3rd WFNS Vascular Symposium Prague

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Abstract Book

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ABSTRACT BOOK

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ORAL PRESENTATIONS

Aneurysms

Keyhole temporalis sparing pterional craniotomy for aneurysm clipping – safety profile and technical nuances

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Smaller incisions and craniotomies provide faster recovery and early hospital discharge. At the same time, keyhole craniotomies are required to provide safe surgical corridor and achieve the same surgical outcomes as the traditional approaches. Here, we discuss our temporalis sparing keyhole pterional craniotomy and its use for both ruptured and unruptured anterior circulation aneurysm clipping.

Surgical Technique: A small curvilinear incision is made at the ventral edge of hairline, making sure not be more than half the distance between tragus and lateral canthus. This minimizes the risk of frontalis palsy. Sub-temporalis fascial dissection is performed, and the temporalis muscle is stripped from the lateral orbital rim and retracted postero-inferiorly. A single burrhole at the lateral sphenoid wing is made, exposing both frontal and temporal lobes. Remaining craniotomy is performed in the standard fashion. Lateral sphenoid wing is extensively drilled to create space for free movement of surgical instruments. A kidney shaped plate covering the lateral sphenoid wing and the autologous bone is replaced and secured. The temporal muscle is pushed forward under the fascia and secured with sutures.

Surgical Cases: Here we discuss two cases: a) ruptured anterior choroidal aneurysm with intra-operative rupture b) unruptured Pcom. Anterior clinoidectomy was performed in both cases.

Outcomes: Excellent cosmetic outcomes with minimal to no temporalis wasting. No frontalis injury was noted. Complete occlusion of aneurysm was achieved in both cases.

Limitations: Keyhole approaches require an intimate surgical knowledge. Familiarity and comfort with working in narrow surgical corridors is essential.

Conclusion: In the era of endovascular surgery, open aneurysm clipping has to not only achieve complete occlusion of aneurysm but also provide excellent cosmetic outcomes. Our approach to keyhole pterional is a step in that direction.

History and emerging trends in intrathecal therapy for patients with aneurysmal subarachnoid hemorrhage

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Background: Aneurysmal subarachnoid hemorrhage remains associated with substantial morbidity and mortality despite successful aneurysm occlusion. Delayed cerebral ischemia (DCI), developing in up to one-third of patients between days 4 and 14 after hemorrhage, is the leading determinant of poor neurological outcome. Cerebral vasospasm (CVS), strongly correlated with the volume of subarachnoid blood, represents a major pathophysiological contributor to DCI.

Historical perspective: Early therapeutic strategies emphasized cerebrospinal fluid (CSF) drainage and reduction of subarachnoid clot burden. Prophylactic lumbar drainage and external ventricular drainage have been associated with improved long-term outcomes and a lower incidence of angiographic and symptomatic CVS, with lumbar drainage demonstrating particularly favorable results. Randomized data further indicate that prophylactic lumbar drainage reduces secondary infarctions and decreases the risk of unfavorable functional outcomes.

Current and emerging trends: Contemporary intrathecal strategies combine CSF drainage with targeted pharmacological intervention, bypassing the blood–brain barrier. Two principal approaches have evolved: (1) fibrinolytic therapy (e.g., urokinase or recombinant tissue plasminogen activator) to accelerate clot degradation, reduce platelet activation, and attenuate inflammatory responses; and (2) vasodilatory therapy (including calcium channel blockers, milrinone, magnesium, or nitric oxide). While intrathecal calcium channel blockers reduce the incidence of CVS, consistent reductions in DCI remain limited. In contrast, prolonged cisternal irrigation with saline combined with fibrinolytics has demonstrated reductions in DCI and improved clinical outcomes. Recent comparative data suggest that prophylactic fibrinolytic cisternal lavage is more effective than rescue spasmolysis in established CVS, highlighting the importance of early intervention before irreversible vasospastic arterial remodeling occurs.

Conclusions: Intrathecal therapy is a promising alternative for DCI prevention and treatment. This approach combines CSF drainage and clearance of blood degradation products with direct drug administration, thereby bypassing the need for passage across the blood–brain barrier.

Temporary Arterial Occlusion in Intracranial Aneurysm Surgery: A Systematic Review of Duration-Dependent Ischemic Risk and Strategies for Neurological Protection

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Background: Temporary arterial occlusion (TAO) is a key surgical maneuver during microsurgical clipping of cerebral aneurysms. While essential for achieving a bloodless field, TAO induces cerebral ischemia, and postoperative infarction remains a significant complication. The safe temporal threshold for TAO is still debated.

Objective: The primary objectives of this systematic review were:

1. To evaluate the dose-dependent relationship between temporary arterial occlusion duration—both single-episode and cumulative—and postoperative neurological outcomes in patients undergoing microsurgical clipping of intracranial aneurysms

2. To assess the role of multimodal intraoperative neurophysiological monitoring in detecting real-time ischemia and predicting postoperative neurological deficits.

Methods: A systematic search of PubMed/MEDLINE, Scopus, and Cochrane Library (January 2010–October 2025) was conducted following PRISMA guidelines. Fifteen studies with over 2,000 patients met inclusion criteria. Non-randomized studies were assessed using the Newcastle-Ottawa Scale (NOS).

Results: Infarction risk increased non-linearly with TAO duration. Occlusion ≤5 minutes was associated with 5–10% infarction rates, rising to 18.6–27% beyond this threshold. Intraoperative neuromonitoring (IONM) reduced stroke rates (8.9% vs. 20.5%). Adenosine-induced flow arrest decreased mean occlusion time (2.04 vs. 4.46 minutes). Pharmacologic neuroprotection showed inconsistent benefit. Most studies (85%) were of good quality (NOS ≥7), though confounding by aneurysm complexity was noted.

Conclusion: Evidence supports limiting TAO to ≤5 minutes. IONM and adenosine are effective adjuncts for complex cases. Future prospective studies with standardized outcomes are warranted.

Keywords: Temporary clipping, Cerebral aneurysm, Ischemic complication, Intraoperative monitoring, Neuroprotection, Systematic review

Distal Aneurysms of Cerebellar Arteries—Case Series

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Background: Distal aneurysms of cerebellar arteries are very rare. The authors report their case series of distal aneurysms of the cerebellar arteries solved successfully by microsurgery or by endovascular treatment.

Materials and Methods: Between January 2010 and March 2020, 346 aneurysms were treated in our institution. Eleven aneurysms in seven patients were located on distal cerebellar arteries and, in three patients, the aneurysms were combined with arteriovenous malformations. There were four women and three men, ranging from 50 to 72 years of age. Five patients presented with different grades of subarachnoid hemorrhage or intraventricular bleeding, and two patients were diagnosed because of headache. Aneurysm location was the posterior inferior cerebellar artery in six cases, the superior cerebellar artery in three cases, and the anterior inferior cerebellar artery in 2 cases. One patient had three aneurysms, and two patients had two aneurysms.

Results: Nine aneurysms were treated by microsurgery trapping or clipping and, in two patients, the associated arteriovenous malformation (AVM) was resected. Two aneurysms were treated by endovascular coiling, and one associated AVM was successfully embolized. Clinical follow-up was a mean of 11.5 months (range, 3–45 months).

Conclusion: The authors present their experience with the treatment of 11 peripheral aneurysms on distal branches of the cerebellar circulation in seven patients which were excluded from circulation by microsurgery or endovascular treatment

Decision making for tailored treatment of cerebral aneurysms – single center experience and literature review

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Background: Last two decades introduced a wide range of new techniques and expertise in the field of cerebral aneurysm treatment. The modality of aneurysm treatment has shifted from microsurgery to endovascular treatment. Recent publications deal with factors critical for decision-making regarding the treatment approach.

Methods: A literature review was performed on relevant articles for decision making for the best treatment option in cerebral aneurysm occlusion. Retrospective analysis of patients treated for an intracranial aneurysm either surgically or endovascularly in University hospital Bratislava was compared with literature results. Analysis of pre and postprocedural clinical status, surgical strategy, periprocedural complications and obliteration rate was performed.

Results: 49 patients with cerebral aneurysm were treated in our department surgically. MCA aneurysms prevailed (26) in our series followed by aneurysms of AComA (16), ICA (4) and VB (3). We compare our results with endovascular series and literature review. Multiple decision-altering factors such as aneurysm characteristics (size, localization, morphology), patient characteristics (age, clinical status, comorbidities) were determined. We provide our decision-making process for cerebral aneurysm treatment based on data from literature and single center experience.

Conclusions: Cerebral aneurysm is a heterogenous vascular pathology that requires various treatment approaches that are nowadays available thanks to progress in microsurgery and endovascular therapy. The decision-making process is based on multiple factors and should be thoroughly tailored for each patient.

New trends in intraoperative neurophysiological monitoring and indocyanine green in aneurysm clipping

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Introduction: Patient safety in neurosurgery is a major priority to prevent complications, procedure failure, and mortality. Intracranial aneurysms clipping requires reliable intraoperative methods to assess ischemia and avoid residual aneurysm filling or arterial occlusion. Among these techniques are: indocyanine green angiography (ICGA) and intraoperative neurophysiological monitoring (IONM), capable of detecting evoked potential drops.

Aims: This study aims to compare the accuracy of evoked potential (EP) and indocyanine green angiography during intraoperative monitoring in intracranial aneurysm clipping.

Methods: This retrospective study included patients with unruptured aneurysms submitted to microsurgical clipping, over the last 12 years, with IONM assistance at the Department of Neurosurgery, Hospital Santa Paula, São Paulo, Brazil. NIM Eclipse™ NP system was used to monitor somatosensory EP (SSEP), electroencephalography (EEG) and motor EP (MEP). Needle electrodes were used for EP recording.

Results: A total of 67 aneurysms from 62 patients (50 women, 12 men; 49 ± 11.9 years [range 29 – 75] were clipped in 64 surgeries (two patients were assisted two times). In nine cases, changes were only detected by only one method: seven showed EP drops whereas two presented decreases in blood flow on ICGA. Aneurysm location included middle cerebral artery (38.7%), posterior communicating artery (17.7%), anterior communicating artery (14.5%), choroidal artery (9.7%), ophthalmic artery (8.1%), and others.

Conclusion: A decrease in evoked potential, despite normal indocyanine green angiography findings, underscores the importance of considering electrophysiological monitoring results as potentially more sensitive indicators of cerebral ischemia. Conversely, when evoked potentials remain stable even with negative indocyanine green findings, the integrity of the electrophysiological signal should be regarded as reliable. These observations suggest that evoked potential monitoring may provide a greater accuracy than the ICGA in detecting ischemia, being a relevant assessment of cerebral perfusion during aneurysm clipping.

Are we overtreating incidentally detected unruptured intracranial aneurysms? A risk-score–based analysis of treatment decisions

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Incidentally detected unruptured intracranial aneurysms are increasingly encountered in neurosurgical practice. Multiple risk stratification systems, including PHASES, ELAPSS, UIATS, and SMALLS, have been developed to guide management decisions; however, the degree to which these scores influence real-world treatment allocation remains uncertain. We performed a retrospective analysis of patients with incidentally detected unruptured intracranial aneurysms managed at our institution, classifying each lesion according to established risk scores at the time of diagnosis. Management strategies were categorized as active treatment (microsurgical or endovascular) or conservative observation with imaging follow-up. Treatment patterns were analyzed in relation to calculated risk profiles to explore whether clinical decision-making aligns with formal risk stratification systems and to address the ongoing debate regarding potential overtreatment of low-risk aneurysms.

Intermediate catheter assisted “Putting down your foot technique” WEB embolization of basilar tip aneurysm: an illustrative case

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Background: The Woven Endo Bridge (WEB) device is widely used for the treatment of wide-neck bifurcation aneurysms. Although generally safe and effective, deployment can be challenging in aneurysms with unfavorable morphology, and device protrusion or malposition may occur. We describe a novel technique intermediate catheter assisted “Putting Down Your Foot” maneuver used to reposition a protruding WEB device in a basilar tip aneurysm.

Observation: A 57-year-old male with an incidental 7-mm basilar tip aneurysm underwent WEB SL 8 × 3 mm embolization. During deployment, the device became butterfly-deformed and repeatedly protruded into both PCAs, causing >50% parent-vessel encroachment despite standard corrective maneuvers. The WEB was re-compressed using the delivery wire and microcatheter, and a Vecta 46 intermediate catheter was advanced to the aneurysm neck to provide counter-support. This stabilization allowed controlled re-expansion and accurate repositioning of the device without further deformation or migration. Final angiography showed optimal device apposition (WOS B) and stable positioning after detachment.

Lesson: Intermediate catheter–assisted support may offer a safe and effective adjunct for controlling WEB device position during challenging deployments, particularly when faced with device protrusion, deformation, or unstable orientation. Further experience is needed to determine its reproducibility and role among existing bailout strategies.

AVM

Intraoperative Visual Evoked Potential Monitoring for Sylvian AVM Resection

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Introduction: Evidence supporting the use of visual evoked potentials (VEPs) in vascular neurosurgery remains limited. A 50% reduction for N75-P100 amplitude and/or a 40% reduction for P100-N145 amplitude has been proposed as early warning criteria in craniopharyngioma surgery.

Aim: To illustrate the utility and prognostic value of intraoperative VEP monitoring during microsurgical resection of a sylvian arteriovenous malformation (AVM).

Method: We report a video case study of a patient undergoing resection of an unruptured 4-cm sylvian–insular AVM with multimodal intraoperative neurophysiological monitoring. The AVM extended from the posterior sylvian fissure to the inferior limiting sulcus and posterior long gyrus of the insula. Arterial supply arose mainly from M2 branches of the middle cerebral artery, with an additional posterior lateral choroidal feeder coursing from the atrium through the optic radiation, deemed unsuitable for embolisation. Venous drainage was via the superficial sylvian vein and vein of Trolard. VEPs were elicited using flash goggles delivering red light (16,000 lb) over closed eyelids, stimulating each eye separately and bilaterally. Recordings were obtained continuously from O1, Oz, and O2 scalp electrodes.

Results: Following coagulation of the posterior lateral choroidal feeders, a marked reduction in VEP amplitude from the right visual cortex was observed, with loss of the N75–P100 complex in all O2-referenced recordings across all stimulation modes. Neuronavigation confirmed the feeder's course through the optic radiation. This early warning prompted clip occlusion rather than further coagulation, aiming to prevent irreversible injury. Postoperatively, the patient developed a left inferior quadrantanopia that resolved over two months.

Conclusion: Intraoperative VEP changes correlated well with a transient postoperative visual deficit, demonstrating predictive value in this vascular case. VEP monitoring may provide real-time functional assessment of the visual pathway and help guide surgical decision-making. Larger studies are required to define reliable thresholds, sensitivity, and specificity in vascular neurosurgery.

Risk engineering rather than risk Avoidance: A multivector mitigation strategy for deep eloquent high-grade arteriovenous malformations

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Background: Surgical management of high-grade Arteriovenous Malformation (AVMs), particularly deep eloquent lesions classified as Grade IV–V under the Spetzler-Martin grading system, remains controversial. We propose a structured "risk engineering" paradigm that deconstructs operative hazard into modifiable vectors rather than defaulting to risk avoidance.

Methods: Over a 4-year period, 13 consecutive high-grade AVMs (9 Grade IV, 4 Grade V) in patients aged 28–57 years (two-thirds male) underwent microsurgical treatment within a multidisciplinary framework. Preoperative 6D catheter angiography informed MDT decision-making. Five patients underwent staged preoperative embolization (three requiring multiple sessions); none exceeded 50% nidus occlusion due to transarterial technical constraints.

Preoperative embolization strategy was not volume-reduction driven. Rather, it was guided by diffusion tensor imaging–based tractography integrated into navigation planning. Feeders supplying nidus compartments in proximity to the most functionally sensitive white matter tracts were selectively targeted first. This was followed by limited embolization of selected high-flow feeders to modulate the hemodynamic vector and achieve gradual venous preconditioning. All patients underwent tractography-guided navigation and preoperative MDT simulation sessions with participation of the endovascular interventional radiologist.

Surgical planning examined four risk vectors: (1) hemodynamic-modulation (selective feeder embolization and intraoperative flowmetry correlation), (2) structural depth-optimization (panoramic surgical corridor design), (3) functional preservation (tractography-guided dissection and subcortical mapping), and (4) venous protection (compartmental nidus deconstruction with predetermined sequence control). Nine patients proceeded directly to surgery without embolization.

Results: Complete resection was achieved in 12/13 patients; one required postoperative embolisation. Good functional outcome (mRS 0–2) was achieved in 11/13; one patient had mRS 3 and one mRS 5. There was no mortality.

Conclusions: High-grade deep eloquent AVMs can be approached through structured risk modification. Selective targeting of tractography-defined critical compartments combined with incremental hemodynamic modulation enables controlled venous adaptation and functional preservation within an MDT framework. Illustrative surgical cases demonstrating this multimodular risk mitigation strategy will be presented.

Surgical Outcomes and Recurrence in Pediatric AVMs: Influence of Preoperative Embolization

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Introduction: Pediatric arteriovenous malformations (AVMs) are rare lesions, and treatment decisions must balance procedural risks against the lifelong risk of rupture. Although microsurgical resection with angiographic confirmation of complete obliteration is considered curative, recurrence may occur. The role of preoperative embolization and its potential influence on recurrence and surgical outcomes remains unclear.

Methods: A retrospective single-center study was conducted including pediatric patients who underwent microsurgical resection of AVMs between 2011 and 2025. Clinical, imaging, and surgical data were analyzed. Long-term follow-up was performed using MRA. Recurrence was defined as AVM reappearance following documented total excision. A focused literature review was performed.

Results: Fourteen pediatric patients who underwent microsurgical resection of AVMs were included. Most presented with hemorrhage (79%) and harbored Spetzler–Martin grade I (15%), II (69%) or III (15%) lesions. Preoperative embolization was performed in 29% (n=4).

Complete excision was achieved in all patients, as confirmed by early postoperative vascular imaging. Postoperative complications occurred in 29% of patients, including infection and seizures. During a mean follow-up of 58 months, no rehemorrhages were observed and functional outcomes improved progressively.

Recurrence was detected on MRA and occurred in 2 patients (14.3%), on average 51.5 months after surgery. Preoperative embolization was significantly associated with recurrence ($p=0.016$), but not with increased surgical morbidity ($p=0.124$).

Literature review supports recurrence as a recognized phenomenon in pediatric AVMs, while the impact of preoperative embolization remains controversial. Associations between preoperative embolization and recurrence have been reported, suggesting recanalization of embolized but incompletely resected nidus components as a possible mechanism.

Conclusions: Delayed recurrence after apparently complete resection of pediatric AVMs may occur several years after surgery. In our series, preoperative embolization was associated with recurrence, without increased surgical morbidity. These findings support long-term vascular surveillance and careful multidisciplinary consideration of embolization strategies in pediatric AVMs.

Microsurgical Treatment of High-Risk Cranial Dural Arteriovenous Fistulas Unsuitable for Endovascular Therapy

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High-grade dural arteriovenous fistulas (DAVFs) (Cognard types III–IV) are associated with a substantial risk of intracranial hemorrhage and therefore require timely treatment. Although the majority of DAVFs can be managed using endovascular techniques, a subset of patients exists in whom endovascular treatment is either not feasible or insufficiently effective, necessitating microsurgical intervention. We evaluated our experience with microsurgical management of high-risk cranial DAVFs.

Medical records of 15 patients (11 men and 4 women) treated for high-risk cranial DAVFs between 2015 and 2023 were retrospectively analyzed. Clinical presentation included intracranial hemorrhage in 9 patients, epileptic seizures in 4 patients, and headache in 1 patient. Preoperative angiography demonstrated drainage via dilated cortical veins with venous varicosities in all cases, corresponding to Cognard type IV lesions. Five patients underwent unsuccessful (including repeated) attempts at endovascular embolization prior to surgery; in another five patients, embolization was considered unsuitable or high-risk by the endovascular team; and in five patients, primary microsurgical treatment was indicated due to the presence of space-occupying hemorrhage (with a concomitant tumor in one case).

No patient experienced neurological deterioration related to surgery. At the last follow-up, 13 patients (87%) achieved a modified Rankin Scale (mRS) score of 0–1, one patient had mRS 2, and one patient mRS 3 (both deficits attributable to prior AVF hemorrhage). Complete obliteration of the AVF was confirmed in 14 patients (93%), including one patient requiring two surgical procedures. In one patient, a low-flow accessory fistula persists and is scheduled for follow-up digital subtraction angiography.

In patients with cranial DAVFs after failed endovascular treatment, when endovascular therapy is contraindicated, or in the presence of space-occupying hemorrhage, microsurgical treatment represents an effective and safe therapeutic option. Precise preoperative localization of the shunt is essential for successful surgical management.

Surgical and endovascular management of Cranial Dural AV fistula

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Introduction: Spinal Vascular malformations are rare lesions, and can be managed with both surgical and endovascular methods. We present our experience with management of spinal vascular malformations.

Materials and methods: Over the last 11 years, we have managed 78 patients with spinal vascular malformations. Retrospective analysis was performed. Clinical, radiological, angiographic, surgical, and follow-up details were analyzed.

Results: A total of 78 patients were treated for spinal vascular malformations over the last 11 years. Majority of them were spinal Dural AV fistulae (56). Patients presented with paraparesis and sensory disturbances. Almost half of the patients presented with urinary symptoms. The mean time from start of symptoms to diagnosis was one and a half years. Majority of fistulae were in dorsolumbar region (44), followed by upper dorsal (7), lumbar (2), sacral (2), and cervical (1). Surgery was done for 40, while embolization was the first choice for 16 patients. Two of them was converted to surgery because of instability of microcatheter. One patient in surgical group had delayed worsening, which became better after starting clexane. There were 18 perimedullary fistulae, eight managed with surgery and 10 with embolization, all leading to complete obliteration. Two glomus and one metameric type had incomplete embolization. One spinal epidural fistula was treated with percutaneous embolization. Sixty-eight patients made complete recovery, eight patients made incomplete recovery, while two patients worsened. One patient with DAVF had recurrence, and was reoperated.

Conclusion: Spinal vascular malformations are rare diseases. A judicious mix of surgery and embolization leads to excellent outcomes.

Timing Is Secondary in Hemorrhagic AVMs: Associated Aneurysms Emerge as a Determinant of Functional Outcome

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Introduction: The optimal timing for microsurgical resection of hemorrhagic cerebral arteriovenous malformations (AVMs) remains controversial. Delayed intervention has been hypothesized to facilitate recovery by allowing hematoma resorption and reduction of peri-lesional edema. However, evidence supporting this strategy remains limited. We aimed to determine whether time from hemorrhage to surgery independently influences functional outcome, while accounting for key angioarchitectural factors.

Methods: We retrospectively analyzed 55 AVM patients surgically treated between January 2009 and January 2026. Mean age was 45.27 years; 30 patients were male (54.5%). Mean Spetzler-Martin grade was 1.56. 24 patients (43.6%) harbored associated aneurysms, and 37 patients (67%) presented with hemorrhage. Mean time to surgery was 38 days (median 19); 15 patients treated ≤14 days (mean 8 days) and 22 patients treated >14 days (mean 57 days). Functional outcome was assessed at 1, 6, and 12 months using the modified Rankin Scale (*mRS*) and Glasgow Outcome Scale-Extended (GOSE). Good outcome was defined as mRS 0–1 and GOSE 6–8. Multivariate logistic regression included surgical timing, age and aneurysm presence.

Results: Functional recovery improved progressively over time: good outcome at 12 months was observed in 76% using *mRS* and 84.3% using GOSE. The regression model demonstrated statistical significance with adequate calibration. Surgical delay >14 days was not independently associated with improved outcome (OR 0.41, 95% CI 0.09–1.92, p=0.257). In contrast, the presence of an associated aneurysm emerged as a strong independent predictor of poor functional recovery, reducing the odds of achieving good outcome by 87% (OR 0.13, 95% CI 0.03–0.64, p=0.012).

Conclusion: Delaying surgery after AVM hemorrhage did not confer functional benefit. Angioarchitectural complexity, particularly the presence of associated aneurysms, proved to be the determinant of outcome. These findings challenge the assumption that surgical timing alone improves recovery and underscore the need to prioritize lesion-specific risk factors when planning microsurgical intervention.

Association between venous congestion and cognitive dysfunction in brain arteriovenous malformations

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Introduction: Neurocognitive impairments affecting memory, attention, executive function, and visuoconstructive abilities can markedly reduce quality of life and functional independence. In the evaluation of brain arteriovenous malformations (bAVMs), however, cognitive consequences are frequently underrecognized, and no structured framework exists to identify patients at risk. Addressing this gap may improve clinical decision-making by enabling individualized neurocognitive support for patients with bAVMs.

Aims: To characterize neurocognitive function in bAVM patients and to investigate associations of venous congestion with cognitive impairments.

Methods: In this prospective cohort study, 36 adult bAVM patients treated at the University Hospital Zurich, Switzerland (2018–2025) underwent standardized neuropsychological testing across memory, visuoconstruction, executive, and attention domains, with composite z-scores derived from validated test batteries. MRI-based assessment included nidus localization and evaluation of venous congestion (e.g. venous ectasia, outflow obstruction, perinidal edema). Patients were stratified according to the presence of radiographic sign of venous congestion. Group differences were assessed using Welch's t-tests, and p-values were corrected for multiple testing using the Benjamini–Hochberg procedure.

Results: Overall cohort performance remained within the normal range (mean composite z-scores -0.37 to +0.10), although domain-specific impairments were observed in a subset of patients. Patients with signs of venous congestion demonstrated moderate evidence for worse performance in memory (-0.67 ± 0.81 vs. -0.10 ± 0.65; adjusted $p = 0.05$) and visuoconstruction (-0.63 ± 0.86 vs. -0.04 ± 0.52; adjusted $p = 0.05$). Performance in executive function and attention did not differ significantly between groups.

Conclusion: In this study, radiographic signs of venous congestion in bAVM patients are associated with memory and visuoconstructive deficits. These findings suggest that venous congestion may represent an important pathophysiological mechanism underlying cognitive dysfunction in bAVM patients. Structured radiographic assessment could help identify patients at-risk and guide early intervention or neurocognitive support to preserve functional independence.

Angiographic and hemodynamic features in brain AVM–associated epilepsy and the effects of AVM resection

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Introduction: Patients with seizure-prone brain arteriovenous malformations (bAVMs) exhibit more pronounced hemodynamic disturbances, including impaired whole-brain and peri-nidal cerebrovascular reactivity (CVR) on blood oxygenation-level dependent (BOLD) MRI, as well as venous congestion features on angiography, compared to those without seizures.

Aims: This study investigates whether resolving venous congestion through microneurosurgical bAVM resection leads to CVR normalization and seizure freedom.

Materials and Methods: In this prospective case-control study, patients with untreated bAVMs were recruited from the Department of Neurosurgery at University Hospital Zurich and categorized into seizure and non-seizure groups. Quantitative BOLD-CVR was measured using a standardized hypercapnic stimulus. Whole-brain and peri-nidal CVR were analyzed and compared between groups. Venous congestion was assessed using six-vessel digital subtraction angiography (DSA). Postoperative BOLD-CVR was performed three months after resection, with DSA before discharge.

Results: Sixty patients were included. The seizure group showed significantly impaired whole-brain CVR and greater venous congestion. Following complete bAVM resection and antiepileptic treatment, all seizure-prone patients remained seizure-free. Postoperative BOLD-CVR demonstrated improved peri-nidal and global CVR in these patients, particularly when venous congestion had resolved.

Conclusion: In seizure-prone bAVM patients, the resolution of venous congestion after microneurosurgical resection is associated with normalization of BOLD-CVR and seizure cessation. These findings highlight the potential of BOLD-CVR as a noninvasive imaging biomarker for predicting seizure outcomes and monitoring postoperative recovery in patients with bAVMs.

Zebra Stripes and cartoon reels: a case of bilateral cerebellar bleed

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Objective: We describe a double rare occurrence of 'Zebra Sign' due to along with visual pseudo hallucinations of 'cartoon reels' when the patient closed his eyes, pre intervention.

Methods: A male patient in his 60s presented to the emergency department as GCS 15 after a sudden onset bilateral headache and a near loss of consciousness. A CT head revealed a bilateral cerebellar bleed,

The patient was able to recount that in the preceding days he experienced nausea, dizziness and mild ataxia. He experienced a reduced ability to visually track moving stimuli, noticeable when attempting to track football on the television. In addition, he noticed difficultly in reading and new visuals of 'reels of cartoons' when he closed his eyes which persisted for months in the lead up to the sudden headache.

Results: We conducted a literature review on any association between zebra sign and visuals of humorous cartoons. Our search identified 233 papers, of which 136 were screened after duplicates were removed. Our study included 28 papers, of these we found 6 similar reports of hysteria due to cerebellum dysfunction, injury, or tumour but none corelating to pseudo-hallucinations.

A CT head revealed a bilateral cerebellar bleed and further characterisation with MRI found a 'Zebra sign', blood in the sulci of both cerebellar hemispheres. A follow up DSA found an AVM to be the source of the bleed. He underwent successful intervention with the Neurointerventional team and found that his visual symptoms of 'reels or cartoons' ceased and his ability to visual track objects improved.

Conclusions: This is a rarely documented event with vivid imagery being seen by the patient alongside the equally rare Zebra sign. We found little reported evidence identifying causes for seeing cartoons or localising them to one unifying neural pathway or region.

Endovascular Treatment of Spinal Dural Arteriovenous Fistulas Using Onyx: A 20-Year Single-Center Experience

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Background: Open surgery is widely regarded as the gold standard for spinal dural arteriovenous fistulas (SDAVFs) treatment. However, over the past two decades, endovascular treatment (EVT) has emerged as a less invasive alternative. While n-butyl cyanoacrylate is often considered the embolic material of choice due to its superior penetration into the draining vein, this study evaluates the effectiveness of an embolization-first strategy using Onyx, based on more than 20 years of clinical experience.

Methods: The study included 50 patients with SDAVFs treated between 2004 and 2025. Only those who underwent EVT as the first-line therapy were included. Clinical and angiographic data were recorded and retrospectively analyzed.

Results: Complete occlusion with liquid embolisate was achieved in 38 cases (76%), with an additional 6 patients (12%) requiring adjuvant surgery, leading to a definitive cure. In the remaining 6 (12%) fistulas, embolization of the feeding artery and fistula nidus resulted in permanent clinical improvement (n=4, 66%) or stability (n=2, 33%), supported by regression of indirect fistula signs on follow-up MRI. No additional intervention was indicated in these cases. Onyx was used exclusively in 42 (84%) EVTs, with a complete occlusion rate of 83%. Overall, clinical stability or improvement was observed in 46 patients (92%), including 39 (93%) in the Onyx group. There were no EVT-related complications and no recurrences in successfully treated patients. One patient experienced ischemic complications after open surgery, while three deteriorations were attributed to chronic myelopathy and secondary spincal cord atrophy after complete and uneventful EVT. Follow-up MRIs showed regression of perimedullary varices and improvement or stability of myelopathy in all cases (n=50; 100%).

Conclusions: The embolization-first strategy, with open surgery if needed, can achieve outcomes comparable to purely surgical cohorts. EVT with Onyx can lead to complete and permanent SDAVF occlusion in over 80% of cases.

Cavernoma

Technical considerations in resection of a giant pontine cavernoma

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Introduction: Detailed white matter dissections of the brainstem have contributed to the development of the 'safe entry zones' concept for cavernoma resection. The Brainstem Cavernoma Score further assists in patient selection and provides an estimate of surgical morbidity. Cavernomas occupying more than 50% of the brainstem are often multiloculated, commonly associated with a developmental venous anomaly (DVA), and tend to significantly distort the native brainstem anatomy, complicating surgical planning.

Aims: To evaluate the utility of white matter tractography in preoperative planning for large brainstem cavernomas, and to assess the role of intraoperative neuromonitoring (IONM) in guiding entry zone selection and modifying the extent of surgical resection.

Methods: An illustrative case of a 5 cm multiloculated pontine cavernoma is presented to demonstrate the use of tractography and intraoperative neuromonitoring in surgical decision-making.

Results: White matter tractography was successfully performed and integrated into surgical planning. Intraoperative neuromonitoring findings correlated with preoperative tractography and guided safe resection margins in real time.

Conclusion: White matter tractography is a valuable tool in planning surgical approaches to large brainstem cavernomas. When combined with intraoperative neuromonitoring, it enables dynamic, anatomy-preserving decision-making during resection, improving the safety of surgery in this high-risk region.

Functional Corridor–Driven Risk Stratification for Deep Eloquent Cerebral Cavernomas: The DECS Algorithm and 5-Year Surgical Outcomes

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Background: Surgical decision-making for deep-seated eloquent cerebral cavernous malformations (CCMs) remains complex due to the absence of validated selection criteria for thalamic and basal ganglia lesions. We introduce the STMC Deep Eloquent Cavernoma Score (DECS), a novel 12-point risk stratification model integrating three weighted domains: Clinical Aggressiveness (0–4), Functional Reserve (0–3), and Tractography-Based Corridor Feasibility (0–5). The anatomical-functional corridor domain carries the highest weight, reflecting its critical influence on operative safety. A total DECS score >9 favors surgical intervention.

Methods: Over five years, 28 consecutive patients underwent microsurgical resection of deep eloquent CCMs (2 brainstem, 9 basal ganglia, 17 thalamic; age 2–61 years; 10 male). All presented with acute neurological deterioration; 60% demonstrated stepwise progressive decline, while the remainder experienced acute hemorrhagic events with poor recovery under conservative management. Surgical candidacy was determined using DECS, with preference for subacute timing after partial edema resolution. Preoperative DTI tractography guided white matter corridor selection, and intraoperative neuronavigation with subcortical mapping was systematically employed.

Results: All patients met operative criteria (DECS ≥9). Gross total resection was achieved in all cases. Two patients (7%) developed new postoperative neurological deficits, both improving substantially within three months. Severe preoperative focal neurological deficits were present in 25 patients (89%), with significant postoperative functional recovery observed in the majority (23/25). Three patients (11%)who presented with significant Intra-ventricular haemorrhage (IVH) required Ventriculo-peritoneal shunt insertion. Six patients (20%) had recurrent seizure preoperative, 4 of them (67%) had significant improvement or remission of their seizures postoperatively (median follow up 23 months). No permanent disabling morbidity or mortality occurred.

Conclusion: A structured decision algorithm emphasizing tractography-guided corridor optimization and functional preservation enables safe resection of deep eloquent CCMs with excellent outcomes. The DECS framework provides a reproducible surgical selection model for high-risk deep cavernoma surgery and warrants multicenter validation.

Artificial intelligence for detecting and predicting hemorrhage in cerebral cavernous malformations: a systematic review

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Introduction: Cerebral cavernous malformations (CCMs) are associated with risk of intracranial hemorrhage and neurological deterioration. Predicting CCM hemorrhage is clinically important for timely intervention and risk stratification.

Aims: This study aims to evaluate the use of artificial intelligence (AI) for hemorrhage detection and prediction in CCMs.

Materials and Methods: Four databases (MEDLINE, Embase, Scopus, Web of Science) were systematically searched for publications until August 2025. Studies reporting AI for detecting or predicting hemorrhage in CCMs were identified, following PRISMA guidelines and PROBAST+AI. Primary outcomes were AI model types and performance metrics. Secondary outcomes included validation methods and clinical readiness.

Results: Of 473 records screened, nine studies were included, published between 2019 and 2025. There were three prospective cohort studies (one multicenter), five retrospective studies (two with prospective follow-up), and one case-control study. Data were from the United States (n=5), China (n=2), Germany (n=1), and Taiwan (n=1). Including ensemble models, commonly used AI algorithms were Support Vector Machine (n=4), Logistic Regression (n=4), Random Forest (n=3), and K-Nearest Neighbors (n=3). Input data included clinical characteristics, blood biomarkers, and imaging features. AI was used for hemorrhage detection (diagnosis) in five studies and prediction (prognosis) in six studies. Performance metrics included area under the curve (AUC; range 0.54–1.000), accuracy (0.53–1.000), sensitivity (0.571–1.000), specificity (0.457–1.000), and others. The best-performing AUC was reported using KNN and MRI radiomics to predict CCM re-hemorrhage after Gamma Knife radiosurgery. Most studies employed internal testing and validation; only one reported external validation. None demonstrated real-world clinical implementation.

Conclusion: AI shows early promise in detecting and predicting hemorrhage in CCMs. However, current evidence comprises mostly single-center studies without real-world preparedness. Further research is needed to determine optimal input variables for CCM hemorrhage diagnosis and prognosis, refine existing AI models, increase external validation and comparison with non-AI methods, and evaluate clinical utility.

Ischemia

Complications in emergent carotid endarterectomy

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Background: This study examines the safety profile of emergent carotid endarterectomy (eCEA) in patients presenting with symptomatic ischemic stroke, emphasizing perioperative and early postoperative complications.

Methods: A total of 160 patients with crescendo transient ischemic attacks or stroke-in-evolution underwent eCEA between 2012 and 2023. Endovascular therapy was deemed unfeasible in all cases, and patients with infarcts exceeding one-third of the middle cerebral artery territory were excluded. Prospectively collected data included demographics, stroke onset characteristics, prior intravenous thrombolysis, onset-to-surgery time (OST), carotid stenosis severity or occlusion, contralateral carotid disease, tandem intracranial lesions, and neurological status at admission and discharge. Surgeries were stratified by OST into emergent (0–8 hours), acute (8–24 hours), and early (24 hours–3 days). Outcomes focused primarily on 30-day morbidity and mortality, postoperative intracerebral hemorrhage, and procedure-related complications.

Results: Of the 160 procedures, 74 were emergent, 51 acute, and 35 early. The overall 30-day morbidity and mortality rate was 13%, and postoperative intracerebral hematoma occurred in 5% of patients. Complications were more frequent in patients undergoing eCEA for carotid occlusion than for stenosis, with greater neurological worsening observed in the occlusion subgroup. Emergent surgery, particularly in occlusion cases, was associated with both heightened complication risk and the greatest potential for neurological improvement. In contrast, complications in stenosis cases were less severe and more evenly distributed across OST categories. Poor neurological status at presentation strongly correlated with adverse perioperative events and unfavorable 30-day outcomes.

Conclusions: eCEA can be performed with acceptable complication rates in carefully selected patients. However, perioperative risks are significantly influenced by infarct size, baseline neurological status, carotid pathology, and surgical timing. Although emergent intervention in carotid occlusion carries higher risk, it may offer substantial benefit when appropriately indicated. Careful patient selection remains essential to minimizing complications.

Long longitudinal carotid endarterectomy in the treatment of long-segment common and internal carotid artery stenosis

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Introduction: Carotid artery stenosis is a major cause of ischemic stroke worldwide. Long-segment stenosis involving both the common carotid artery (CCA) and internal carotid artery (ICA) presents a surgical challenge, and evidence regarding optimal treatment options remains limited. Long longitudinal carotid endarterectomy (LLCEA) allows plaque removal through a single extended arteriotomy and may be used in these complex cases.

Aims: To present our experience with LLCEA in tandem CCA–ICA stenosis, highlighting technical aspects, instrumentation, and its advantages and limitations.

Materials and Methods: We retrospectively reviewed LLCEA procedures performed at our centre between 2021 and 2024. Intraoperative videos and surgical documentation were analyzed to demonstrate key steps, instrument selection, and management of long-segment plaques. Perioperative outcomes, 30-day morbidity and mortality, and follow-up results were evaluated.

Results: Three patients underwent LLCEA. The extended arteriotomy enabled complete en bloc plaque removal without stenting or hybrid procedures. There were no perioperative complications, no 30-day mortality, and no restenosis during follow-up.

Conclusion: In our cohort, long longitudinal carotid endarterectomy proved to be a feasible and reproducible approach for selected patients with long-segment CCA–ICA stenosis, enabling complete plaque removal in a single procedure and resulting in favourable outcomes.

Carotid Endarterectomy under General versus Cervical Block Anesthesia: A Single-Surgeon Comparative Experience

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Carotid endarterectomy (CEA) remains a cornerstone procedure for the prevention of ischemic stroke in patients with significant carotid artery stenosis. The optimal anesthetic technique, however, continues to be debated. This study presents a comparative analysis of a neurosurgeon's experience with CEA performed under general anesthesia (GA) and under regional anesthesia using a cervical block (CB). Perioperative parameters, including operative time, hemodynamic stability, neurological monitoring, perioperative complications, and early clinical outcomes, were evaluated in two consecutive patient cohorts.

Microsurgical Intracranial Intervention in Acute Ischemic Stroke

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The gold standard treatment for acute large vessel occlusion (LVO) stroke is mechanical thrombectomy (MTE). Nevertheless, 3–9% of patients fail to achieve successful recanalization with endovascular approaches. Persistent LVO is a strong predictor of poor clinical outcome. Open microsurgical intervention (microsurgical thrombectomy and EC–IC bypass) represents an alternative option for a subgroup of patients in whom standard endovascular recanalization treatment has failed or could not be performed. The current expansion of the therapeutic time window for mechanical thrombectomy also increases opportunities for open microsurgical thrombectomy.

Open microsurgical intervention may be indicated as a first-line treatment in developing countries where access to endovascular therapy is limited, and in developed countries in patients without a suitable vascular access route or with severe allergy to contrast material. As a second-line strategy, it can be performed in cases of failed endovascular treatment.

We present our experience with open microsurgical intervention used both as a first-line and second-line treatment for acute ischemic stroke, illustrated by three successfully treated patients.

Experience in evascularization for Moyamoya disease: an experience in 378 patients

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Introduction: Moyamoya disease (MMD) is a chronic cerebrovascular disease characterized by stenosis/occlusion of bilateral terminal internal carotid arteries with the development of collaterals at base of the brain. We describe our experience of treating 378 patients (686 bypasses) surgically.

Patients and methods: Surgically treated patients with MMD from 2006 to 2025 treated personally by the author were reviewed retrospectively. There were 378 patients (286 pediatric, 92 adults). Six Hundred and eighty six bypasses were done; 559 underwent combined revascularization (superficial temporal artery – middle cerebral artery bypass and encephalo-duro-arterio-myo-synangiosis [EDAMS]); and, 127 underwent an indirect revascularization (EDAMS).

Results: The median follow-up was 15.9 months (range 3–62 months). 546The morbidity rate was 2.6%, and the mortality rate, 1.2%. Other patients were symptom-free at the latest follow-up. Angiographic outcome did not statistically correlate with age, anastomosis type, or Suzuki grade, though there was trend toward better angiographic outcomes in patients who underwent a combined revascularization.

Conclusion: Both the combined and indirect revascularization procedures are effective in treating MMD. Pediatric patients had a better clinical improvement after surgery than the adult patients. Patients undergoing combined revascularization had a better clinical status compared to those who only underwent indirect revascularization. Combined revascularization surgery should be the surgical strategy in all age groups as it is feasible in a significant proportion of pediatric patients too.

Correlation of cerebrovascular reactivity and STA-MCA bypass flow

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Background: STA–MCA bypass is effective for Moyamoya vasculopathy and selected large-vessel atherosclerotic occlusion. Blood oxygenation level–dependent cerebrovascular reactivity (BOLD-CVR) is increasingly used to quantify cerebral hemodynamics for patient selection and follow-up. However, the relationship between preoperative CVR impairment, intraoperative bypass flow, and postoperative hemodynamic improvement remains unclear.

Aim: We evaluated the association between preoperative CVR in the affected territory and quantitative intraoperative bypass flow, and whether intraoperative flow predicts postoperative hemodynamic improvement.

Methods: We prospectively included patients with Moyamoya vasculopathy or large-vessel atherosclerotic disease undergoing STA–MCA bypass with pre- and postoperative BOLD-CVR imaging and intraoperative flow measurement (Charbel Flowprobe). Pearson correlation and uni-/multivariable linear regression assessed associations between preoperative CVR, intraoperative flow, and postoperative CVR changes.

Results: Forty-six patients were analyzed. STA–MCA bypass significantly improved CVR in the revascularized MCA territory. In multivariable analysis, preoperative CVR was the only factor independently associated with intraoperative bypass flow. For each 0.1 unit decrease in preoperative CVR (% BOLD signal change/mmHg CO_2), bypass flow increased by 14.61 mL/min. Preoperative CVR was also the sole predictor of postoperative CVR.

Conclusion: STA–MCA bypass improves hemispheric hemodynamics. Greater preoperative impairment is associated with higher bypass flow demand. Revascularization is most effective before cerebrovascular reserve is exhausted, while remaining beneficial even in patients with markedly reduced preoperative CVR.

Oxidative Stress as a Reliable Biomarker of Carotid Plaque Instability: A Pilot Study

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Background: Predicting stroke risk in patients with carotid artery stenosis (CS) remains challenging. Circulating biomarkers seem to provide improvements with respect to risk stratification.

Methods: Study patients who underwent carotid endarterectomy were categorized into four groups according to symptomatology and compared as follows: symptomatic with asymptomatic patients; and asymptomatic patients including amaurosis fugax (AF) (asymptomatic + AF group) with patients with a transient ischemic attack (TIA) or brain stroke (BS) (hemispheric brain stroke group). Carotid specimens were histologically analyzed and classified based on the American Heart Classification (AHA) standard. As a marker of OS, the plasma levels of malondialdehyde (MDA) were measured. Comparisons of MDA plasma levels between groups were analyzed.

Results: In total, 35 patients were included in the study. There were 22 (63%) patients in the asymptomatic group and 13 (37%) in the symptomatic group. Atheromatous plaque ($p = 0.03$) and old hemorrhage ($p = 0.05$), fibrous plaque ($p = 0.04$), myxoid changes ($p = 0.02$), plaques without hemorrhage ($p = 0.04$), significant neovascularization ($p = 0.04$) and AHA classification ($p = 0.006$) had significant correlations with clinical presentation. There were 26 (74%) patients in the asymptomatic group and 9 (26%) in the hemispheric brain stroke group. Atheromatous plaque ($p = 0.02$), old hemorrhage ($p = 0.05$) and plaques without neovascularization ($p = 0.02$), fibrous plaque ($p = 0.03$), plaques without hemorrhage ($p = 0.02$) and AHA classification ($p = 0.01$) had significant correlations with clinical presentation. There was no significant difference between symptomatic and asymptomatic groups with respect to MDA plasma levels ($p = 0.232$). A significant difference was observed when MDA plasma levels were compared to asymptomatic + AF and the hemispheric stroke group ($p = 0.002$).

Conclusions: MDA plasma level correlates with the risk of hemispheric stroke (TIA or BS) and is a reliable marker of plaque vulnerability in carotid artery stenosis.

Arterio-arterial rete mirabile of the brain

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Introduction: A rete mirabile is an uncommon vascular abnormality in the brain. It consists of a network of arteriovenous connections with different levels of fragmentation, where blood flows through these connections in place of the usual arterial trunk found in that area.

Aims: The study aimed to assess the morphology of the substitute vascular system, observe its natural course at diagnosis, and evaluate the treatment.

Materials and Methods: Patients received treatment at the Department of Neurosurgery, DSS im. T. Marciniak, from 2013 to 2025. Following initial vascular diagnostics, they were referred either for ongoing surveillance or surgical intervention.

Results: The study included 39 patients, 23 women, aged 1 to 72 years (median 31). Pediatric patients were under 12 years old, while adult participants were evenly distributed across age groups. The most common symptoms were ischemic stroke (12 cases), followed by headache (8), haemorrhagic stroke (7), limb weakness or numbness (8), progressive slowness (2), incidental findings (2), and epilepsy (1). Except for typical comorbidities, we observed PHACES, NF1, multiple sclerosis, Hashimoto's thyroiditis, and schizophrenia—each in one case. An intraretal aneurysm was detected in eight patients. Treatment approaches included observation in 26 cases, direct aneurysm clipping in 6 patients (with two refusing the procedure), endovascular in 2 patients, and STA-MCA bypass in 6 cases.

Besides aneurysm-related treatment indications, patients were observed for ischaemia signs. Usually, symptoms subsided or improved to a manageable level within a few months after diagnosis. After bypass symptoms improvement stabilisation was observed after median period of 10 months.

In approximately 25% of cases, further vascular examinations successfully identified the process of network formation.

Conclusion: Arterial-arterial networks typically develop into a stable, single-vessel system that maintains itself after formation. Interventional procedures could be appropriate in approximately 30% of cases, including ischemic bypasses or aneurysm securing within the network.

FAST bypass: translating microsurgical precision into measurable outcome in STA–MCA revascularization

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Background: Despite decades of experience, STA–MCA bypass for moyamoya disease remains vulnerable to variability in clamp time, hemodynamic instability, and perioperative complications. We hypothesized that structured implementation of the FAST (Fast, Accurate, Simple, Tidy) bypass philosophy would translate microsurgical discipline into reproducible clinical and hemodynamic benefit.

Methods: A retrospective analysis was conducted on 38 consecutive patients (38 hemispheres) undergoing direct STA–MCA bypass for symptomatic moyamoya disease between 2023 and 2025 under a standardized FAST protocol. Procedures were performed by a junior cerebrovascular surgeon within a structured operative framework emphasizing areolar-plane donor harvesting, minimized recipient occlusion time, toe-first interrupted suturing, elimination of the rubber dam, a standardized clip-removal sequence, and continuous heparinized irrigation. Primary endpoints included temporary occlusion time, bypass patency, perioperative ischemic and hyperperfusion events, functional outcome (mRS), and symptom resolution. Hemodynamic efficacy was assessed using intraoperative ICG FLOW800 and mean arterial pressure measurement of the bypass conduit.

Results: Mean temporary occlusion time was 27 ± 4 minutes. Immediate cortical hemodynamic improvement patency was achieved in 100% of cases, with sustained 100% radiological patency at 6 months. No symptomatic perioperative ischemic infarctions occurred. Symptomatic hyperperfusion was observed in 7.9% and resolved completely under standardized management. Favorable functional outcome (mRS 0–2) increased from 45% preoperatively to 95% at final follow-up. Preoperatively, 90% of patients presented with headache, dizziness, or recurrent transient ischemic deficits; more than 70% of these symptomatic patients experienced complete or substantial postoperative symptom resolution. FLOW800 demonstrated consistent cortical perfusion augmentation in all hemispheres.

Conclusion: FAST bypass reframes cerebral revascularization from a technique-driven approach to an outcome-oriented microsurgical architecture. Even when performed by a junior surgeon, this structured framework achieved zero early ischemic events, universal patency, and significant functional improvement. FAST may represent a scalable and training-compatible paradigm for modern cerebrovascular revascularization.

Pediatrics, ethic, future

Microsurgical management of infants and pediatric cerebral aneurysms: illustrative surgical series for complex aneurysm clipping and parent vessel reconstruction

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Background: Pediatric intracranial aneurysms are rare, biologically distinct lesions characterized by complex morphology, immature vascular architecture, and unpredictable behavior. Their management demands adaptation beyond adult paradigms. We report a focused surgical experience emphasizing technical strategy in this high-risk yet potentially curable population.

Methods: Over a 4-year period at Sheikh Tahnoon Medical City (STMC), eight pediatric patients (0–15 years) underwent microsurgical treatment by a senior vascular neurosurgeon (Dr. MJA). Age distribution included two infants (4 and 8 months), one 3-year-old, one 6-year-old, and four patients aged 7–15 years. Six presented with acute rupture and subarachnoid hemorrhage; two were identified electively due to interval enlargement or high-risk morphology. Aneurysms predominantly involved the internal carotid artery terminus, followed by posterior circulation lesions (mainly PICA–basilar junction). Most were large and demonstrated complex configurations.

Surgical Strategy and Challenges: Management required tailored microsurgical techniques accounting for developmental vessel fragility, smaller operative corridors, limited instrument scaling, and pathological vessel wall characteristics. Multiple-Clipping with aneurysm reconstruction or resection was performed in three cases. One infant required parent vessel sacrifice with attempted microvascular anastomosis due to prohibitive intraoperative anatomy. The rest underwent standard clipping. Intraoperative findings frequently revealed dysplastic vessels, broad necks, and adherent perforators, necessitating advanced microsurgical handling and flow preservation strategies.

Results: There was no mortality. Seven of eight patients achieved excellent neurological outcomes. One patient developed postoperative upper limb weakness with partial recovery but persistent focal dystonia.

Conclusions: Pediatric cerebral aneurysms represent a surgically formidable but hopeful pathology. When managed within an experienced microsurgical framework, even complex lesions—including those in infancy—can be treated with favorable outcomes. This series highlights operative nuances, intraoperative decision-making, and developmental vascular considerations, underscoring that microsurgery remains a critical and durable modality in the management of pediatric aneurysms. Illustrative cases and technical strategies will be presented.

Initiation of a pilote neurovascular unit at university clinics of Kinshasa, DRC

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Introduction: Neurovascular diseases in general and strokes in particular, currently constitute a major public health problem. This is all the more true as they increasingly affect relatively young people.

In November 2017, at the 7th International Congress of AFMED (Association of Alumni of the Faculty of Medicine), the work presented by the Neurosurgery teams of the University Clinics of Kinshasa and the Ngaliema Clinic demonstrated the need for multidisciplinary and optimized care for stroke patients in order to reduce morbidity and mortality associated with this condition. Indeed, in the field of neurovascular pathologies, the lack of specialized units contributes to the slower participation of healthcare professionals in patient care. Following these analyses, the Neurosurgery Department at the University Clinics of Kinshasa opted to develop a multidisciplinary unit dedicated to neurovascular pathologies.

The unit became operational in April 2024. Our aim is to present a summary of activities after 18 months of operation.

Methods: This is a documentary study from hospital stay files

Results: After 18 months, 190 patients were treated in Neurovascular Unity among whom, 168 (88%) for hemorragic CVA and 132 (66 %) aged 20–60 ans with sex ratio F/M of 3/1. People in professional activities represented 64,6%. 80 % had medical treatment only and 20 % had surgical treatment (CSF drainage, intra-parechymal hematoma evacuation, aneurysm clipping). 86 % had favorable outcome. Global mortality accounted for 14 % that represent a great decreasing by comparison with 30% mentioned in preliminary evaluation at 3 months of operation.

Conclusion: Development of Neuro-Vascular pilote unity contribute largely to improve strokes management in our contexte with important decreasing of mortality.

Keywords: *Stroke, Neurovascular Unit, CUK, DRC*

Burr Hole Evacuation for Chronic Subdural Hematoma Dead?

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Introduction: The author provides a comprehensive review of current management strategies for chronic subdural hematoma (cSDH), including the incidence of this diagnosis in the CR. The study traces the evolution of diagnostic and therapeutic procedures, with a focus on contemporary views on pathophysiology, particularly the critical role of outer membrane neovascularization.

Methods: The study compares long-term patient cohorts and clinical outcomes from the author's department. Various surgical and non-surgical approaches are analyzed, with a primary focus on the incidence of hematoma recurrence.

Discussion: Since the 1980s, burr hole trepanation and evacuation have served as the gold standard of care. Over the decades, the role of cavity irrigation and the type and timing of postoperative drainage have been extensively debated. Furthermore, risk factors predicting cSDH recurrence have been identified, highlighting the importance of risk stratification based on preoperative imaging CT according *Nakaguchi* classification. In cases of multiple recurrences, decompressive craniectomy with temporary bone flap removal can remains a one of salvage option. In the last decade, however, the focus has shifted toward causal vasoactive treatment, including Middle Meningeal Artery (MMA) embolization.

Results: Meticulous execution of a standard burr hole evacuation, even in the absence of postoperative drainage, combined with the administration anticoagulant and antiaggregant drugs yields consistent results with a recurrence rate of approximately 10%.

Conclusion: Burr hole trepanation maintains its definitive role in the treatment of cSDH, primarily due to its ability to provide immediate decompression and clinical improvement in symptomatic patients with negligible cost-effectiveness. MMA embolization represents a causal treatment modality that is currently establishing its position within the treatment algorithm. Future perspectives include the combination of both methods, as well as the revolutionary potential of endovascular hematoma evacuation followed by MMA embolization according *Savastano* in indicated cases.

POSTERS

Aneurysms

A metaphor for medicine, timelines, and jumping timelines

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Introduction: A metaphor-phrase holds most truth with least amount of space; an example in Medicine is “like father/like son, like mother/like daughter” its timeline alludes to genetics, even epigenetics; Anthropology’s most famous metaphor “ontogeny recapitulates phylogeny”, means an individual-organism’s development mirrors its species’ evolutionary-history.

Aims: This investigation shows how basal-metabolic-rate (BMR) links internal-carotid-artery’s cerebral blood-flow rate, Q_{ICA}, to brain-volume; exploring its evolutionary-backbone, and how this and metabolic-support jumped timelines in evolutionary-history.

Materials/Methods/Results: Evolution’s traditional focal-point has been extraordinary increase in brain-size and metabolic-rate over 4.4Myrs hominin evolution; cognition, related to neural-activity, is importantly championed with ensuing technological-expertise; our metaphor returns to fetal-ontogeny, where metaphors’-guidance reveals the vascular-system’s appearance actually precedes nervous-system development. A recent study mirrored this vascular-prominence truth; this hominin-fossil-study used carotid-artery canal-radius to estimate Q_{ICA}, scaling Q_{ICA} against body-size/brain-volume/fossil-age to show the human-brain’s evolutionary-progression within hominins’-brains; ICA-radius increased with endocranial- volume: $p<0.001$ as Q_{ICA} scaled 1.41 allometrically with brain-volume; in 4.4Mys; brain-volume had increased 4.7-fold and $Q_{ICA,}$ 9.3.

Hominin-CBF-pattern was established prior to divergence from hominin’s last-common-ancestor (LCA), anthropoid-ape. Brain needs blood, and CBF strongly correlates with O_2/glucose consumption/utilization. Their respective allometric- exponents 0.84//0.86/0.86 match well with BMR’s. Early primate-evolution’s CBF-rate and brain-volume-increases continued with diversity of vascular-supply solutions: vertebral-artery dominance, external-carotid-artery/pharyngeal-artery dominance, promontory-artery-reliance. Other metabolic homeostatic-mechanisms, P_{450} and antioxidants, co-evolved, sending phylogenetic-signals of primate-clade relatedness throughout evolution.

The “uncoupling of Q_{ICA} from brain-volume” pattern is the human-timeline in ontogeny, empirically measured: maximum Q_{ICA} at 5–6 years correlates with absolute brain-volume, 90% at 5–6 years; whole glucose-uptake, 2.5-increase from birth; and metabolic-rate (resting) peaks, 66% at 4–5 years.

Conclusion: Ontogenetically, blood-supply’s importance to brain reaches back to Euprimate-evolution, dominance of carotid over vertebral artery; frontal-cortex perfusion increased disproportionately faster than brain-volume, leaving us pondering: Q may be cognition’s better corollary.

Endoscopic evacuation of spontaneous intracerebral haemorrhage: a narrow-corridor approach

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Introduction: Spontaneous intracerebral haemorrhage (ICH) accounts for 10–15% of strokes and remains a therapeutic challenge with high mortality and disability rates. While traditional craniotomy has failed to demonstrate superior functional recovery, the 2024 ENRICH trial catalysed a paradigm shift toward minimally invasive surgery (MIS) to mitigate mass effect and heme-related neurotoxicity. Achieving high evacuation rates through ultra-narrow corridors is a critical objective to minimise iatrogenic disruption of vital white matter tracts and surrounding parenchyma.

Aims: This study evaluates contemporary evidence on MIS evacuation and details a narrow-corridor approach using the MINOP® system to assess its efficacy within an "ultra-early" (<24 hours) intervention framework.

Materials and Methods: A narrative review of 133 full-text articles published between January 2020 and May 2025 was conducted. We demonstrate a "narrow-corridor" technique based on the SCUBA (Stereotactic Intracerebral Haemorrhage Underwater Blood Aspiration) approach. The procedure utilises a 19FR (6.33 mm) introducer and a 2.7 mm endoscope. It employs a "dry-wet" transition: initial dry-phase aspiration for bulk clot removal, followed by a controlled wet phase (irrigation ≤15 mmHg) to optimise visualisation and haemostasis using endoscopic bipolar coagulation.

Results: Evidence from recent pilot studies and meta-analyses indicates that endoscopic MIS is associated with significantly improved functional outcomes (mRS 0–3) compared to medical management or craniotomy. Our technical application confirms that near-complete evacuation (≤15 mL residual volume) is achievable through an operative corridor more than twice as narrow as standard 15.8 mm tubular systems, while maintaining a low rate of rebleeding. Early intervention (<24 hours) is consistently linked to superior functional recovery and reduced ICU stays.

Conclusion: Narrow-corridor endoscopic evacuation is an emerging, evidence-supported alternative for ICH management that minimises surgical exposure while maximising mechanical clearance. Timely intervention supports a proactive shift from therapeutic nihilism toward optimised patient care. A detailed surgical video is available for presentation.

Delayed Aneurysmal Rupture Following Flow Diverter Placement despite adjunctive coiling: Case report

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Introduction: Flow diverters significantly alter the inflow dynamics of an aneurysm, leading to both qualitative and quantitative changes in the intra-aneurysmal hemodynamic environment.

Case presentation: A 65-year-old woman with a giant left internal carotid artery aneurysm causing visual symptoms underwent treatment with coiling, surpass evolve flow diverter placement, and balloon angioplasty. Despite being on dual antiplatelet therapy, she developed in-stent thrombosis on postoperative day 4, leading to neurological symptoms. Intra-arterial thrombolysis with eptifibatide and tenecteplase achieved near total recanalization and initial clinical improvement. However, she subsequently developed a massive subarachnoid hemorrhage and was declared brain dead the next day.

Conclusion: Delayed rupture of an aneurysm following surpass evolve flow diverter embolization is a rare complication associated with high morbidity and mortality. In our case, in-stent thrombosis occurred on postoperative day 4 and subsequently progressed to aneurysmal rupture, despite the presence of coils within the aneurysm sac. Rupture on the fourth day after Surpass Evolve flow diverter placement—despite initial coil embolization—along with aneurysmal thrombosis, partial recanalization, thrombus extension into the parent vessel, and subsequent treatment with intra-arterial eptifibatide and tenecteplase, highlights the profound hemodynamic instability in giant aneurysms that can contribute to post-procedural rupture.

AVM

Carotid–Cavernous Fistulas: A 29-Year Single-Center Endovascular Experience

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Introduction: Carotid–cavernous fistulas (CCFs) are rare vascular disorders characterized by abnormal communication between the carotid arterial system and the cavernous sinus. Clinical manifestations vary from mild ocular symptoms to progressive visual impairment and cranial nerve dysfunction. Over the past decades, endovascular therapy has become the treatment of choice. Long-term institutional experiences remain valuable for evaluating safety and effectiveness.

Aims: To present a single-center experience with exclusive endovascular management of carotid–cavernous fistulas over a 29-year period and to assess treatment safety and clinical effectiveness.

Materials and Methods: We performed a retrospective review of consecutive patients treated for CCF at a tertiary neurosurgical center between 1997 and 2026. All patients underwent endovascular intervention. Clinical presentation, angiographic characteristics including Barrow classification, treatment strategy (transarterial and/or transvenous approach), and procedural details were analyzed. Primary outcomes included angiographic fistula occlusion and clinical improvement. Secondary outcomes were procedural complications and need for additional interventions.

Results: A total of 30 patients were treated during the study period. Both direct and indirect fistulas were identified. Ocular manifestations such as chemosis, proptosis, diplopia, and visual disturbance were the most common presenting features. Treatment strategy was individualized according to angioarchitecture and venous drainage patterns. Endovascular therapy resulted in high rates of fistula closure and substantial clinical improvement in the majority of patients. Procedure-related complications were infrequent, and no treatment-related mortality was observed. In selected cases, repeat endovascular procedures were required to achieve complete occlusion.

Conclusion: Our long-term single-center experience supports endovascular therapy as a safe and effective first-line treatment for carotid–cavernous fistulas. Careful angiographic evaluation and tailored procedural planning are essential for achieving durable occlusion and favorable clinical outcomes.

Challenging the Binary Concept of Eloquence in the Spetzler–Martin Grading System

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Introduction: Brain arteriovenous malformations (AVMs) are complex vascular lesions posing high surgical risk in eloquent brain areas. We aimed to evaluate surgical outcomes of AVMs in eloquent areas and explore whether different eloquent zones carry distinct functional risks.

Methods: We retrospectively analysed all AVMs surgically treated between January 2009 and March 2025. Patients were first divided into eloquent and non-eloquent AVM groups. Eloquent lesions were subsequently stratified into motor and non-motor eloquent regions. Functional outcomes were assessed at 30 days, 6 months, and 12 months using the Modified Rankin Scale (*mRS*) and the Glasgow Outcome Scale-Extended (GOSE). Good outcome was defined as mRS 0–1 and GOSE 6–8, while bad outcome corresponded to mRS >1 and GOSE <6.

Results: Fifty patients were included (54% male; 56% <40 years). Mean Spetzler–Martin grade was 1.62 ± 0.75 and mean Lawton–Young score was 4.54 ± 1.01. Fifteen patients (30%) harboured AVMs in eloquent areas, and 70% of all patients presented after haemorrhage. Among eloquent lesions, 5 (33%) were located in motor cortex and 10 (67%) in non-motor eloquent regions. Eloquence itself did not significantly influence long-term outcome when compared with non-eloquent AVMs. However, haemorrhagic presentation strongly affected early prognosis (30-day GOSE p=0.011; mRS p<0.001), and none of the unruptured AVMs resulted in poor outcome. Within eloquent AVMs, differences emerged: at 6 months the mean mRS was 2.4 for motor lesions versus 1.3 for non-motor eloquent AVMs, with 80% of non-motor patients achieving good outcome at 12 months.

Conclusion: Microsurgical resection of AVMs in eloquent areas can achieve favourable results, particularly in non-motor regions. Our findings suggest that the binary eloquence variable of the Spetzler–Martin system may mask important prognostic differences. Motor cortex involvement appears to confer a substantially higher functional burden, supporting the need for a more nuanced risk stratification of eloquent territories.

Design of a Novel Endovascular Embolization Catheter Module Incorporating an Electrothermal Detachment Zone

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Introduction: Reliable catheter detachment remains a critical challenge in endovascular embolization, particularly during procedures involving injectable embolic agents, where reflux or prolonged injection may impair mechanical separation. Failure of detachment can result in catheter retention, vessel injury, or embolic complications, underscoring the need for alternative detachment strategies.

Aims: We describe the conceptual design of a novel endovascular embolization catheter module incorporating a predefined electrothermal detachment zone within a hollow, injection-capable catheter architecture.

Methods: The device integrates an electrolytic conductor routed along the catheter body and terminating at a circumferential detachment zone positioned between a retained distal tip and a retrievable proximal shaft. Detachment is intended to be achieved through controlled electrothermal activation without mechanical traction.

Results: The proposed design enables separation at a defined intravascular location following embolic delivery, allowing withdrawal of the proximal catheter segment while leaving the distal tip in situ. Structural features are intended to support compatibility with standard endovascular workflows and commonly used injectable embolic agents.

Conclusion: This design introduces a novel application of electrothermal detachment to an injection-capable endovascular catheter platform. Although limited to conceptual description, the proposed system provides a framework for future experimental validation and translational development to improve detachment reliability and procedural safety in endovascular embolization.

Ischemia

01-04 Development of endovascular care for patients with ischemic stroke in the Ivanovo region

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Introduction: Endovascular care for patients with ischemic stroke began to develop in the Ivanovo region in 2018. The region has traditionally had a low percentage of patients arriving within the therapeutic window, so the development of these technologies was particularly relevant.

Materials and methods: Extensive preparatory work was carried out to organize this type of care: training of endovascular surgeons; development of algorithms for routing patients within the hospital and from other emergency care centers in the region; selection of patients for thromboaspiration by emergency medical teams based on the LAMS scale. This made it possible to extend a 6-hour window and to perform staged reperfusion. For staged reperfusion, we use the domestic thrombolytic agent Fortelizin 10 mg. Over a total of 7 years (2018–2024), 99 operations were performed on the vessels of the carotid basin in patients admitted within a time interval of up to 6 hours from the onset of the disease. In 2023 and 2024, 33 and 34 interventions were performed, respectively, which accounted for 0.9% of all ischemic strokes in the region. In 2023 and 2024, the average time for thromboaspiration was 50 minutes, and the time from admission to the operating room was 54 minutes. In 2025, the RSC gained access to advanced neuroimaging in the form of CT perfusion. Taking into account the DEFUSE-3 selection criteria, the temporal indications for thrombus aspiration were expanded.

Results: In 2025, the department performed 49 procedures, which is 1.5 times higher than in 2024: 15 with fatal outcomes, 25 with positive results, and 9 with no change. This accounted for 1.5% of all ischemic strokes in the region.

Conclusion: We see the following prospects for the development of this area: achieving the target indicators for thromboaspiration – 2% of all ischemic strokes in the region, reducing mortality.

Advanced Quantitative Hemodynamic and Flow MRI in Cerebral Revascularization Surgery

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Introduction: Revascularization surgery for a symptomatic hemisphere with hemodynamic impairment is effective in carefully selected patients and is best guided by advanced quantitative imaging. Blood oxygenation level–dependent cerebrovascular reactivity (BOLD-CVR) and quantitative magnetic resonance angiography with noninvasive optimal vessel analysis (qMRA-NOVA) are increasingly used to assess cerebral hemodynamics and flow.

Aim: To report BOLD-CVR and qMRA-NOVA findings and evaluate changes in cerebral hemodynamics and flow after flow augmentation with superficial temporal artery–middle cerebral artery (STA–MCA) bypass in patients with steno-occlusive disease.

Materials and Methods: Symptomatic patients with Moyamoya vasculopathy or atherosclerotic large-vessel occlusion treated at the Clinical Neuroscience Center, University Hospital Zurich, who underwent pre- and postoperative BOLD-CVR and qMRA-NOVA imaging were analyzed.

Results: All patients showed reduced hemispheric volume flow and impaired BOLD-CVR before surgery. After STA–MCA bypass, BOLD-CVR improved in the revascularized MCA territory and affected hemisphere. qMRA-NOVA demonstrated a significant increase in hemispheric volume flow attributable to bypass augmentation.

Conclusion: Symptomatic hemispheres in Moyamoya and atherosclerotic steno-occlusive disease exhibit measurable hemodynamic and flow impairment. STA–MCA bypass effectively improves both cerebrovascular reactivity and hemispheric volume flow.

The spatial association between recurrent stroke lesions and impaired BOLD cerebrovascular reactivity

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Introduction: In patients with symptomatic atherosclerotic large vessel disease, impaired cerebrovascular reserve is linked to an increased risk of recurrent ischemic stroke. Blood oxygenation-level dependent cerebrovascular reactivity (BOLD-CVR) provides additional insights into the severity and spatial distribution of cerebrovascular impairment at the brain tissue level.

Aims: We hypothesized that recurrent ischemic events occur predominantly in regions of the affected hemisphere (ipsilateral to the large vessel disease) exhibiting the steal phenomenon, characterized by negative BOLD-CVR.

Materials and Methods: This prospective longitudinal study included 190 patients with symptomatic ischemic stroke or transient ischemic attack due to atherosclerotic large vessel disease of the anterior circulation. All patients underwent BOLD-CVR as part of their initial stroke work-up and had at least one clinical follow-up MRI with diffusion-weighted imaging (DWI). The voxel-wise spatial agreement of steal phenomenon (BOLD-CVR<0), BOLD-CVR<0.05, and BOLD-CVR<0.10 with recurrent DWI lesions was calculated. Kaplan-Meier survival analysis and Cox proportional hazard models assessed the association between ipsilateral steal volume and ischemic stroke recurrence.

Results: Of the 190 patients, 48 (25.3%) had recurrent ischemic lesions, with significantly lower BOLD-CVR values and higher steal volumes compared to the non-recurrent group. Spatial analysis showed that 77.6% of recurrent lesions occurred within voxels with negative BOLD-CVR (steal phenomenon), increasing to 94.7% when considering more severely impaired regions (BOLD-CVR<0.10). Patients with higher steal volume (>107.7 ml) had a 6.87-fold higher risk of recurrent ischemic stroke in the ipsilateral hemisphere within 12 months (hazard ratio: 6.87, CI: 3.41–13.88, p<0.001).

Conclusion: Recurrent ischemic strokes predominantly occur in ipsilateral brain regions with the steal phenomenon (negative BOLD-CVR) in patients with large vessel atherosclerotic disease. A higher steal volume (>107.7 ml) significantly increases the risk of recurrent ischemic stroke, emphasizing the value of BOLD-CVR in personalized risk assessment.

Retroaortic Technique During Anterior Lumbar Exposure in Severely Calcified Aortoiliac Disease: Operative Strategy and Literature Review

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Background: Anterior lumbar interbody fusion (ALIF) provides wide access to the disc space, allowing for restoration of disc height and lordosis, but it necessitates mobilizing the great vessels. Severe aortoiliac calcification can diminish vessel compliance, increase difficulty of retraction, and increase technical challenges during exposure, particularly at the L4–5 disc level.

Observations: A 76-year-old woman with symptomatic lumbar degenerative disease and extensive aortic bifurcation calcification underwent staged surgery with L4–S1 ALIF, aided by vascular surgery for retroperitoneal exposure. Dense calcification at the bifurcation limited mobilization, requiring precise retractor placement and careful corridor selection. A retroaortic approach was used to reduce traction on the calcified aorta during disc preparation and implant placement. Intraoperative neuromonitoring remained stable, and no vascular injuries occurred. Intraoperative images show vessel control, retraction, and interbody device placement.

Lessons: Severe aortoiliac calcification can limit exposure compliance during ALIF and increase vulnerability to vascular injury including hemorrhage and acute limb ischemia from plaque rupture or arterial dissection. When noncontrast CT suggests heavy bifurcation disease, selective CTA, real-time distal perfusion surveillance, and a predefined contingency plan (including conversion or posterior salvage) help align operative decisions with physiologic safety.

Tumor-mimicking Primary CNS Vasculitis: A Single Patient Pooled Meta-Analysis with Illustrative Case

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Background: A subset of Primary central nervous system vasculitis (PCNSV) cases can present with clinical and radiological features that closely resemble brain tumors, creating a significant diagnostic challenge for clinicians. Accurate differentiation between these entities is crucial for timely and appropriate management, as their treatment strategies and prognoses differ substantially. We performed a pooled analysis of all published series to study the disease landscape, including presentation, management, and outcomes, along with a case example.

Methods: We present an illustrative case alongside a systematic review and individual patient data meta-analysis following PRISMA guidelines. We searched major databases up to September 2025 for studies on PCNSV mimicking malignancy. Data extraction and statistical analysis, including logistic regression for outcome predictors, were performed using R software.

Results: Our illustrative case involved a 35-year-old male initially presenting with stroke-like symptoms, whose MRI findings suggested a diffuse left hemispheric lesion concerning for glioma. Despite initial biopsies, the diagnosis remained unclear until a subsequent biopsy revealed vasculitis after a course of chemotherapy and radiation. The meta-analysis included 63 patients with tumor-mimicking PCNSV, with an average age of 40 years. Common presentations were focal deficits (61.9%) and headaches (52.4%). MRI consistently showed T2/FLAIR hyperintense lesions with variable enhancement and edema. Lymphocytic vasculitis was the predominant histological finding (76.2%). Most patients (92.1%) received high-dose steroids. Recurrence occurred in 23.8% of patients. Seizures at presentation significantly predicted both recurrence and poor outcomes, as did diffuse lesions. Granulomatous findings were associated with lower odds of recurrence.

Conclusion: Tumor-mimicking PCNSV poses a significant diagnostic challenge. Recognizing its diverse presentations is critical for prompt diagnosis and appropriate clinical management.