroke and compression of adjacent structures.¹ Stroke is the third leading cause of death and disability combined globally among non-communicable disorders.²

Case Illustration: This case series presents 10 cases of IADE in stroke patients, where 6 patients had ischemic stroke, 1 patient had intracranial hemorrhage (ICH), and 3 patients had history of both strokes. All patients had vertebrobasilar dolichoectasia (VBD), with bilateral internal carotid artery dolichoectasia also found in 1 patient. IADE caused compression of brainstem and adjacent structures in 6 cases, and compression of only cranial nerves in 2 cases. Stroke recurrence occurring 3 or more times was found in 6 cases. All patients received appropriate medication. Surgery was done in 1 case with endoscopic evacuation due to ICH and 1 case with microvascular decompression due to hemifacial spasm.

Discussion: IADE is present in 12% of stroke patients, with 80% occurring in the basilar artery.^{1,3} Injury to tunica media causes disruption of internal elastic lamina, leading to vascular malformation which causes abnormal antegrade blood flow leading to thrombi formation and embolism. Distortion and obstruction of small vessels arising from a dolichoectatic artery may contribute to ischemic stroke.⁴ A retrospective cohort found IADE in 20% of ICH patients, where VBD was associated with deep ICH location.⁵ Stroke patients with IADE have high risk of stroke recurrence,³ as seen in our cases. In patients with VBD and history of ischemic stroke, use of anti-thrombotic therapy is reasonable.⁶

Conclusion: IADE is a rare condition and frequently underdiagnosed, requiring adequate brain imaging for diagnosis. IADE can cause potentially life-threatening complications and should be taken into consideration carefully to not miss the diagnosis.

Keywords: Intracranial artery dolichoectasia (IADE), stroke, vertebrobasilar dolichoectasia (VBD), vascular malformation, stroke recurrence

MILLARD-GUBLER SYNDROME WITH LIMITED CT FINDINGS REVEALING MULTIFOCAL POSTERIOR INFARCTIONS ON MRI**Juarni Sudarsono¹, Ummu Atiah¹**¹*Department of Neurology, Faculty of Medicine, Hasanuddin University, Makassar, Indonesia*

Background: Millard-Gubler syndrome is a classical ventral pontine syndrome characterized by ipsilateral abducens and facial nerve palsy with contralateral hemiparesis. Although traditionally associated with focal pontine lesions, posterior circulation stroke may present with broader and overlapping clinical features, particularly when vestibulocerebellar pathways are involved.

Case Presentation: A 46-year-old man with poorly controlled hypertension and diabetes mellitus presented with persistent non-spinning dizziness, diplopia, facial asymmetry, and right-sided weakness. Neurological examination revealed left abducens nerve palsy, ipsilateral peripheral facial paralysis, and contralateral hemiparesis, consistent with Millard-Gubler syndrome. Initial computed tomography suggested a localized pontine infarction. However, subsequent magnetic resonance imaging demonstrated multifocal infarctions involving the pons, bilateral cerebellum, basal ganglia, and cortical motor regions. The patient received antiplatelet therapy, vascular risk factor control, symptomatic vestibular management, and rehabilitation, with gradual clinical improvement during hospitalization.

Discussion: This case illustrates how a classical brainstem syndrome can represent the initial manifestation of multifocal posterior circulation ischemia. Prominent vestibular symptoms may obscure brainstem localization and pose a diagnostic challenge. Magnetic resonance imaging plays a critical role in detecting posterior fossa lesions and redefining disease extent when initial CT findings appear limited.

Conclusion: Millard-Gubler syndrome may signal a broader ischemic process rather than an isolated pontine lesion. Careful neuroanatomical assessment combined with early MRI is essential to recognize multifocal posterior circulation infarction, guide management, and avoid underestimation of disease burden in patients presenting with central vertigo.

Keywords: Millard-Gubler syndrome, Pontine infarction, Posterior circulation stroke, Central vertigo, Clinical–radiological correlation

TOO YOUNG TO BE STROKE? ISCHEMIC STROKE OUTCOME IN YOUNG-ADULTS AT VINCENTIUS HOSPITAL**Vivi Kristiani Rumapea¹, Anthony Ekaputra²**¹*Neurology Department, St. Vincentius Hospital, Singkawang, Indonesia*²*Emergency Medicine Department, St. Vincentius Hospital, Singkawang, Indonesia*

Background: Stroke-related disability may have profound socioeconomic consequences in young adults. In Indonesia, the prevalence of stroke has increased from 7% to 13%, with a growing proportion occurring in younger populations. However, published data on stroke in young adults, particularly from regional centers, remain limited. This case report describes the management and short-term outcome of ischemic stroke in a young adult treated in Singkawang.

Case Presentation: A 36-year-old man presented with sudden left-sided weakness and headache (Visual Analogue Scale 7) one day before admission. He was a heavy smoker. On examination, he was fully alert with stable vital signs. Neurological findings revealed left facial and hypoglossal nerve palsy, left spastic hemiparesis (grade 3/5), and increased deep tendon reflexes without pathological reflexes. The NIHSS score was 16, indicating moderate-to-severe stroke. Electrocardiogram and laboratory tests were normal. Non-contrast head CT scan demonstrated a large infarction in the right cerebral hemisphere. The patient received a loading dose of oral aspirin 320 mg within 24 hours of onset, followed by 80 mg daily, along with intravenous citicoline 500 mg and mecobalamin 500 mg every 8 hours. After 5 days, the NIHSS score improved from 16 to 11.

Discussion: This case illustrates that a large infarction with an NIHSS score greater than 4 (severe stroke) was likely caused by vascular stenosis. Despite the patient's young age, the principles of stroke management remain similar to those applied in older patients. Early administration of a loading dose of oral aspirin combined with neuroprotective agents was associated with a significant improvement in the NIHSS score from 16 to 11.

Conclusion: This case showed that ischemic stroke can occur in young adults and, when managed according to established stroke guidelines, may lead to improvement in NIHSS scores.

Keywords: ischemic stroke, NIHSS, vascular, young adult

