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HOW DOES VERTICAL LAMINAR FRACTURE IMPACT THE DECISION-MAKING IN THORACOLUMBAR FRACTURES? A SYSTEMATIC SCOPING REVIEW AND META-ANALYSIS

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OBJECTIVE

Although vertical laminar fracture (VLF) is generally considered a severity marker for thoracolumbar fractures (TLFs), its exact role in decision-making has never been established. This scoping review aims to synthesize the research on VLF's role in TLF decision-making.

METHODS

A systematic review was conducted following PRISMA guidelines. We searched PubMed, Scopus, and Web of Science from inception to 11 June 2023 for studies examining the association of VLF in thoracolumbar fractures with dural lacerations, neurological deficits, radiographic parameters, or treatment outcomes. Additionally, experimental studies that analyze the biomechanics of burst fractures with VLF were included. The studies extracted key findings, objectives, and patient population. A meta-analysis was performed for the association of VLF with dural laceration and neurological deficit, and ORs were pooled with a 95% confidence interval (CI).

RESULTS

Twenty-eight studies were included in this systematic review, encompassing 2,021 patients, and twelve were included in the

meta-analysis. According to the main subject of the study, the association of VLF with a dural laceration (n=14), neurological deficit (n=4), radiographic parameters (n=3), thoracolumbar fracture classification (n=2), treatment outcome (n=2). Seven studies with a total of 1010 patients reported a significant association between VLF and neurological deficit (OR= 7.35, 95% CI [3.97, 14.25]; P< 0.001). The pooled OR estimates for VLF predicting dural lacerations was 7.75, 95% CI [2.41, 24.87]; P< 0.001).

CONCLUSION

VLF may have several important diagnostic and therapeutic implications in managing TLFs. VLF may help to distinguish AO type A3 from A4 fractures. VLF may help to predict preoperatively the occurrence of dural laceration, thereby choosing the optimal surgical strategy. Clinical and biomechanical data suggest VLF may be a valuable modifier to guide the decision-making in burst fractures; however, more studies are needed to confirm its prognostic importance regarding treatment outcomes.

MULTICENTER EXTERNAL VALIDATION OF THE
ACCURACY OF COMPUTED TOMOGRAPHY
CRITERIA FOR DETECTING THORACOLUMBAR
POSTERIOR LIGAMENTOUS COMPLEX INJURY

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BACKGROUND AND OBJECTIVE

Recent studies have proposed computed tomography (CT) criteria for posterior ligamentous complex (PLC) injury: disrupted if ≥ 2 CT findings, indeterminate if single finding, and intact if 0 CT findings. The study aims to validate the CT criteria for PLC injury externally.

METHODS

Three level 1 trauma centers enrolled 614 consecutive patients with acute thoracolumbar fractures (T1- L5) who received Computed tomography (CT) and magnetic resonance imaging (MRI). Three reviewers from each center were the patients from the respective center for assessed CT for facet joint malalignment, horizontal laminar fracture, spinous process fracture, and interspinous widening and MRI for disrupted PLC. The primary outcome is the diagnostic accuracy of CT criteria (0,1, ≥ 2 findings) in detecting disrupted PLC on MRI using all CT readings. Subgroup analysis for each participating center and reviewer was done. The inter-

reader agreement on PLC status on MRI and CT criteria was assessed using Fleiss Kappa (k).

RESULTS

The positive predictive value (PPV) for PLC injury was 0 findings, 3%; single positive CT, 43%; ≥ 2 CT findings, 94%, and was consistent among different centers and reviewers. The AUC for ≥ 1 CT findings in detecting PLC injury ranged from 90% to 97%, indicating excellent discrimination for all centers. The inter-reader k on PLC status by MRI and CT criteria was substantial ($k > 0.60$).

CONCLUSIONS

This study externally validates the previously proposed CT criteria for PLC injury. ≥ 2 positive CT findings or 0 CT findings can be used as criteria for a disrupted PLC (B-type injury) or intact PLC (A-type injuries), respectively, without added MRI. A single CT finding implies indeterminate PLC status and the need for further MRI assessment. The CT criteria will potentially guide MRI indications and treatment decisions for burst fractures in patients without neurological impairment.

KEYWORDS

posterior ligamentous complex, diagnostic accuracy, multicentre, external validation, computed tomography, thoracolumbar fractures, AOSpine classification

TREATMENT OPTIONS FOR RECURRENT MALIGNANT DIFFUSE ASTROCYTOMA (WHO GRADE IV): CASE REPORT

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INTRODUCTION

Diffuse astrocytomas IDH mutant (WHO II) are tumors originating from glial progenitor cells that are characterized by the presence of IDH1/2, ATRX, and TP53 mutations. The natural history of these lesion is to undergo malignant transformation over a period of approximately 4-29 months due to accumulation of new mutations.

OBJECTIVES

We present the case of a 37-year-old female who underwent partial resection in 2018 for a diffuse fibrillary astrocytoma (WHO II) that invaded almost the entire right cerebral hemisphere. The patient followed conventional radiotherapy and chemotherapy. She presents after 6 years of regularly follow-ups with left hemiparesis, intracranial hypertension syndrome and tumor recurrence on MRI. The patient underwent another surgical intervention and the new histopathological diagnosis was diffuse astrocytoma grade IV. Therapeutic options for these patients are limited considering the fact that a gross total resection or a conventional re-irradiation could impact the quality of life. Therefore, exploring new

therapeutic methods, such as targeted molecular therapy like EGFR antagonists or proteasome inhibitors, or proton therapy, should be considered.

MATERIAL AND METHODS

We conducted extensive research in two public medical databases for information related to the molecular pathways and management of primary and recurrent malignant astrocytoma and relevant articles were selected. Subsequently, we correlated this information with our direct experience in our case and discussed the observed results.

RESULTS

Treatment modalities for these patients include reintervention, re-irradiation and second line chemotherapeutics. In relapsing cases the goal of reintervention is both to alleviate symptoms and obtain tumoral tissue for immunohistochemical analysis for identification of the new mutations. Conventional re-irradiation for large lesions carries high risks of producing both short-term and long-term side effects, impacting the quality of life. Alternatively, proton therapy minimizes the risk of adverse events due to Bragg peak reducing the irradiation of the surrounding tissue.

CONCLUSIONS

Genetic characterization of these lesions can facilitate targeted molecular therapy and help in establishing the prognosis. Re-irradiation of malignant astrocytomas with proton therapy is an effective treatment measure allowing for comparable tumor control to conventional radiotherapy.

KEYWORDS

diffuse astrocytoma, malignant progression, proton therapy, molecular therapy, re-irradiation, reintervention

DECISION MAKING IN EPILEPTIC AVMS

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While there is no doubt about the need for surgical treatment of a ruptured arteriovenous malformation (AVM), the decision to surgically treat a patient presenting solely with seizures is more controversial.

Arteriovenous malformations (AVMs) arise from an abnormal connection between high-flow arterial vessels and low-flow venous vessels, resulting in a dysplastic vascular nidus within the brain tissue. The inherent flow irregularities within AVMs make them prone to rupture, which occurs in approximately half of patients. Additionally, seizures represent the second most common clinical manifestation of AVMs, presenting in 20%–45% of individuals with these lesions.

This paper investigates the angiographic and MRI features of arteriovenous malformations that present with epilepsy, and discusses the surgical considerations in managing these patients and integration of multimodal approach focusing on the standard microsurgical techniques utilized.

Patients presenting with seizures as the primary symptom of an arteriovenous malformation carry a higher surgical risk compared to those presenting with haemorrhage.

Several factors have been associated with an increased risk of seizures in patients with arteriovenous malformations (AVMs). These include male gender, younger patient age, AVMs located in the frontal or temporal lobes, AVMs situated in the brain cortex, superficial venous drainage, a superficial temporal lobe AVM nidus, fistulous AVMs, and AVMs with venous stenosis.

Surgical treatment is the recommended approach for patients with Spetzler-Martin grade I–III arteriovenous malformations. Resecting an unruptured brain arteriovenous malformation in a patient presenting only with epilepsy is a complex decision that requires a thorough understanding of the lesion's anatomy, the patient's history, and the neurosurgeon's skills.

TIPS AND TRICKS IN SURGICAL TREATMENT OF LARGE VESTIBULAR SCHWANNOMAS

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Vestibular schwannomas (VS) frequently referred to as acoustic neuromas are the most common tumours of the cerebellopontine angle. They are benign, generally slow-growing tumors that arise from the vestibular portion of the eighth cranial nerve. For patients with large vestibular schwannomas or those exhibiting symptoms from the tumor’s mass effect, surgical intervention remains the preferred treatment approach.

This paper discusses the surgical management of patients with large vestibular schwannomas operated in our department and emphasizes the use of intraoperative monitoring for preserving facial nerve function. We review the key surgical steps and highlight the importance of preoperative planning, patient position, and the use of microsurgical techniques to optimize the surgical outcome.

Gross total resection of large vestibular schwannomas is associated with worse facial nerve outcomes. Our preferred treatment strategy, especially for older patients, is planned subtotal resection followed by periodic imaging evaluation and radiotherapy in cases of documented tumor growth. This approach may lead to superior facial nerve preservation and improved quality of life for individuals with large vestibular schwannomas.

CONCLUSION

The optimal treatment approach for vestibular schwannoma remains a subject of debate. Gross total resection has traditionally been the gold standard for large tumors, but this is often accompanied by a higher risk of postoperative facial nerve dysfunction. Planned subtotal resection with the goal of preserving facial nerve function, followed by closed observation is an alternative approach.

MANAGEMENT OF EXTRAMEDULLARY INTRADURAL SPINAL TUMORS

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Spinal tumors are relatively uncommon, accounting for approximately 5%–10% of all central nervous system tumors, with an estimated 70%–80% being located in the intradural extramedullary space. The most common intradural extramedullary tumors are schwannomas, followed by meningiomas. Other less common intradural extramedullary tumors include myxopapillary ependymomas.

The clinical presentation of these tumors is often rather nonspecific, and clinicians must maintain a high index of suspicion when evaluating patients with chronic back pain. Approximately 50% of affected individuals experience nonspecific back pain, whereas radiating pain, motor deficits, and sensory loss often progress gradually.

This study examines the surgical management of intradural spinal tumors treated in our department, focusing on surgical techniques. Some of these benign lesions can pose a surgical challenge due to their location to spinal cord, tumor consistency (densely mineralized / calcified).

Posterior approaches involving laminectomy while preserving facet joints are typically sufficient for the surgical resection of dorsal and dorsolateral tumors.

In conclusion the total surgical removal of these tumors while preserving neurological function remains can pose a surgical challenge especially for those that are densely calcified and situated anterolateral to spinal cord, but employing standard microsurgical techniques often makes these resections possible.

PREDICTORS OF POSTOPERATIVE COMPLICATIONS AND FUNCTIONAL OUTCOMES IN PEDIATRIC PATIENTS WITH SURGICALLY TREATED FOURTH VENTRICLE TUMOR

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BACKGROUND

Tumors of fourth ventricle are frequently treated pathologies in pediatric neurosurgery. Data regarding predictors for permanent neurological deficits, long-term functional outcomes, cerebellar mutism (CM), the extent of resection (EOR), and oncological outcomes are scarce. We attempt to contribute to this topic with analysis of our institutional cohort.

METHODS

A retrospective single-center study of patients aged ≤ 19 years who underwent primary surgical resection of fourth ventricular tumor over a 15-year period (2006–2021). Predictors analyzed included: age, gender, surgical approach, anatomical pattern, tumor grade, EOR, tumor volume, and others as appropriate.

RESULTS

106 patients were included (64 males, mean age 7.3 years). Rate of permanent neurological deficit was 24.2%; lateral tumor extension ($p = 0.036$) and tumor volume greater than 38 cm³ ($p = 0.020$) were significant predictors. Presence of deficit was the only significant predictor of reduced (less than 90) Lansky score ($p = 0.005$). CM occurred in 20.8% of patients and was influenced by medulloblastoma histology ($p = 0.011$), lateral tumor extension ($p = 0.017$), and male gender ($p = 0.021$). No significant difference between transvermian and telovelar approach in development of CM was detected ($p = 0.478$). No significant predictor was found for EOR. EOR was not found to be significant predictor of overall survival for both low-grade and high-grade tumors, however, gross total resection (GTR) was protective against tumor recurrence compared to near-total or subtotal resection ($p < 0.001$). Survival was found to be better in older patients (≥ 7.0 years, $p = 0.019$).

CONCLUSION

The overall rate of postoperative complications remains high due to the eloquent localization. Older patients (>7 years) have been found to have better outcomes and prognosis. Achieving GTR whenever feasible and safe has been shown to be critical for tumor recurrence. CM was more common in patients with medulloblastoma, and in patients with tumors extending through the foramen of Luschka. The telovelar approach uses a safe and anatomically sparing corridor, however, it has not been associated with a lower incidence of CM and neurological sequelae in our series, showing that each case should be assessed on an individual basis.

KEYWORDS

fourth ventricle tumours, childhood tumor, overall survival, postoperative complications, cerebellar mutism

USE OF AUGMENTED REALITY IN TREATMENT OF PITUITARY MICROADENOMAS

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INTRODUCTION

Transsphenoidal surgery, performed using endoscopic or microscopic techniques, is a safe and effective method for treating neuroendocrine pituitary tumors, including microadenomas. However, the precise location of microadenomas can be challenging to determine, particularly in acromegaly patients, who often exhibit a reduced intracarotid distance. Augmented reality (AR), particularly through heads-up displays (HUD) integrated into surgical microscopes, has been predominantly utilized in transcranial approaches but shows potential in enhancing transsphenoidal procedures.

AIM

This study aims to present the surgical workflow, techniques, and outcomes associated with using AR in microscopic transsphenoidal surgery for pituitary microadenomas.

MATERIAL AND METHODS

All procedures were conducted at the Targu Mures Clinical Emergency Hospital's Department of Neurosurgery between 2019 and 2024. A total of 15 cases were treated using AR-assisted techniques. While the surgical operative time was comparable to non-AR-assisted procedures, the preoperative setup was more time-consuming and required staging to optimize the surgical workflow. In all cases, surgeons successfully identified and

resected the microadenomas without complications related to navigation accuracy.

CONCLUSIONS

The findings suggest that integrating AR into transsphenoidal surgery enhances anatomical understanding and precise localization of microadenomas, providing a valuable tool for neurosurgeons. However, AR cannot replace surgical expertise and clinical judgment.

KEYWORDS

pituitary tumours, microadenomas, transsphenoidal surgery, augmented reality

A SPINAL TRAUMA, A TUMOR AND EVERYTHING IN BETWEEN

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INTRODUCTION

Burkitt lymphoma is a male predominant (3:1 male:female ratio) aggressive B-cell non-Hodgkin lymphoma that can present as a sporadic variant with meningeal involvement in about 20% of cases. Therefore, it can manifest with neurologic deficits due to compression of the spinal cord or spine nerve root.

CASE REPORT

We report the case of a 6 years-old girl who presented in the emergency department following a traumatic vertebral injury (fall from around 1.5 meters) with no spinal cord involvement. She accused upper back pain, walking and orthostatism difficulties and manifested a light to moderate inferior paraparesis (MCR 3/5) The MRI revealed a space-occupying epidural mass between T1-T4, severely compressing the spinal cord initially thought to be an epidural hematoma. Emergency surgery was performed with duro-radicular decompression and mass excision through a T1-T4

laminotomy followed by a laminoplasty. The unveiled mass was white, minimally vascularized and adherent to the dura raising the suspicion of a tumor. Postoperatively the patient exhibited significant neurological improvement with resolution of the paraparesis and normal gait restoration.

Three weeks later, the patient returned with complaints of abnormal gait, lumbar pain radiating in the right lower leg and upon examination a light right lower limb monoparesis (MRC 4/5) following another traumatic event. Emergency MRI of the whole spine with contrast was requested just as the pathologist in charge of the case suggested a diagnosis of Burkitt lymphoma, prompting a whole-body MRI. A severe recurrence was noted at the site of the previous lesion along with a new lumbar lesion, and several intraabdominal, intrathoracic, ovarian tumor sites with diffuse infiltration of the bone marrow. The patient was urgently referred to the pediatric oncology department and started on steroidal anti-inflammatory treatment and chemotherapy.

CONCLUSIONS

Burkitt lymphoma involving the nervous system in children requires increased medical attention during the clinical, histopathological examination and treatment phase, due to the association with advanced disease and, although rare, should be considered as a differential diagnosis in pediatric patients with epidural lesions. The management of such lesions demands a solid collaboration between neurosurgeon, pediatrician, pathologist and oncologist for an early diagnosis and proper treatment.

KEYWORDS

Burkitt lymphoma, pediatric tumor, recurrence, epidural involvement

DEALING WITH TWO SYNCHRONOUS LESIONS: GIANT INTRAVENTRICULAR MASS AND A CONVEXITAL LESION – CONNECTED OR COINCIDENTAL?

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INTRODUCTION

Multiple synchronous intracranial lesions present a significant diagnostic and therapeutic challenge, in most cases appearing as metastatic tumors or same-cell type tumors.

CASE REPORT

We report the case of a 73-year-old patient admitted in our department with light left hemiparesis (MRC MMT 4/5), light left hypoesthesia and transitory and remitted state of temporo-spatial confusion that debuted around six weeks prior to presentation. The neurological exam confirmed the sensorimotor deficit and displayed the existence of left neglect syndrome. The patient’s MRI revealed a giant temporo-parieto-occipital mass almost 7 cm in diameter that appeared to have an intraventricular starting point and showed a relatively homogeneous contrast enhancement with

significant mass effect. A concomitant superficial parieto-temporal lesion was also noted. Both lesions were excised in a successive manner from superficial to deep, using a right parieto-temporal craniotomy. While the giant mass had a yellowish color and an extremely hard consistency, the superficial one was easily suctionable and had a grey-reddish color and was extremely well vascularized, raising the suspicion of concomitant brain lesions of different histology. Postoperatively the patient underwent a routine thoracic CT scan in the context of a position related soft tissue injury that revealed the existence of two pulmonary lesions, further deepening our suspicion of concomitant brain lesions of different histology.

CONCLUSIONS

Although extremely rare, the appearance of two histologically distinct brain lesions in patients with no evidence of a genetic condition should be taken into consideration especially in the context of intraoperative differences in order to successfully guide the patients' follow-up treatment.

KEYWORDS

synchronous lesions, giant intraventricular mass, histology

INTRACRANIAL ANEURYSMS IN CHILDREN - A NEW PERSPECTIVE. AN EXPERIENCE OF 51 CASES (MULTICENTER STUDY)

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INTRODUCTION

Intracranial aneurysms in children are very rare pathologic entities. (1200 cases presented in literature from 1939-2011).

MATERIAL AND METHODS

The authors present 51 cases of children (aged: 0-16) operated between January 1999 and December 2023 - 24 years in three neurosurgical centers: “Bagdasar Arseni” Emergency University Hospital (Bucharest), Sanador Clinical Hospital (Bucharest) and Timis County Emergency Hospital (Timisoara). We collected data from many children’s intracranial aneurysms cases because “Bagdasar-Arseni” Emergency University Hospital has the most important pediatric neurosurgical unit in the country.

Regarding our series, pediatric aneurysms represent 6.14% (51 cases) of all operated intracranial aneurysms (765 cases). The mean

age of the patients was 14.3 years. There were 29 boys (58.7%) and 22 girls (41.2%). The clinical features are dominated by headache (48 cases - 95.7%), neck stiffness (45 cases - 91.4%), vomiting (44 cases - 89.3%), focal neurological deficit (24 cases - 44.6%), an altered level of consciousness (17 cases - 36.1%), seizures (24 cases - 44.6%), fever (20 cases - 34%). The majority of patients were Hunt & Hess II at admittance (27 cases, 53%). All neuroimagic investigations were done in the first 48 hours (CT, DSA, MRI). Locations: anterior communicating artery aneurysms (20 cases, 36.1%), followed by middle cerebral artery aneurysms (15 cases, 25.5%) and internal carotid artery bifurcation aneurysms (9 cases, 19.1%) and so on. Many aneurysms were large and giant (18 cases - 31.9%). Microsurgery approach was performed in 48 cases (99.7%) and 3 case (4.4%) were endovascular approached. This represents a new vision because the actual endovascular way is extremely efficient and performant in occluding pediatric intracranial aneurysms.

The Glasgow Outcome Scale (GOS) at six months postop. showed GR in 40 cases (78.5%), MD in 9 cases (17.2%), SD in 1 patient (2.1%) and (preoperative) death in 1 patient (2.1%).

CONCLUSIONS

Intracranial aneurysms in children are a very rare pathologic entity. Early microsurgical or endovascular approach is mandatory and has excellent results (good recovery).

KEYWORDS

intracranial aneurysms, children, microsurgical approach, early therapy, DSA-angiography, extended Glasgow, outcome scale

MULTUM IN PARVO-THE GLASGOW COMA SCALE.
A NEW SPECTRUM IN NEUROTRAUMA AT ITS
50TH BIRTHDAY

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INTRODUCTION

Coma assessment scales have been developed to facilitate ease of communication between emergency team members and to facilitate ease of clinical assessment for patients with severe impairment of consciousness.

In 1974 Graham Teasdale and Bryan Jennett published in the *Lancet* a scale which theoretically helped physicians get a quick and accurate status of comatose patients. The scale they described assessed patient behaviour regarding three key aspects – motor reactivity, verbal communication and eye opening. As the two authors were working in Glasgow, the scale was dubbed the Glasgow Coma Scale (GCS) a name which all neurologists and neurosurgeons are well-accustomed with.

MATERIAL

The use of the GCS is based on the patient’s capacity to react using language and motion to external stimuli. Eye movement (1-4

points), Speech (1-5 points) and Motion (1-6 points) for a maximum total of 15 points or a minimum total of 3 points. A patient with a Glasgow Coma Score of 3 is completely non-reactive, while a patient with a Glasgow Coma Score of 15 is perfectly aware.

This scale introduced in neurotrauma has simplified enormously the communication in neurosurgery, accompanying neurotrauma to the whole spectrum of neurosurgical pathology.

Despite its wide use today, the GCS has been seriously criticised due to its incapacity to determine the functional status of brainstem structures. Therefore, various improvements and updates were performed for the Glasgow Coma Scale.

CONCLUSIONS

Over the years, the use of the GCS extended in the entire medical meme despite its criticism. The simplicity and ease of use which characterize the GCS made it a very useful instrument for neurological examination since the first moment a patient is seen by a medical professional.

The Glasgow Coma Scale which recently reached its 50th birthday became a universal language for physicians. Since it has been in use neurological status can be expressed with great ease and without loss of meaning.

KEYWORDS

Glasgow Coma Scale, traumatic brain injury, neurosurgery

REMEMBER: 30 YEARS SINCE CONSTANTIN
ARSENI PASSED AWAY - THE FONDATOR OF
ROMANIAN NEUROSURGERY

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INTRODUCTION

The authors will present one of the great personalities of Romanian neurosurgery, Dr Constantin Arseni, who created it in Bucharest, creating the largest university centre of neurosurgery in Europe at that time.

MATERIAL

After the tragic loss of his mentor Prof. Dr Dumitru Bagdasar in 1946, Dr Constantin Arseni, took over the management of the

neurosurgery service at the Central Hospital for Mental, Nervous and Endocrinologic Diseases, the only department of this kind in this country; He was able to have the first Clinic of Neurosurgery from Romania.

For his merits, Dr Constantin Arseni, became an Associate Professor in 1952 and University Professor in 1963. His neurosurgical activity was complex, but mainly focused on tumoral pathology, cerebral and spinal, and also on spinal degenerative disease.

Under Professor C. Arseni, the Neurosurgical Clinic of Bucharest is transformed in 1975 into the “Prof. Dr D. Bagdasar” Clinical Hospital of Neurosurgery, the largest hospital of Neurosurgery in the Europe, with 550 beds and, subsequently, 650 beds. Also, he developed the departments of neurosurgery in each of the biggest university centres in the country; while being the first President of the Romanian Society of Neurosurgery.

SCIENTIFIC ACTIVITY

Scientific activity of Prof. Dr Constantin Arseni includes the numerous publications (54 treaties and monographies), together with all his collaborators, encompassing all domains of neurosurgery: Tumoral, Neuropathological, Vascular, Paediatric, Spinal Degenerative Pathology, Central Nervous System Malformations, History, etc. with high international visibility.

An editorial board under C. Arseni published, with the substantial contribution of the Bucharest Medical Publishing House of the Clinic, the “Treatise of Neurology” in 8 volumes (1979-1981).

CONCLUSIONS

Professor Constantin Arseni was a dedicated surgeon, he practiced his job asking from those around him as much as he offered - the maximum. He was a schoolmaster and a teacher in the true sense of word.

Professor Constantin Arseni, Member of the Romanian Academy, was an exemplary professional, a model of conduct, which will forever remain in our memory, of the neurosurgeons, and of the Romanian neurosurgery, leaving behind a legacy hard to match for those who followed him.

KEYWORDS

history, neurosurgery, founder, Constantin Arseni

RETROSPECTIVE ANALYSIS OF GLIOBLASTOMA OUTCOMES

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BACKGROUND

Glioblastoma (GBM) is one of the most aggressive brain cancers, with a median overall survival (OS) of about 15 months. This retrospective study focuses on 144 GBM cases treated over 12 years in our clinic in Romania, analyzing factors affecting progression-free survival (PFS) and OS, including genetic markers and treatment modalities.

METHODS

This study involved patients treated between 2012 and 2024 at the National Institute of Neurology and Neurovascular Diseases in Bucharest. The cohort included 144 patients, with variables such as age, gender, tumor location, IDH mutation status, Karnofsky Performance Status (KPS), and genetic markers (MGMT methylation and EGFR amplification) analyzed. Survival outcomes were evaluated using Kaplan-Meier curves and log-rank tests.

RESULTS

- Patient Demographics: The cohort included 64 males (44.4%) and 80 females (55.6%) with a mean age of 60.7 years.
- Tumor Characteristics: The most common tumor location was the frontal lobe (31.9%), followed by multilobular GBM (26.3%). Right-side tumors were more prevalent (51.3%).
- Genetic Markers: MGMT promoter was methylated in 46 patients (31.9%), and EGFR was amplified in 76 patients (52.7%).
- Treatment Modalities: 105 patients (72.9%) received chemotherapy with temozolomide (TMZ), and 116 patients (80.5%) underwent radiotherapy.
- Survival Outcomes: Median PFS was 5 months, and median OS was 8.5 months. Kaplan-Meier survival curves indicated significantly increased OS in patients with MGMT methylation undergoing chemotherapy ($p < 0.005$) and radiotherapy ($p < 0.005$). Similarly, OS was significantly higher in patients without EGFR amplification receiving chemotherapy ($p < 0.005$) and radiotherapy ($p < 0.005$).

CONCLUSION

The study emphasizes the importance of MGMT methylation and EGFR amplification in predicting survival outcomes in GBM patients. Immediate postoperative adjuvant therapy significantly improves PFS and OS. The findings underscore the need for coordinated care and timely access to adjuvant therapies to enhance survival rates in GBM patients. Second surgical interventions also showed a survival benefit, highlighting their potential role as salvage therapy in recurrent GBM cases.

KEYWORDS

glioblastoma, overall survival, Kaplan-Meier survival curves, log-rank tests

INTRACRANIAL ARTERIAL LOOP WITH A COMPLEX PARTIALLY THROMBOSED LARGE ANEURYSM ON THE POSTERIOR CIRCULATION: WHAT TO DO NEXT?

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INTRODUCTION

Managing intracranial aneurysms in the posterior circulation is particularly challenging due to anatomical complexities and the high risk of rupture. The presence of a large, partially thrombosed aneurysm adds another layer of difficulty. This report details the case of a 66-year-old female patient presenting with a symptomatic intracranial arterial loop and a large, partially thrombosed aneurysm in the posterior circulation, successfully treated through microsurgical clipping.

MATERIAL AND METHODS

A 66-year-old female with a history of intermittent headaches, vertigo, and diplopia underwent neuroimaging, including computed tomography angiography (CTA) and magnetic resonance imaging (MRI). Imaging revealed a large aneurysm in the posterior circulation, with partial thrombosis and an associated intracranial arterial loop. The patient was scheduled for a craniotomy to perform microsurgical clipping of the aneurysm. Two titanium aneurysm clips were applied to achieve complete occlusion.

RESULTS

Intraoperative findings confirmed the large, partially thrombosed aneurysm arising from the basilar artery, with a complex arterial loop intricately intertwined with the aneurysm and adjacent neurovascular structures. The first clip was placed to secure the primary inflow, and the second clip provided additional reinforcement. Postoperative imaging demonstrated successful clipping with no residual aneurysm filling. The patient had an uneventful recovery with no immediate postoperative complications. Clinically, the patient reported significant improvement in symptoms, with a complete resolution of headaches and vertigo.

CONCLUSIONS

This case highlights the challenges and considerations in managing large, partially thrombosed aneurysms in the posterior circulation, particularly in the presence of an intracranial arterial loop. Successful management requires precise microsurgical technique and careful intraoperative decision-making. Further research is needed to optimize treatment strategies, potentially incorporating adjunctive endovascular techniques to enhance surgical outcomes.

KEYWORDS

intracranial aneurysm, posterior circulation, arterial loop, thrombosed aneurysm, aneurysm clipping

CHALLENGES IN BRAIN METASTASES DIAGNOSIS AND TREATMENT

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Although brain metastases are the most frequent type of intracranial tumors, their diagnosis and treatment is still challenging. They have poor prognosis and life expectancy is short, as brain metastases appear in advanced stage cancers.

In U.S., the rate of recently discovered cancer that will evolve with brain metastases is considered to be 6-14%. Left untreated, brain metastases become lethal in less than 2 months. The most common primary cancers that develop brain metastases are lung, breast, melanoma and colorectal.

In our department, approximately 60 patients with brain tumors were diagnosed after surgery with brain metastases in the last 10 years. The most common cancer to metastasize by far was lung cancer, with a mean age at diagnosis 60 years old, affecting mostly smoking men. The majority of patients presented with multiple metastases, unaware of the primary disease and without conducting any oncological treatment prior to admission in our department.

We observed that COVID-19 pandemic period highly affected patients with cancer. The number of patients with brain metastases operated on in our department has drastically decreased in that period. There were a lot of reasons why cancer patients among which being the impossibility to reach emergency rooms without having COVID-19 symptoms and difficulty of reaching radiology centers for early imaging.

Most of the patients presented in the Emergency Department with multiple brain metastases, comatose or with focal neurological deficits installed long before presentation, regardless of their primary cancer, thus making neurosurgery an impractical option for most of these cases.

Although there have been significant advances in systemic oncological treatment and radiotherapy, surgery remains an essential method of managing brain metastases, even in cases presenting with multiple lesions. Careful patient selection is essential in obtaining the best outcome.

IN VIVO INOCULATION OF GBM CELLS IN RATS AND TREATMENT WITH RUXOLITINIB: PART OF THE GLIOSTAT STUDY

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GlioStat (patent pending) denotes an invention that addresses the current deficiencies of glioblastoma (GBM) chemotherapy by developing a molecularly imprinted drug reservoir that is specifically designed for post-surgical recovery. The goal of our research was to guarantee the long-term release of the antitumor drug ruxolitinib (RUX), which is specifically designed to target residual infiltrative cancer cells, while simultaneously reducing the risk of adverse effects. In order to achieve this goal, we have successfully developed and characterized four distinctive molecularly imprinted polymers (MIPs), with one of them advancing to in vivo experimentation.

The selection of one MIP for further in vivo investigations was guided by the Alamar Blue viability assay on C6 GBM cell cultures, which took into account both the efficacy and the potential toxicity of residual monomers. Over the course of 96 hours, MIP 2 demonstrated the most favorable risk-benefit profile, providing superior efficacy against GBM C6 cells. In contrast, its non-imprinted counterpart (NIP 2) exhibited minimal toxicity.

The protocol involved anesthetising the male Wistar rats, immobilising them on a corkboard, without the use of a stereotactic headholder. After shaving the head and local

disinfection with iodine solution, we made a linear sagittal incision and exposed the parietal bones. A 3x3 mm burr hole was made with a pneumatic drill in the right parietal bone, revealing the dura mater. Subsequently, we injected 20,000 C6 GBM cells suspended in 5 microliters of solution in the cerebral parenchyma at a depth of 3 mm. Clinical and imaging control was performed.

For the animals that developed tumors, a second therapeutic intervention was performed. The rats were anesthetised, disinfected, and readied in the same manner as before. The burr hole was exposed, with the tumor being partially resected via a “microscoping” technique. Next, 5-10 microliters of MIP2 solution (4 mg/mL) were injected into the parenchyma respective of the tumor bed. Five microliters of thrombin solution were then added (100 UI/mL) to form the fibrin network.

In comparison to the untreated controls and animals treated with free RUX, animals treated with MIP2 exhibited a substantial increase in survival time during the *in vivo* evaluation, extending from 20 to 50 days. As such, our research had yielded a potentially life-changing drug delivery system in GBM, with the capacity to significantly increase postoperative survival. More *in vivo* tests should be conducted to validate our findings.

KEYWORDS

glioblastoma (GBM), Ruxolitinib (RUX), molecularly imprinted polymers (MIP), *in vivo* studies, Gliostat, microscoping

FORESTIER DISEASE: A CASE STUDY

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INTRODUCTION

We present the case of M.E., a 73-year-old patient, who presented to his local medical services for progressive dysphagia. Follow-up cervical CT scan revealed ossification of the anterior longitudinal ligament, at C3 - C4, C4 - C5 and C5 - C6 levels, consistent with diffuse idiopathic skeletal hyperostosis (DISH), also known as Forestier disease.

MATERIAL AND METHODS

The patient was operated on by a multidisciplinary team (Neurosurgery and O.M.F. surgery). After a left sided vertical cervical incision and dissection of tissue, the spinal cervical levels were identified radiologically, followed by reduction of bony elevations at C3 - C4, C4 - C5 and C5 - C6 using a regular drill tip. Postoperatively the patient's dysphagia was completely alleviated.

CONCLUSION

Although Forestier disease is usually identified incidentally, patients may present with decreased neck mobility, cervical pain and dysphagia. While the disease is similar to ankylosing spondylitis, it does not have a genetic component and it mainly affects the cervical and thoracic spines. Surgery may be necessary if dysphagia progresses.

RARE TUMORS OF POSTERIOR CRANIAL FOSSA IN ADULTS: A SINGLE UNIT EXPERIENCE AND LITERATURE REVIEW

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OBJECTIVES

Tumors arising in the posterior cranial fossa pertain to a special category of neoplasm in the manner that they can cause cerebellar syndrome, obstructive hydrocephalus, brainstem compression – cranial nerve dysfunction – and herniation. In the cerebellopontine angle, the most common tumors are acoustic neuromas followed by meningiomas. Among the petroclival tumors, the most common benign tumors are meningiomas and the most common malign tumors are chordomas and metastases. Among jugular foramen tumors, the common tumors are schwannomas, paragangliomas and meningiomas. We report our unit’s experience with the neurosurgical management of rare posterior cranial fossa tumors as compared to the main literature results, taking into consideration the clinical, radiological aspects and the outcome.

MATERIALS AND METHODS

Retrospective analysis of a single unit cohort of patients diagnosed with rare posterior cranial fossa tumors, who underwent surgical treatment in the Neurosurgery I Department of the University Emergency Hospital Bucharest between 2017 and 2024. Relevant literature review was analyzed, as well as serial clinical

examinations, imaging studies, and operative records were taken into consideration.

CONCLUSIONS

Depending on the location, size, and pathology of the posterior cranial fossa tumors, there are different treatment options, which include microsurgical resection, observation, stereotactic radiotherapy. These type of lesions still represent a challenge and require electing the most suitable approach whilst preserving the neurologic function of the patient.

KEYWORDS

acoustic neuroma, meningioma, metastases, management outcome, microsurgical technique, posterior fossa, hydrocephalus

REMODELING AND COMPARTMENTALIZATION OF THE NIDUS AS A SOLUTION FOR SAFE RESECTION OF RUPTURED UNEMBOLISED LARGE AND GIANT ARTERIOVENOUS MALFORMATIONS

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INTRODUCTION

Arteriovenous malformations (AVMs) consist of fistulous connections of arteries and veins without intervening capillaries, organized as a mass with definable sides. AVMs are composed of enlarged feeding arteries, a nidus of dysmorphic vessels in relationship with the brain parenchyma, through which arteriovenous shunting occurs and draining veins. In a series of corticalised and deep avm's the senior author conceptualised the nidus as composed of two or more compartments that can be separated completely after partial disconnection from corresponding feeding arteries and unessential drainage veins. This surgical strategy allowed a wider surgical corridor to the deeper AVM compartments, a faster resection and reduced blood loss.

MATERIAL AND METHODS

In this study we review 4 large and one giant AVM cases removed surgically using the technique of nidus compartmentalization. Clinical and imaging data included complete surgical videos, gender, age, clinical presentation, Spetzler-Martin and Lawton-Young grade, nidus size, modified Rankin Score (mRS) were collected.

SURGICAL NUANCES

The surgical strategy was adapted to the location of the main

feeders. when the main feeders were deep we preferred opening a narrow deep surgical corridor to interrupt them first and then enlarging it circumferentially from depth to surface.

In this scenario, the main drainage vein has a trajectory that is not perpendicular to the nidus, folding many times in close contact with one or more faces of the nidus or even inside the nidus. In this case, the classical dissecting strategy by opening surgical corridors circumferentially around the AVM, can be hazardous as the main drainage vein can be injured, resulting in heavy haemorrhage from the remaining nidus which is attached to the vein. When the main feeders came from MCA branches a superficial to deep dissection of the nidus was followed.

In order to facilitate the resection, after a partial dissection of the nidus was performed, this part of it, completely freed from feeders and drainage veins was separated from the rest of the AVM with a large clip. After coagulation and resection of the nidus compartment above the clip, the circumferential interruption of deep feeders continued beyond the clip, securing another compartment of the AVM. In only one case this manoeuvre was repeated more than 3 times. In 3 cases the division of the nidus in two compartments was enough. In three of the cases, we encountered bleeding from the nidus, especially the part of the nidus disconnected from feeders. Applying a clip to compartmentalize the nidus in this situation controlled the bleeding and opened new corridors to advance the dissection.

When bleeding was encountered from multiple sources, both in the compartment disconnected from feeders and in the not yet dissected compartment, clip disconnection of the compartments diminished the bleeding considerably and allowed us to focus on the bleeding from the perforators.

In other two cases we applied this strategy of nidus separation by clips even if there was no bleeding as we gained more space to access the rest of the nidus once one compartment was completely

disconnected. For the giant AVM, complete resection presumed resection in multiple steps as six nidus compartments were separated from the residual nidus and resected.

RESULTS

Compartmentalization and staged disconnection of the nidus with large clips was performed in five cases. Three patients presented in the emergency care unit with ruptured AVMs and subsequent hematomas and two had only minor intraoperative bleeding. There were three and 2 females in the study. The mean (\pm SD) age of the patients was 40 years (\pm 14.6 years). On admission, three patients presented with altered mental status and hemiplegia and two patients with refractory epileptic seizures. Four patients underwent digital subtraction angiography (DSA) prior to surgery, while in one case only a computed tomography angiography (CTA) was performed, since the patient was in a critical state and needed urgent surgery. Three AVMs were located in the left dominant hemisphere, (two in the temporal lobe and one at the parieto-occipital junction), one AVM was cited in the, fronto-parietal right hemisphere and one giant left hemispheric avm. The median (range) size of the nidus was 4 cm (3-6 cm). Two AVMs were classified as Spetzler-Martin and Lawton-Young Supplemented grade VIII, one grade X and two as grade V.

Total resection of AVM was achieved in all cases as confirmed by postoperative CT cerebral angiography (Fig 3). Immediate postoperative CTA or DSA and magnetic resonance angiography (MRA) were performed in selected cases, also confirming total removal of the AVM.

For ruptured AVMs, resection and hematoma evacuation was performed in less than 12 hours after the onset of symptoms. There were no signs of cerebral infarction attributable to the staged temporary clipping of AVM's compartments shown on postoperative CT scans and due to the lack of symptoms indicating ischemia, there was no need for diffusion-weighted imaging (DWI)

or perfusion-weighted imaging (PWI) MRI sequences. There was no mortality in this case series. A modified Rankin's scale was used to assess the outcome at six months, with a score ranging from 0 to 2 points, all patients were free of seizures and neurological deficits, fully socially reintegrated and returned to their previous jobs one year after surgery.

DISCUSSION

Once a high-flow AVM has ruptured and subsequent hematoma progresses, brain's protection mechanisms, such as local vasoconstriction and increased blood pressure are failing as the volume of the hematoma increases and cerebral oedema takes over. Therefore, is expressed the need for a faster removal of the AVM, regardless of the bleeding's mechanism: the rupture of the AVM with massive hematoma or intraoperative bleeding, especially from the perforating arteries which are more difficult to control. We propose in this paper a surgical reorganization of AVM's with separated compartments that are disconnected step by step from the lesion, in a decrescendo or crescendo way. Depending on the location of the main feeders, superficial or deep, this approach involves working circumferentially and spiralling deep from the surface or in the second scenario attacking deep feeders first, after creating a corridor in one of the AVM's walls, then coming toward the surface. For this staged disconnection and resection of each one of the "feeding compartments" is used a clip-by-clip technique, occluding the arterial input and even secondary drainage veins. After the flow arrest, vessels are more susceptible to be coagulated and cut (Fig 5).

In many cases, a unique apparenity of the nidus, with numerous loops all over its surface, possibly in close contact with the brain parenchyma can compromise the dissection, hence we recommend less coagulation on the surface of the nidus, to maintain the intranidal draining system. Once bleeding from the nidus occurs, it is important to avoid enlarging the surgical corridor and opening

of new bleeding fronts, until active feeders are identified and controlled.

Concrete identification and anatomical description of each AVM compartment, followed by stepwise disconnection as a whole entity, decreases the intranidal pressure with a better bleeding-control and easier mobilization of the remnant lesion and ensures a faster resection in case of emergency.

Our study is limited by the small sample size, the emergency circumstances and the lack of intraoperative imaging techniques, such as intraoperative angiography in order to identify missing feeding arteries.

Further understanding of the pathophysiology of brain AVM is a milestone for adapting microsurgical resection that suits better each one of these malformations, conceptualized as a box with multiple compartments.

CONCLUSIONS

Developing strategies in refining microsurgical resection is a continuous target in AVMs approach. In emergency cases, with rupture and consequent hematoma, quick resection is mandatory. In order to achieve that, remodelling of the nidus and segmentation, with gradual clip application and separate disconnection is a safe solution with a good outcome.

SURGICAL RESECTION OF A COMPLEX TUBERCULUM SELLAE MENINGIOMA ENCASING MAJOR ARTERIES: A CASE REPORT

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INTRODUCTION

Though constituting only a minor proportion (1%) of sellar masses, suprasellar meningiomas pose a significant diagnostic challenge within the region of sellar and suprasellar tumors. Pituitary adenomas, at nearly 90% prevalence, dominate this anatomical region. Distinguishing these two entities is paramount, as both clinical presentation and, to some extent, biochemical profiles exhibit notable overlap. Accurate preoperative differentiation is critical due to the contrasting behaviors of these tumors. Meningiomas, with their robust vascularity supplied by dural and osseous arteries, present a heightened risk of intraoperative hemorrhage.

CLINICAL CASE

A 53-year-old woman presented with a two-month history of worsening headaches and gradual vision loss. Neurological examination revealed only visual acuity decline. Her hormone profile showed elevated prolactin but lacked clinical features of prolactin excess, suggesting a possible prolactin-secreting pituitary macroadenoma. A contrast-enhanced MRI confirmed a significant sellar and suprasellar mass with homogeneous enhancement, extending to the right paramedian region and encasing the right internal carotid artery (ICA) at its critical segment involving the cavernous and supraclinoid portions. Furthermore, the right

middle meningeal artery (M1) and anterior cerebral artery (A1) originated from this same location, highlighting the high surgical risk. Surgical resection was deemed necessary. The patient underwent a right pterional craniotomy, revealing a grayish, extradural soft mass lesion encasing the ICA bifurcation. Careful microsurgical dissection with basal devascularization was performed, followed by near-complete tumor removal using an ultrasonic aspirator to minimize damage to the encased arteries. Postoperative follow-up CT scan confirmed successful near-total tumor ablation.

CONCLUSION

This case underscores the critical role of meticulous preoperative diagnosis in managing complex sellar tumors. While pituitary adenomas dominate this region, suprasellar meningiomas, despite their rarity, demand a high index of suspicion. Overlapping clinical and biochemical presentations highlight the reliance on advanced imaging for accurate differentiation. The intricate vascularity of meningiomas, as exemplified by the encasement of critical arteries in this case, necessitates meticulous surgical technique with devascularization strategies. This successful near-complete tumor removal emphasizes the importance of such surgical expertise in navigating these diagnostically challenging sellar lesions.

KEYWORDS

suprasellar meningiomas, meningioma, sellar masses

MIGRAINE: ADVANCES IN THE PATHOGENESIS AND TREATMENT

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BACKGROUND

Migraine is a prevalent neurological disorder characterized by chronic headaches, significantly impacting the global population. This comprehensive review aims to advance the understanding of migraine pathogenesis and treatment, focusing on molecular markers and novel therapeutic strategies.

MATERIAL

Molecular markers such as calcitonin gene-related peptide (CGRP) and their role in migraine development. Traditional medical treatments and emerging therapeutic strategies, including neuromodulation, are analyzed for their effectiveness and limitations. Clinical studies and imaging techniques are leveraged to identify key mechanisms and triggers in migraine pathology.

Approximately 95% of people experience a headache at some point, with migraines being a significant contributor. Migraine is recognized by the World Health Organization as one of the top ten causes of disability globally, particularly affecting women. CGRP is identified as a crucial factor in migraine development.

Inhibitors targeting CGRP have shown significant effectiveness in managing migraines. Other molecular markers, including proinflammatory cytokines and neurotransmitters, are discussed for their roles in pain transmission and migraine pathophysiology. Traditional treatments, such as triptans and NSAIDs, are evaluated alongside new therapies, including CGRP inhibitors and neuromodulation techniques. Neuromodulation, involving devices like external trigeminal nerve stimulators, shows promise in migraine management. Genetic markers associated with familial hemiplegic migraine (FHM) and common migraine forms are reviewed. Recent genome-wide association studies (GWAS) have identified several genetic variants linked to migraine susceptibility.

CONCLUSION

This presentation enhances the understanding of migraine pathogenesis and introduces novel therapeutic possibilities. By focusing on molecular markers like CGRP and exploring advanced treatment options, the study aims to improve migraine management and patient care. The findings underscore the need for continued research and innovation in migraine treatments to reduce the global burden of this debilitating condition.

KEYWORDS

migraine pathogenesis, molecular markers, CGRP, migraine treatment, GWAS

COMPLEXITY OF PITUITARY ADENOMA SURGERY. NEW APPROACHES IN DEALING WITH COMPLICATIONS

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INTRODUCTION

Pituitary adenomas are the most common intrasellar tumors, representing 16% of all intracranial lesions. Although the symptomatology is very complex, it requires a multimodal treatment plan, in order to cover all corners of this combined pathology. Mostly the treatment is surgical, hormonal or combined. The transnasal sphenoidal corridor offers an optimal visualization of the anatomic location (via microscope or endoscope) but also comes with a variety of morbidities, one of the most important being the cerebrospinal fluid fistula (CSF leak).

OBJECTIVE

We effectuated a retrospective cohort study in which we included patients with pituitary adenoma who were operated in the Clinic of Neurosurgery from Targu-Mures Emergency County Hospital between January 2018 and April 2024 with full documentation, including complications (apoplexy, infections, CSF fistula etc.).

RESULTS

A total of 45 patients passed the inclusion criteria with a predominance of female patients (60%, n=27) with a mean age of 55.77 years. Analyzing the clinical and paraclinical data, there were 39 patients with macroadenoma (vs. microadenoma n=6), with the dominant symptomatology being headache (86.66%) and visual disturbances (66.66%). In 32 cases the transnasosphenoïdal (TSS) approach was used (1 case endoscopic and 31 cases microscopic), in 10 cases pure transcranial with modified pterional or subfrontal craniotomy and in 3 cases there was a combined approach. Postoperative complications were encountered in 8 cases (17.77%), and death in 1 case. 6 patients presented postoperative CSF fistula. In 16 cases we encountered postoperative Diabetes Insipidus with a significant difference in the tumor volume favoring this manifestation ($p=0.0001$). There was no significance found between the volume of the tumor and postoperative CSF leak ($p=0.665$). In 31 cases (68.88%) the TSS approach was used and the closing of the sphenoid sinus and cranial base was effectuated in a classic manner with fat, fascia and muscle; in additional cases specified glues were used.

CONCLUSIONS

Our study wants to reflect on the importance of anterior/middle cranial base closure, taking into account the possible postoperative complications. It is important to be aware of the technique of different nasoseptal flaps in order to prevent CSF fistula and reduce postoperative complications.

KEYWORDS

pituitary adenoma, transnasosphenoïdal, nasoseptal flaps, CSF leak

ADVANCING PRECISION: AUGMENTED REALITY IN SPINE SURGERY

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Augmented reality (AR) technology is revolutionizing spine surgery, offering unprecedented intraoperative image guidance and enhancing patient safety, particularly in complex procedures. This presentation explores the expanding applications of AR in spinal surgery, highlighting recent technological advances that have transformed surgical practices. In addition to improving surgical precision and accuracy, AR provides real-time visualization of critical anatomical structures, aiding in navigation and decision-making during intricate spinal procedures.

This presentation will delve into the benefits that AR brings compared to classical techniques, including enhanced visualization, improved spatial awareness, and reduced radiation exposure for both patients and surgical teams. By overlaying virtual information onto the surgeon's view of the patient, AR facilitates a more intuitive understanding of complex spinal anatomy and pathology, leading to optimized surgical outcomes.

Furthermore, this session will cover the diverse applications of AR in a range of spinal conditions operated in Royal Hallamshire Hospital, Sheffield, UK - including spinal tumors, calcified disc herniation, spinal CSF-venous fistula etc.

By showcasing the benefits of AR technology across various pathologies, this presentation aims to underscore its transformative potential in advancing spinal surgical care.

UNVEILING THE VEIN: CSF-VENOUS FISTULA. AN UNDERDIAGNOSED NEUROSURGICAL CHALLENGE

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Cerebrospinal fluid (CSF)-venous fistula represents a formidable yet often overlooked neurosurgical dilemma. Despite its disabling consequences, it remains significantly underdiagnosed.

This abstract sheds light on the clinical intricacies, diagnostic challenges, and therapeutic interventions associated with CSF-venous fistula. Early diagnosis is paramount, yet hindered by its rarity and diverse and often unspecific clinical presentations. The importance of heightened awareness among clinicians and radiologists for timely detection and management cannot be overstated.

This presentation will draw upon a review of clinical cases operated in the Royal Hallamshire Hospital, supplemented by a concise surgical video which is focused on surgical technique and benefit of microscope mediated augmented reality.

NEW TECHNOLOGIES AVAILABLE FOR MICRONEUROSURGICAL REMOVAL OF ACOUSTIC NEUROMAS. PERSONAL EXPERIENCE IN 350 CONSECUTIVE CASES

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INTRODUCTION

The aim of this study was to analyze the results of microsurgery removal of acoustic neuromas (AN) using new technologies: flexible hand-held laser fiber, Sonopet Ultrasound Aspirator, Facial Nerve “detector” monopolar stimulation (for localize position and course of facial nerve), BAER’s with level specific (LS) CE-Chirp stimulus for hearing preservation, endoscope for IAC final check, and injectable bone substitute for closure. We report a retrospective nonrandomized clinical study on 300 cases consecutively operated on.

MATERIAL AND METHODS

From July, 2010 to December, 2023, 350 consecutive patients suffering from AN have been operated on with microneurosurgical technique by key-hole retrosigmoid approach. In majority of cases tumor resection was performed with the aid of a handheld flexible laser fiber. In the same period, Sonopet Ultrasound aspirator was used for tumor debulking and/or opening of the internal auditory meatus and canal. From May 2015, hearing preservation by means LS CE-Chirp BAER was attempted in patients with preoperative socially useful hearing (AAO-HNS class A and B). In addition, we check the removal of tumor inside

the internal auditory canal (IAC) by using the flexible and/or rigid endoscope, for completing tumor removal near the fundus.

RESULTS

Overall time from incision to skin suture changed in relation to size of tumor (from 165 to 575 minutes) and was not affected by the use of hand-held laser. Facial nerve function was clinically assessed with the House-Brackmann (HB) scale preoperatively, in the early postoperative period (after 1 week), and at 6-month follow-up. In 3 cases a preoperative facial nerve palsy was observed (HB III and HB IV, respectively). In the remaining cases, 6 months after surgery facial nerve preservation rate (HB I) was 92%, Hearing preservation rate (AAO-HNS A and B, pre- and postoperatively) was 52% in eligible cases. Total and “nearly total” removal of tumor was possible in about 80% of cases. Dura closure was performed with underlying autologous pericranium. Injectable bone substitute in the gaps after bone flap repositioning minimized postoperative CSF leakage and improved the aesthetic result.

CONCLUSIONS

The use of new technologies (handheld flexible laser fibers, Sonopet Ultrasound Aspirator, fluoreceine, Nimbus facial nerve continuous monitoring, LS CE-Chirp BAER, endoscope for IAC final check) in AN microsurgery seems to be safe and efficacious and facilitates tumor resection, especially in “difficult” conditions (e.g., large size, highly vascularized, or hard tumors). The good functional outcome following conventional microsurgery seems to be further improved and the extent of tumor removal could be increased with the proper use of the new technologies available in the neurosurgical armamentarium.

AWAKE SURGERY DURING 5-ALA HIGH GRADE GLIOMA FLUORESCENCE GUIDED RESECTION

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INTRODUCTION

Awake surgery (AS) is currently the gold standard for low-grade glioma located in language brain areas to provide patients with the best prognosis with a high quality of life. A recent meta-analysis by Gerritsen et al (2019) also suggests that AS with direct cortical stimulation for high grade gliomas (HGG) provides a better outcome. Direct cortical stimulation and subcortical mapping during AS allows the surgeon to detect regions of the cortex and white matter tracts involved in specific functions of language, semantics, syntax, phonetics, or phonology. 5-ALA fluorescence-guided tumor resection is a technique that offers the advantage of better delineating high-grade glioma, increasing the chance of achieving gross total tumor resection, improving overall survival.

5-ALA is a metabolic tracer with a risk of photosensitisation and for 48 hours after administration the patient must be kept in a dark environment avoiding the risk of skin reactions. For this reason, during the operation including in the awake phase we have to keep the same low light exposure conditions, which could sometimes pose some difficulties for the operating team.

MATERIAL AND METHODS

We present a case operated in MedLife Polissano Hospital in May 2023, for frontal HGG, using AC together with 5-ALA fluorescence. The patient was evaluated preoperatively with MRI, MPRAGE contrast and DTI tractography, which was fused to the navigation system during surgery. The operation was performed with asleep-awake-asleep technique and in the awake phase we used the Boston test for naming, specific questions and calculation tests with direct cortical stimulation by the Penfield bipolar technique and monopolar subcortical mapping with the Raabe suction probe, adapted to our Natus Medical intraoperative monitoring system. Surgery was performed in semi-dark conditions with a tablet, turning on dim light tuning.

RESULTS

In the awake phase we obtained speech arrest, semantic and phonological paraphrases, which allowed us to determine the brain areas, cortical and subcortical regions, involved in language functions. Thus we performed a total tumor resection with language-preserving. There were no incidents during surgery and the patient was discharged in good condition on the 5th postoperative day.

CONCLUSIONS

Brain tumor surgery is multimodal, using many tools and techniques. The use of AS together with 5-ALA fluorescence-induced resection is safe and provides the prerequisites to achieve gross total tumor resection while preserving language functions.

KEYWORDS

glioblastoma, awake surgery, fluorescence guided surgery

SURGICAL APPROACH TO THALAMIC CAVERNOUS MALFORMATIONS. CASE REPORT

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INTRODUCTION

Thalamus is a high eloquent brain region, because it contains important relay nucleus and is surrounded by vital neural and vascular structures. Cavernous malformations involving deep structures such as the basal ganglia and thalamus account for 5–10% of all cerebral cavernomas and can cause devastating neurological deficits. Surgical approach to thalamic cavernomas is associated with risks of new or worsening neurologic deficits. The benefit of surgery must be carefully weighed on an individualized basis. There are several surgical routes that can be used to approach thalamic lesions, mainly transcortical and interhemispheric approaches. A particular approach should be selected based on the location of the cavernoma in the thalamus to minimize lesion of the unaffected brain.

METHODS

We present the case of a 43-year-old right-handed lady with right bleeding posterolateral thalamic cavernoma, admitted to the neurosurgery department of Sibiu MedLife Polissano Hospital in February 2024. The patient underwent surgery, through a transcortical trans-sulcal para-fascicular, navigation guided

approach. Preoperative tractography imaging, tubular cerebral corridor retractor system and intraoperative monitoring of the cortico-spinal tract, through motor evoked potentials (transcortical, cortical and subcortical mapping) and of the spinotahamic tract through somatosensory evoked potentials were used. The postoperative course was uneventful and the patient was discharged on the 7th postoperative day.

CONCLUSIONS

Thalamus is a complex structure located in a deep brain area and surgery for these region carries high risks, so the surgeon must carefully tailor these patients. The transcortical transsulcal para-fascicular approach is feasible and safe using the cerebral tubular corridor, neuronavigation and neuromonitoring. Advanced surgical technology offers the advantages of minimizing the risks of new neurological deficits.

KEYWORDS

cavernoma, neuronavigation, subcortical mapping, motor evoked potential, tubular retractor

GLIOMA-RELATED EPILEPSY: CHARACTERISTICS AND IMPLICATIONS ON TREATMENT AND PROGNOSIS

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Diffuse low-grade gliomas (LGGs), originating from glial tissue, have a propensity to progress to higher-grade tumors over time, presenting a complex challenge in clinical management. Glioma-associated epilepsy is a significant clinical indicator influencing both treatment strategies and prognostication. This study aims to assess the impact of glioma-related epilepsy on treatment outcomes and explore the current management guidelines.

MATERIAL AND METHODS

A retrospective analysis was conducted on 38 patients diagnosed with LGGs (WHO grades 2 and 3) treated in our neurosurgical department from 2013 to 2023. The focus was on glioma-related epileptic seizures, with outcomes evaluated using the Engel classification six months post-surgery. Additionally, anti-seizure medication (ASM) regimens were reviewed, and current National Institute for Health and Care Excellence (NICE) guidelines on low-grade gliomas were synthesized.

RESULTS

Of the 38 patients, 30 had diffuse astrocytoma and 8 had oligodendroglioma. Among those with glioma-related epilepsy (n=25), management strategies included biopsy only (8%), gross total resection (GTR) (40%), subtotal resection (StR) (32%), and partial resection (PaR) (20%). No significant correlation was found between seizures and tumor volume, growth rate, or histological findings. However, a positive correlation between the extent of surgical resection and improved Engel outcomes was observed.

DISCUSSION

Existing research suggests that early seizures may be a favorable prognostic indicator for malignant progression-free and overall survival. Epilepsy significantly impacts the quality of life for glioma patients. Exploring targeted epilepsy surgery for glioma-related seizures could potentially enhance patient outcomes and quality of life posttreatment.

CONCLUSION

Advancing approaches in epilepsy surgery for glioma-related seizures holds promise for improving patient quality of life and treatment efficacy. Further investigation into these strategies is warranted.

KEYWORDS

glioma-related epilepsy, low-grade glioma, epilepsy surgery, Engel classification, brain tumour guidelines

GIANT LUMBO-SACRAL TUMORS. THE SILENT INTRUDERS

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OBJECTIVES

Despite comprising just 8% of all spinal tumors, sacral tumors present a long list of issues that should be taken in consideration when neurosurgical approach is tempted. Their unique anatomic location, close relation with neural structures and pelvic organs and high-vascularity are just a few nuances of these type of conditions. This paper outlines the importance of a good preoperative and intraoperative management in order to facilitate the maximum recovery of the patients.

MATERIAL AND METHODS

This paper analyses retrospectively a series of 2 cases of giant sacral tumors ($>100\text{ cm}^3$) that were operated in our clinic in 2024 by a multidisciplinary team (neurosurgeons and general surgeons). Follow-up data were obtained from the charts and medical records. All the lesions were localised under L4 vertebra with invasion of sacrum.

RESULTS

Our first case was a 47-years old man who accused diffuse mild lumbar pain for more than 2 years, but acutely aggravated in the last months with lumbosacral radicular pain, palsy of the inferior

lumbar nerves, urinary incontinence and paraesthesia. MRI showed a giant L5-S2 mass and biopsy diagnostic was myxopapillary ependymoma. Second case was of a young woman with lumbosacral radicular pain debuted a few months ago, whose clinical state worsened rapidly becoming paralytic of lower limbs. MRI showed a giant sacral mass with invasion of the pelvic musculature and surrounding the iliac vessels (intraoperative aspect: sarcoma). Both patients ameliorated postoperatively, and are currently enrolled in a recovery program. Sub-total resection and near-total resection were obtained.

CONCLUSIONS

Sacral tumors exhibit a challenge in the field of spine surgery being clinical silence over a period of months and years, and then followed by gross deficit. We diagnosed sacral tumors based on clinical, radiographic and laboratory aspects. Prognostic factors were preoperative clinical status and gross-total resection.

KEYWORDS

sacral tumours, MRI, spine, quality of life

NOT THE USUAL SUSPECTS: GLIOBLASTOMA OF THE CEREBELLOPONTINE ANGLE MASQUERADING AS A VESTIBULAR SCHWANNOMA. CASE REPORT

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INTRODUCTION

Most tumoral processes involving the cerebellopontine angle (CPA) are extraneuraxial and usually comprise of vestibular schwannomas and meningiomas, followed by less common lesions such as epidermoid cysts, metastases and arachnoid cysts. Glioblastomas located in the CPA are rarely diagnosed. Uncommonly, intraneuraxial tumors in the CPA may grow in an exophytic manner compressing the surrounding cranial nerves, resembling the clinical picture of a more common extraneuraxial tumour.

CLINICAL CASE

A 47 year old male presented to our department accusing gait imbalance, vertigo, vomiting and nausea, symptoms that started 2 months prior to admission. Upon neurological examination, the patient additionally presented right facial paresis and hypoesthesia, right sided hypoacusis, hypogeusia and diplopia. A contrast enhanced cerebral MRI revealed a right cerebellopontine angle mass with inhomogenous contrast enhancement, relatively well delineated, exerting mass effect on the cerebellum and pons with reduced perilesional edema but with involvement of the internal acoustic meatus. The indication for surgical removal of the tumour

was made. The patient was placed in sitting position and a right retrosigmoid approach was performed using the operating microscope. Upon retraction of the cerebellar hemisphere, a greyish, highly vascularized and soft lesion was seen, exhibiting a spread growth, engulfing the V, VII and VIII nerves, without infiltrating them, resembling anything but a schwannoma. A frozen section of the tumour revealed a surprising result: high grade glioma. The surgical excision continued in a piece-meal fashion, using the ultrasonic aspirator with preservation of the cranial nerves until an almost complete removal was achieved.

The immediate postop evolution of the patient was favourable. Nevertheless, the final histopathological diagnosis confirmed a grade IV glioblastoma. Oncological treatment followed, but the tumour relapsed in 2 months after surgery, the control MRI revealing a multilocular tumoral dissemination in the cerebellum and brainstem which was surgically unsalvageable.

CONCLUSION

Glioblastoma of the CPA, manifesting both imagistically and clinically as a vestibular schwannoma is a rare entity but nevertheless extant, that dramatically changes the prognosis and postop evolution of a patient. Physicians involved in the diagnosis and treatment of such tumours must always be suspicious of the usual suspects in the CPA.

KEYWORDS

glioblastoma, cerebellopontine angle tumour, schwannoma

PERIOPERATIVE ANTICOAGULANT TREATMENT IN BRAIN SURGERY

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Toma Papacocea

[Prof. Dr]

In clinical practice, neurosurgeons are often faced with problems raised by the anticoagulant therapy of patients with cerebral pathologies. They are routinely asked to decide between the risk of postoperative ICH and the benefit of therapeutic AC in high-risk situations and without strong guidelines. There are many controversial situations in which the neurosurgeon can be put in a dilemma regarding the best therapeutic attitude towards anticoagulation.

The first question related to the anticoagulant treatment that the neurosurgeon asks before a brain intervention is: how long before the operation should the chronic anticoagulant therapy be stopped, under safe conditions? Another problem that neurosurgeons often face is that of postoperative anticoagulant treatment. One of the questions they frequently ask themselves is: how quickly can the anticoagulant treatment be introduced/resumed after brain surgery?

In this presentation we will try to answer these important questions. For this, we will study patients with cerebral pathology who are on anticoagulation for various health issues (VTE, afib, hearth valves etc.). First of all, we have to assess the thrombosis risk for each patient. And we have:

Low risk patients	Moderate risk patients	High risk patients	Very high-risk patients
<p>1. VTE with target INR 2.0-3.0 unless:</p> <p>§ VTE in prior 3 months = high risk</p> <p>§ Associated with malignancy = moderate risk</p> <p>2. Non-valvular AF with target INR 2.0-3.0 unless:</p> <p>§ Previous stroke or TIA = high risk</p>	<p>1. VTE provoked by malignancy</p>	<p>1. VTE in prior 6-12 weeks</p> <p>2. Aortic caged ball/disc heart valves</p> <p>3. AF with previous stroke / TIA</p> <p>4. Valvular heart disease</p> <p>5. Any indication with target INR 3.0-4.0</p>	<p>1. VTE in prior 6 weeks</p> <p>2. Metallic mitral valves</p>

In balance with the thrombotic risk, there is the postoperative haemorrhagic risk. In this matter, we must emphasize that any brain surgery is considered high bleeding risk intervention!

Regarding the pre-operative management of patients with anticoagulant treatment, we have some clear guidelines.

Therefore, for low-risk patients, we have to:

1. Stop VKA 5 days before surgery to allow INR to normalise;
2. Check INR 1 day prior (ideally) or the morning of the procedure (urgently);
3. If on DOAC's stop 2 days before surgery.

N.B: Safe INR is <1,4 for brain surgery

For moderate and high risk patients, we must:

1. Stop VKA 5 days before surgery to allow INR to normalise;
2. Start prophylactic dose of LMWH 3 days pre-operatively (start at 08.00h);
3. Check INR 1 day prior (ideally) or the morning of the procedure (urgently);
4. On day of procedure omit LMWH dose at 08.00h;
5. If on DOAC's bridging with LMWH is not mandatory.

The use of LMWH between the time of stopping the VKA and the operation is called bridging therapy, and the goal is that the patient is not left completely non-anticoagulated.

For very high-risk patients, the attitude is:

1. VTE in prior 6 weeks: ideally avoid surgery. Consider use of temporary inferior vena cava (IVC) filter. Then manage as per high risk.
2. Metallic mitral valves. LMWH is not recommended in metallic valves; UFH may be preferable.

Then manage as per high risk.

But what about anticoagulation after craniotomy? This is a more controversial issue than the previous and we should keep in mind that, in operated neurosurgical patients, the consequences of either haemorrhage or thromboembolism can be devastating. We have 2 indications of postoperative anticoagulation:

- VTE prophylaxis;
- resuming preoperative anticoagulation.

For the first situation, a study regarding VTE prophylaxis was published in 2021 (1) and its conclusion is that initiating anticoagulant prophylaxis with subcutaneous enoxaparin sodium 40 mg once per day within 72 h of surgery can be done safely while reducing the risk of developing lower extremity DVT.

What about therapeutic doses of anticoagulants in operated patients? When can we start them? Few studies to date have

attempted to determine the optimal time to resume anticoagulation after craniotomy. As a result, the decision of when to restart anticoagulation remains largely subjective and highly variable between surgeons.

A Brazilian study from 2020 (2) showed that:

- Postop. VTE was statistically associated with a delay in starting therapeutic AC of more than two days.
- ICH was not statistically associated with AC started after the 2nd postop. day, which may encourage the strategy of early AC treatment.
- The frequency of bleeding complication was statistically significant higher in patients treated with warfarin(13.8 % vs. 0% in NOAC group).

A very recent study published this year (3) has an interesting conclusion: therapeutic AC in postoperative craniotomy patients from postoperative days 2 to 10 did not result in any major complications.

Another recent study (4) draws the following conclusions:

- The risk of postoperative hemorrhage is most significant within the first 24 hours after intervention, and anticoagulation must be avoided during this time period.
- From postop day 2, the use of low doses of LMWH is recommended in patients at high risk of DVT.
- AC can be safely resumed starting with postop.

At the end of this presentation, we can draw some conclusions that could serve as future guidelines for postoperative anticoagulant treatment:

- From postop day 2, low doses of LMWH can be used in patients at risk of DVT.
- In patients with high thrombotic risk LMWH in prophylactic dose is started 8-12 hours postoperatively.

- If low bleeding risk, VKA can be resumed in postoperative day 2 together with LMWH until desired INR is reached.
- Full anticoagulation can be safely restored 7 days postoperatively even in high bleeding risk patients.
- DOAC's can be resumed 24 hr post-operatively at normal dose. If patient has high VTE risk consider prophylactic dose of LMWH on evening of surgery.

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RISKS AND OUTCOME IN PATIENTS WITH ACUTE
SUBDURAL HEMATOMAS UNDER
ANTICOAGULANT TREATMENT WITH
VITAMIN K ANTAGONISTS

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In this study we tried to determine the existence of a link between the INR at admission of patients with acute subdural hematomas and their subsequent evolution, the risk of requiring decompressive surgery and the mortality rate. We thus formulate the following questions to be researched, in correlation with the objectives of the study:

1. Does anticoagulant treatment with VKA increase the risk of needing surgery in patients with acute SDH?
2. Are acute subdural hematomas larger in patients anticoagulated with VKA?
3. Is mortality in patients with acute subdural hematomas higher in the case of association with anticoagulant treatment with VKA?

MATERIAL AND METHODS

Retrospective study.

Inclusion criteria:

Patients discharged from the “Neurosurgery” Department of the “Sf. Pantelimon” from Bucharest with the main diagnosis at discharge “Traumatic subdural hemorrhage”, identified in the ICD-10 system with code S06.5.

Exclusion criteria:

- Patients with other post-traumatic intracerebral injuries (lacerations, cerebral contusions, epidural hematomas) that

required surgical treatment.

- Patients with severe polytrauma.
- Patients with severe thrombocytopenia (< 50000 platelets / mmc).
- Patients with increased INR due to other causes (hepatopathies, alcoholism, etc.).
- Patients with chronic subdural hematomas with rebleeding.

Thus, in the interval 01.01.2020 – 31.12.2023 (4 years), after applying the inclusion and exclusion criteria, we obtained a group of 294 patients who had an acute subdural hematoma as their main or secondary diagnosis. Of these, 130, representing 44.2%, underwent a surgical intervention to evacuate the hematoma through craniotomy. Mortality for the entire group was 36.7% (108 deaths). In the case of operated patients, the postoperative mortality was 47.7% (62 deaths out of 130 patients), and in that of conservatively treated patients the mortality from various causes was 28.1% (46 cases out of 164).

Having this general information, we began the analysis of the situation of patients who, at the time of the trauma, were under anticoagulant treatment with vitamin K antagonists (Thrombostop or Sintrom). We found 42 such patients, most of them on anticoagulant therapy for atrial fibrillation, but there were also a few cases of valve prostheses. Of these patients, 20 (47.6%) underwent decompression surgery by evacuation of acute HSD. By comparison, 110 patients without anticoagulant treatment out of 252 underwent surgery (43.6%). Only a small difference is observed, at the limit of statistical significance, between the 2 groups, which made us analyze this aspect in more detail. First, we observed the INR in all 42 patients under VKA treatment and found a surprising fact: only 20 patients (47.6%) had an altered INR. Of these, 11 (55%) were operated and 9 (45%) treated conservatively. If we compare these numbers with those of all patients with a normal INR (274 of which 119 were operated on,

i.e. 43.4%) we will find a significant difference between the 2 groups, a fact that confirms the assumption that patients with a modified INR and HSD acute have a higher risk of requiring surgery to evacuate the hematoma. Going even further with this analysis, we tracked the indication for surgery in patients on anticoagulant treatment by hematoma size and Glasgow score. Thus, we found that 25 of the 42 (59.5%) anticoagulated patients had an indication for surgical treatment. If we look only at patients with altered INR (20), we find that 16 of them (80%) had a surgical indication. Where does this difference between the surgical indication and the actual number of operations come from? The explanation is simple: 5 patients in the anticoagulant group, all with modified INR (average INR in this group 3.33) and aged over 70 years, were in such a serious condition that they died before they could be operated on, either in the EU or in the ICU, during attempts to stabilize the coagulant balance.

At this point in the presentation, we can answer the first question of this study: “Does anticoagulant treatment with VKA increase the risk of requiring surgery in patients with acute SDH?” The answer is yes, provided the treatment is properly administered and changes the INR. If we nuance things a little, we will notice that there are 13 patients with an INR below 3 and 7 with an INR above 3. In the first group, the surgical indication was present in 10 out of 13 patients (76.9%) and in the second in 6 from 7 patients (85.7%), so we can conclude that the higher the INR, the more the subdural hematoma risks to become a surgical lesion.

We also analyzed the average thickness of the hematoma in the patients in the group receiving anticoagulant treatment and found a significant difference between the group of patients with normal INR (0.9 cm) and that of patients with modified INR (1.55 cm). And within this group we have a difference between patients with an INR below 3 (1.36 cm) and those with an INR above 3 (2.04 cm). Therefore, the answer to the question: “Are acute subdural

hematomas larger in patients anticoagulated with VKA?”, is clearly affirmative.

Next, we tried to highlight the causal relationship between the INR value at the time of trauma and the mortality rate. Thus, in patients with normal INR, the overall mortality was 33.9% (93 deaths out of 274 cases) and the postoperative mortality was 45.4% (54 deaths out of 119 cases). In those with modified INR, it was 70% (14 deaths out of 20 cases), respectively 63.6% (7 deaths out of 11 cases). Paradoxically, in patients with altered INR operated the mortality is lower than in non-operated ones (7 deaths out of 9 cases i.e. 77.7%), which would suggest that a more aggressive surgical approach could be beneficial in patients with acute subdural hematomas and anticoagulant treatment. Of the 7 patients with INR above 3, the only one who survived was an operated patient. Therefore, the answer to question 3: Is mortality in patients with acute subdural hematomas higher in the case of association with VKA treatment with modified INR? is also affirmative

CONCLUSIONS

1. Properly administered vitamin K anticoagulant treatment resulting in elevated INR increases the risk of patients with acute subdural hematomas, who will be more likely to require decompressive surgery, have larger hematomas, and have a higher mortality rate, regardless of therapeutic conduct.
2. In these patients, early surgical intervention, even if the INR has not been completely brought under control, is a therapeutic approach associated with a lower mortality than conservative treatment until the normalization of the INR.

KEYWORDS

subdural hematomas, vitamin K antagonists, mortality

HEADS OR TAILS: POST-SURGICAL COMPLICATIONS IN TRAUMATIC BRAIN INJURY - A LITERATURE REVIEW

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INTRODUCTION

Craniocerebral trauma oftentimes requires urgent neurosurgical interventions and poses a great threat on its own as a result of inherent complications. Surgery is performed in order to tackle immediate mortality and to enhance long-term recovery. However, it is noteworthy to take into consideration that we can distinguish complications that stem from the procedure itself from those which are attributable to the traumatic event and its physiopathology.

OBJECTIVES

This study is a comprehensive review of literature addressing complications related to surgery in traumatic brain injury. To further illustrate the findings, we studied the incidence of post-surgical complications in 100 patients from our department that underwent surgical procedures for head trauma.

MATERIAL AND METHODS

The databases that were enquired were PubMed and Scopus. Literature written in the past two decades has been analysed, with an emphasis on more recent meta-analyses. A retrospective cohort of 100 patients was assembled from our departments' database.

Inclusion criteria consisted of traumatic brain injury that required surgery. The main post-surgical complications (mentioned in the results) were identified and the rate of incidence was calculated using Microsoft Excel 2019.

RESULTS

The complications related to surgical procedures for traumatic brain injury included the following medical entities: brain herniation, hydrocephalus, pneumocephalus, subdural hygroma, subdural effusion after decompression, cerebrospinal fluid leaks, infections, wound complications, syndrome of the trephined, cranioplasty-related issues and neuropsychological outcomes. Out of 100 surgeries for head trauma, we identified 13 cases in which complications occurred, as follows: 5 (35,7%) infections, 4 (28,6%) contralateral subdural effusion, 2 (14,3%) pneumocephalus, equal incidence of 1 (7,1%) for hygroma, intracerebral hematoma and contralateral epidural effusion. Additionally, this study explored comparisons of surgical techniques employed in head trauma (craniectomy vs craniotomy, types of incisions) and long term outcomes of patients.

CONCLUSIONS

This literature review highlights the most frequently encountered complications of head trauma surgery, as well as some exceptional ones, with the purpose of informing on previous and current management of such situations which a neurosurgeon may encounter, with special attention to young neurosurgeons, who can benefit from open space discussions on this topic with more experienced neurosurgeons.

KEYWORDS

surgical complications, traumatic brain injury, secondary interventions

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GAMMA KNIFE RADIOSURGERY. AN UNDERRATED TREATMENT METHOD IN THE MULTIMODAL MANAGEMENT OF NASOPHARYNGEAL CARCINOMAS

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PURPOSE

In the treatment of nasopharyngeal carcinomas, a multimodal approach is always needed. The present study attempts to show the necessity and role of Gamma Knife Stereotactic Radiosurgery in the treatment of this kind of tumors.

MATERIAL AND METHODS

In this retrospective study, 34 patients were included. All had been previously treated with fractionate radiotherapy, but had local or intracranial recurrence at the time of the Gamma Knife treatment. The patients were treated in the Radiotherapy Laboratory of the Emergency Clinical Hospital “Bagdasar-Arseni”, between 2004 and 2024, initially using a Gamma Knife 4C device, then a Perfection and lately an Esprit model. The purpose of the treatments was total tumor destruction, but also, in a significant number of cases the treatment of debilitating symptoms: epistaxis, secondary trigeminal neuralgia, and oculomotor nerve palsies.

RESULTS AND CONCLUSIONS

The Gamma Knife treatment determined a significant prolongation of the life span and an improvement in the quality of life, without the occurrence of a significant number of complications. This treatment remains a palliative method,

applicable only in selected cases, yet we consider that the number of Gamma Knife treated patients is very small, compared with the general incidence of this disease.

KEYWORDS

gamma knife, nasopharyngeal carcinomas, treatment of recurrences

PITFALLS IN THE GAMMA KNIFE TREATMENT OF
PITUITARY ADENOMAS. A REVIEW OF THE
COMPLICATIONS THAT OCCURRED IN THE
GAMMA TREATED PATIENTS, AT THE
RADIOTHERAPY LABORATORY OF THE
“BAGDASAR-ARSENI” HOSPITAL

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PURPOSE

In the multimodal treatment of pituitary adenomas Radiosurgery is mainly used as a secondary treatment after the medical treatment and neurosurgery. Yet the Gamma Knife Treatment isn't possible without some risks and complications.

MATERIAL AND METHODS

In this retrospective study 841 treatments were included. The patients were treated in the Radiotherapy Laboratory of the “Bagdasar-Arseni” Emergency Clinical Hospital, between 2004 and 2024, initially using a Gamma Knife 4C device, then a Gamma Knife Perfection and now an Esprit model. Most of the cases underwent surgery beforehand. The purpose of the treatment was tumor growth control and, in functioning adenomas, hormone hypersecretion control with the preservation of normal pituitary functions and the normal functioning of surrounding structures.

Due to the treatment guidelines, we used during the treatments, very few complications occurred. There were 7 cases of hypopituitarism, 3 cases of oculomotor palsies, 6 cases of pituitary

apoplexy. There were no recorded cases of significant optic neuropathy or carotid stenosis.

RESULTS AND CONCLUSIONS

The Gamma Knife treatment determined, in almost all cases, the stopping of tumor growth and in most cases a reduction in tumor volume. Complications (optic neuropathy, hypopituitarism, damage to the nerves inside the cavernous sinus) were very scarce. Gamma Knife Radiosurgery, if basic rules are followed, is an efficient and safe method in the treatment of pituitary adenomas.

KEYWORDS

gamma knife, pituitary adenomas, complications, risks

ROLE OF nTMS BRAIN MAPPING IN PRESERVING FUNCTIONAL INTEGRITY OF MOTOR AND LANGUAGE AREAS AND PREVENTING POSTOPERATIVE DEFICITS IN PATIENTS WITH MALIGNANT BRAIN TUMORS

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INTRODUCTION

Navigated transcranial magnetic stimulation (nTMS) is a non-invasive preoperative mapping technique used to identify eloquent cortical areas. Malignant brain tumors often have an infiltrative growth pattern, making complete resection difficult, especially when these tumors are situated in eloquent regions. In this paper, we present our experience with nTMS cortical mapping for malignant brain tumors located in eloquent areas.

MATERIAL AND METHODS

Patients with malignant brain tumors located in motor or language eloquent areas who underwent nTMS mapping followed by surgery at our institution were included in the study. Patients were excluded if they presented TMS or MRI contraindications.

RESULTS

Patients with gliomas and metastases located in motor or language eloquent areas were included in the study. The results of the nTMS brain mapping were integrated into the intraoperative

neuronavigation system and used to guide surgical planning. nTMS was useful in determining the eloquent areas, especially for motor cortex. No patients suffered new-onset or worsening of the preexistent neurological deficits following surgery.

CONCLUSIONS

nTMS preoperative cortical mapping combined with intraoperative neuronavigation is a valuable tool for the resection of malignant brain tumors. It offers guidance for avoiding eloquent areas, thereby improving the functional outcomes for patients.

KEYWORDS

navigated transcranial magnetic stimulation, brain mapping, malignant brain tumours

ULTRASOUND GUIDED MAXIMAL SAFE RESECTION OF MALIGNANT BRAIN TUMORS

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INTRODUCTION

Intraoperative ultrasound (IOUS) is a non-invasive technique that is increasingly used in neurosurgery, especially in oncological pathology. The main advantage consists of offering a real time image and can help localize the lesion and guide the extent of resection.

MATERIAL AND METHODS

We describe our experience at Bagdasar-Arseni Clinical Emergency Hospital from a prospectively maintained database of malignant CNS tumors where IOUS was used over the past three years.

RESULTS

Intraoperative ultrasound (IOUS) was routinely employed in the resection of brain tumors, proving helpful not only in localizing the lesion but also in determining the extent of resection. This was particularly useful for diffuse infiltrative lesions such as gliomas. Moreover, in patients with multiple metastases, where the neuronavigation system was limited due to brain shift following the resection of one lesion, IOUS was very efficient in determining the location.

CONCLUSION

Intraoperative ultrasound is a widely adopted technique in neurosurgery, aiding neurosurgeons achieve maximal safe resection of brain and spinal tumors. Its main advantages include quick, real-time image acquisition, compensation for brain shift, and integration with neuronavigation systems. The most significant limitation, however, is the relatively long learning curve associated with mastering the technique.

KEYWORDS

intraoperative ultrasound, maximal safe tumour resections

A CASE SERIES OF NINE PATIENTS WITH SPINAL CORD HEMANGIOBLASTOMA: SURGICAL MANAGEMENT AND CLINICAL OUTCOME

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BACKGROUND

Hemangioblastomas are defined as benign vascular tumors, being located almost exclusively in the cerebellum, brainstem and spinal cord. Spinal cord hemangioblastomas have low frequency. Their occurrence can be associated with von Hippel – Lindau (VHL) disease, but in most cases these tumors arise sporadically. Clinical presentation is usually determined by the mass effect. Thus, gross total resection without significant neurological impairment remains a great challenge. The aim of this study was to evaluate patient outcome after surgical treatment of intramedullary hemangioblastoma.

METHODS

The present study included nine patients who underwent surgery for intramedullary hemangioblastoma (histopathologically confirmed) at our neurosurgery clinic between January 2015 and May 2024. There were seven male and two female patients with a mean age of 43.5 years. Operation was recommended based on presence of intramedullary lesion on MR imaging and of neurological deficits, usually progressive. The neurological function was evaluated at admission, discharge and at 6 months and graded according to McCormick scale. In all cases a posterior

approach via laminectomy was performed. Location, pre-surgery syringomyelia and recurrence status were also assessed through MR scans.

RESULTS

Tumor localization was exclusively intramedullary: in the cervical spinal cord in four cases, in the thoracic spinal cord in other four, and in one case it had a lumbar localization. The mean duration from symptomatology onset to surgery was 9.3 months. Presence of tumor on MR imaging was accompanied by syringomyelia in six patients (66.6 %). Complete removal was achieved in all nine cases. Three patients had VHL disease screening at the time of admission. Of those, VHL was confirmed in two. For five patients, neurological functions improved at discharge and significant improvements were reported in seven cases at 6 months in the follow-up period.

CONCLUSION

Our results showed that gross total resection was effective in improvement of clinical symptoms with a good prognosis considering recurrence rate and McCormick grade evolution at 6 months after surgery.

KEYWORDS

intramedullary hemangioblastoma, surgery, spinal cord, clinical outcome, patient

FRACTURES OF THE DENS. A RETROSPECTIVE STUDY

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INTRODUCTION

The odontoid process has a peg-like conformation of the C2 vertebra. Fractures of the dens represent about 15% of all cervical injuries. The most common appears due to hyperextension of the neck, in older patients. The most obvious complication is nonunion, also high mortality in older patients.

MATERIAL AND METHODS

This retrospective study was created with medical records of 105 patients during 3 years, being gathered from the database of EHBA. Our series consisted of 65 males, 40 females, with the average age between 70-90. Data collection involved frequency of appearing cases depending on the season of the year, Frankel scale, type of fracture, the circumstances of the occurrence of the fracture, associated injuries, alcohol consumption and type of treatment. Also, was exemplified this topic through clinical cases, with pre- and postoperative status. Surgical procedures included phylodesis C1-C2. Conservative treatment was tried for type I and III fractures.

RESULTS

During 3 years, the most cases were in 2023, especially in autumn season. From all types of fractures - the most frequent was type II

with dislocation, the least common was type I. The circumstances of the occurrence of the fractures included fall from the same level, from another level, also due to road accidents. According Frankel scale, about 73 cases were Frankel D and E, and only 6 cases were Frankel A. Besides this, were associated other injuries, cranio-facial lesions, other spinal lesions, thoracic and abdomino-pelvic injuries. A lot of cases were related with alcohol consumption - 22 cases. Surgical procedures included 26 cases, others -conservative option. Moreover, I considered a lot of clinical cases, and I mentioned imagistic section and their evolution accordingly type of treatment.

CONCLUSIONS

The dens fractures are quite frequent of the axis, especially in elderly patients, in low energy falls. Treatment varies on the type of fracture and risk factors for nonunion - philodesis C1-C2 or nonoperative technique. Unfortunately - there are few symptoms, many cases don't have neurologic deficits, being missed the diagnosis of these fractures. Furthermore, many cases were polytraumatic, that needed a multidisciplinary team.

KEYWORDS

odontoid process, Frankel scale, philodesis, dislocation

A RARE CASE OF CROUZON SYNDROME ASSOCIATED WITH
INTRACRANIAL MENINGIOMA WITH NASAL EXTENSION:
CASE REPORT

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INTRODUCTION

Crouzon syndrome is a genetic disorder caused by mutations in the FGFR2 gene, leading to premature fusion of cranial sutures (craniosynostosis) and resulting in distinct craniofacial abnormalities such as a beaked nose, shallow orbits causing proptosis, and midface hypoplasia. These patients often experience complications such as vision and hearing loss, and breathing difficulties due to nasal obstruction. Besides craniofacial anomalies, Crouzon syndrome can be associated with intracranial anomalies like meningiomas, making their management complex and multidisciplinary.

MATERIAL AND METHODS

We present the case of a 33-year-old female patient with a history of Crouzon syndrome, giant olfactory groove meningioma treated with gamma-knife in 2008 and 2009, chronic infantile encephalopathy, and behavioral disorder. The patient was admitted with complaints of headache, conductive hearing loss in the left ear, and a vegetative tumor formation in the left nasal fossa. Cerebral MRI and CT scans revealed multiple intracranial and nasal formations

RESULTS

The patient underwent surgical resection of the nasal tumor. Histopathological result was atypic meningioma. Post-operative evolution of the patient was favorable, with no post-operative complications following total ablation of the nasal extension.

CONCLUSIONS

This case highlights the complexity of managing patients with multiple neurocranial, especially in the context of genetic disorders like Crouzon syndrome. While the precise incidence of meningiomas in patients with Crouzon syndrome isn't well-documented, it appears to be a rare complication. Due to its complexity, Crouzon syndrome may be associated with other complex pathologies like aneurysms and intracranial tumors, like it was presented in this case. Therefore, a multidisciplinary collaboration is crucial for optimal treatment and long-term follow-up.

KEYWORDS

Crouzon syndrome, olfactory groove meningioma, intracranial meningioma, aneurysmal complexes

CLINICAL PRESENTATION, TREATMENT
OUTCOMES, AND DEMOGRAPHIC TRENDS IN
VESTIBULAR SCHWANNOMAS:
A 68-CASE RETROSPECTIVE STUDY

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INTRODUCTION

Vestibular schwannomas (VS) are benign tumors affecting the vestibulocochlear nerve. This study analyzed the clinical presentations and treatment outcomes of 68 VS cases managed between 2014 and 2023 at the National Institute of Neurology and Neurovascular Diseases in Bucharest, Romania.

METHODS

A retrospective analysis was conducted on patient demographics, clinical symptoms, tumor characteristics, treatment modalities, and outcomes. Statistical analysis was performed using Python 3.10.

RESULTS

The study cohort exhibited a male-to-female ratio of 1:1.6, with a median age of 54 years at diagnosis. The most common symptoms were balance and gait disorders (91.8%), and hearing impairment (71.8%). A notable correlation was observed between facial palsy and hearing loss, with 60% of patients experiencing both symptoms simultaneously. Dysphagia was present in 13.3% of cases. The median size of the tumor was 2,5 cm. While

hydrocephalus was responsible for visual impairments in some patients, the study challenges the notion that it is the sole cause of these symptoms. The primary treatment method was open surgery (93.3% of cases) through a retrosigmoid approach, with Gamma Knife radiosurgery used in 6.6% of cases as primary treatment method. Following treatment, 24.4% of patients achieved good recovery from facial palsy, while 54.8% continued to experience dysfunction. The overall relapse rate was 14.9%.

CONCLUSIONS

This study provides valuable insights into the clinical presentation and treatment outcomes of vestibular schwannomas. The findings support the use of open surgery in most cases, particularly when hydrocephalus is present, while also highlighting the importance of considering personalized treatment approaches. The observed gender disparity and symptom correlations suggest the need for further research into potential genetic and environmental risk factors.

KEYWORDS

vestibular schwannoma, hydrocephalus, facial palsy, balance disorders, visual impairment, gamma knife, radiosurgery, open surgery

SURGICAL CHALLENGES IN CLIPPING LARGE ANEURYSMS IN DISTAL ARTERIAL TERRITORIES

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BACKGROUND

By distal arterial territories we mean the arteries located after the main bifurcations of the cerebral arteries. They can occur at multiple sites throughout the course of distal arteries, but most often are found after the bifurcation of the M1 segment of the middle cerebral artery.

METHODS

A retrospective review of 18 consecutive patients with large aneurysms located in distal arterial territories, treated by surgical clipping between 2019-2023, was performed. We consider aneurysm larger than 10 mm in diameter as large aneurysm. The data of all our consecutive patients were searched to obtain patient characteristics, details of the aneurysm size and orientation, treatment details, complications and follow up. At admission, the clinical condition of all patients was classified according to the Hunt and Hess scale. Clinical outcome was graded according to the modified Rankin scale. The follow-up period varied widely from 6 to 54 months (mean 24 months).

RESULTS

Surgical clipping was performed for all aneurysms; only in 2 cases the aneurysm was unruptured. Three patients presented with significant hematoma which required the evacuation of the clot. Most large aneurysms were located in M2 or M3 segments of the MCA (16 patients). Post-operative control angiography was performed in 11 patients (61%), from which we reported a full occlusion of the aneurysm in 10 patients (90%). No perioperative mortality was recorded. The outcome was graded mRankin 0–2 in 83% of the cases (15 patients) at the end of the first postoperative months, and 94.4% (17 patients) at six months follow-up. The most important improvement was recorded for patients graded mRankin 1-2 at the first month follow-up.

CONCLUSIONS

The large size of the aneurysm, the size of the neck, as well as the reduced diameter of the parent vessel, represent important trials for the neurosurgeon in the correct clipping of the aneurysm. In some cases, sectioning of the aneurysm dome was necessary for successful clipping.

KEYWORDS

large aneurysms, distal arterial territories, retrospective review, microsurgical clipping, postoperative results

EFFICACY OF DEEP BRAIN STIMULATION.
A COMPARATIVE ANALYSIS OF STN AND GPI
TARGETS AND OUR CLINIC'S EXPERIENCE WITH
MOVEMENT DISORDERS

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During the last decade deep brain stimulation (DBS) has been established as a highly effective surgical therapy not only for advanced Parkinson's disease, but also for dystonia or essential tremor. It is defined as a neuromodulatory technique that delivers adjustable electrical stimuli to different key targets such as the subthalamic nucleus (STN), the internal globus pallidus (GPI) or the ventral intermediate nucleus (VIM).

This comparative analysis aims to guide in tailoring individual patient profiles, optimizing outcomes by selecting the most appropriate target area based on symptomatology and patient specific factors and has the end goal to improve motor function, quality of life and diminish possible side effects.

The existing clinical trials were reviewed with results that showed no significant differences between the STN-DBS and GPI-DBS groups in Unified Parkinson's Disease Rating Scale (UPDRS) III scores within 1st year post-surgery. STN-DBS allowed greater reduction in medication dosages for patients, whereas GPI-DBS provided greater relief from psychiatric symptoms. Dyskinesia scores were also greatly improved by GPI stimulation. Moreover,

for patients with dystonia, both GPIDBS and STN- DBS were successful in improving quality of life, patients with primary dystonia having a better response overall in terms of efficacy of the procedures than those with secondary dystonia.

45 cases of STN-DBS and 5 cases of GPI- DBS procedures were safely performed in our clinic using a stereotactic frame with significant motor symptoms relief and medication reduction.

In conclusion, further research comparing the side effects and quality of life is needed to refine target selection criteria and to optimize long-term management of patients with Parkinson's disease and other movement disorders.

KEYWORDS

Parkinson's disease, deep brain stimulation, subthalamic nucleus, internal globus pallidus, ventral intermediate nucleus, motor symptoms

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RECENT DEVELOPMENTS IN ENDOVASCULAR THERAPY FOR CHRONIC SUBDURAL HEMATOMAS USING LIQUID EMBOLIC AGENTS

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Chronic subdural hematomas (cSDH) remain a significant challenge in neurosurgery, particularly among the elderly. Recent advancements in endovascular therapy, specifically the use of non-adhesive embolic agents, have shown promise in improving outcomes for these patients. This presentation will delve into the latest developments and clinical evidence surrounding this innovative approach.

The discussion will include findings from recent randomized trials that have evaluated the efficacy and safety of embolisation with non-adhesive agents, both as a standalone treatment and in conjunction with traditional surgical methods. Technical outcomes from these studies will be analyzed, highlighting key differences in patient recovery, complication rates, and long-term results between the combined and isolated approaches.

One of the focal points of the presentation will be the technical nuances of performing embolisation, emphasizing the procedural intricacies and the choice of embolic materials. Comparative data will be presented to illustrate the benefits of non-adhesive agents

over other embolisation methods, particularly in terms of reducing re-bleeding rates and minimizing invasive interventions.

Additionally, we will explore future implications of widespread adoption of this technique, including its potential to alter standard care practices and improve patient prognoses. Projections will be made regarding the impact on healthcare resources, patient quality of life, and overall survival rates.

The presentation aims to provide a comprehensive overview of the current state and future potential of endovascular therapy for cSDH, offering valuable insights for neurosurgeons and interventional radiologists seeking to enhance their therapeutic arsenal.

THE ROLE OF DYNAMIC MYELOGRAPHIC TECHNIQUES IN IDENTIFYING SPINAL DURAL LEAKS IN INTRACRANIAL HYPOTENSION SYNDROME

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Spontaneous intracranial hypotension (SIH) presents a unique diagnostic and therapeutic challenge due to its varied symptomatology, which often includes orthostatic headaches, nausea, and neurological deficits. Recent advancements in dynamic myelographic techniques have significantly improved the ability to identify spinal dural leaks, a key causative factor in SIH.

This presentation will provide an in-depth review of the clinical manifestations of SIH, emphasizing the importance of accurate and timely diagnosis. We will explore modern dynamic myelographic techniques, including digital subtraction myelography and dynamic CT myelography, which have enhanced the detection of dural breaches and spinal cerebrospinal fluid (CSF) leaks.

The technical aspects of performing dynamic myelography will be discussed, highlighting the procedural steps and imaging protocols that optimize the identification of dural leaks. Comparative data will be presented to illustrate the superiority of these dynamic

techniques over traditional imaging methods, particularly in terms of diagnostic accuracy and the ability to pinpoint the exact location of CSF leaks.

Additionally, the presentation will address the implications of these diagnostic advancements for neurosurgery. Identifying spinal dural leaks early can significantly impact the management and outcomes of patients with SIH. The role of neurosurgeons in the surgical repair of these leaks, as well as the potential benefits of minimally invasive techniques, will be explored.

We will also discuss the critical need for healthcare professionals to recognize potential SIH patients and refer them promptly for advanced imaging investigations. Early identification and intervention can prevent chronic disability and improve quality of life for affected individuals.

This presentation aims to provide a comprehensive overview of the role of dynamic myelographic techniques in the diagnosis and management of SIH, offering valuable insights for neurosurgeons, radiologists, and clinicians involved in the care of patients with this condition.

BRIDGING TECHNOLOGY AND NEUROSURGERY: THE BRAINIT INITIATIVE

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OBJECTIVES

The BrainIT project aimed to revolutionize neurosurgical practices by integrating advanced technologies to enhance the precision and outcomes of neuro-oncology and neurovascular surgeries. The project sought to address the growing need for technological innovation in neurosurgery to improve patient outcomes and surgical efficiency.

STUDY STAGES

The project encompassed several key stages. Initially, comprehensive e-learning modules were developed to provide continuous education and training for neurosurgeons, ensuring they stayed updated with the latest technological advancements. Concurrently, extensive research was conducted to explore the applications and benefits of cutting-edge technologies in neurosurgery. This research was pivotal in identifying new methods and tools that could be integrated into surgical practices.

To facilitate knowledge exchange and collaboration, the project organized international conferences and workshops. These events brought together neurosurgical professionals from around the world, fostering a collaborative environment where ideas and

innovations could be shared. Additionally, strategic partnerships were established with leading institutions and organizations. These partnerships were crucial in promoting interdisciplinary collaborations, which were essential for the successful implementation and impact of the project.

Supported by the European Commission, the BrainIT project emphasized the importance of disseminating innovative practices and findings within the medical community. This dissemination ensured that the knowledge and advancements generated by the project were widely adopted and implemented, ultimately benefiting the broader medical field.

CONCLUSIONS

The integration of advanced technologies within the BrainIT project has demonstrated significant improvements in surgical precision and patient outcomes. These findings highlight the crucial role of interdisciplinary collaboration and continuous innovation in the advancement of neurosurgical practices. The project serves as a model for integrating technology and medicine, underscoring its potential to shape future neurosurgical methodologies. The successful implementation of the BrainIT project showcases the potential for technological advancements to revolutionize medical practices and improve patient care on a global scale.

KEYWORDS

neurosurgery, innovative technologies, neuro-oncology, neurovascular surgery, e-learning

BRACHIAL PLEXOPATHY DUE TO THE ONCOLOGICAL RADIATION TREATMENT RELATED TO MALIGNANCY?

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Radiation-induced brachial plexopathy is a rare but well-known late complication of radiotherapy, typically manifesting several years after treatment. While its incidence is low, it is becoming more prevalent due to improved long-term cancer survival rates, predominantly affecting females. This condition is devastating, significantly altering the quality of life, as it often results in chronic disability that is progressive and usually irreversible. This study aims to present a 38-year single centre experience in the surgical treatment of radiation-induced brachial plexopathy.

The study involved 92 female patients referred for potential surgical treatment of radiation-induced brachial plexopathy. Surgical candidates typically experienced progressive worsening of symptoms 4-6 months after onset, despite exhaustive conservative treatment. Diagnostic criteria included evident fibrosis on MRI or ultrasound and confirmation of plexopathy through electromyography. In total 37 patients were included, all females. Out of 92 cases, 37 were surgically treated due to plexopathy, all underwent external neurolysis, with 25 treated infraclavicularly and

12 both infraclavicular and supraclavicular. The overall functional recovery following surgery was useful, with a median outcome of M3. Post-surgery, 25 patients reported weakness, 31 experienced pain, 5 had lymphedema, and 23 had improved range of motion.

Successfully treating patients with radiation-induced brachial plexopathy poses a significant challenge due to the progressive and often irreversible nature of the condition. Despite surgical interventions, achieving meaningful functional recovery is complex, with many patients continuing to experience persistent symptoms such as weakness and pain.

COMPLICATIONS IN PERIPHERAL NERVE SURGERY

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Peripheral nerve surgery is a rapidly advancing field that provides promising treatment options for a variety of neurological disorders and traumatic injuries. However, with this progress comes the potential for various complications, which require a deep understanding of their occurrence, prevention, and management. This paper provides an illustrative case series highlighting the diverse complications encountered in clinical practice, complemented with a comprehensive review of the literature, detailing their frequency, causative factors, and outcomes. Additionally, it presents a series of illustrative cases. These cases emphasize the importance of vigilance, meticulous surgical technique, and proper postoperative care to minimize complications and enhance patient outcomes in peripheral nerve surgery. By integrating empirical evidence with real-world clinical examples, this paper aims to contribute to the collective knowledge base, promoting improved patient care and safety in this dynamic area of neurosurgery.

DECISION-MAKING PROCESS IN UPPER BRACHIAL PLEXUS PALSIES - POINT OF NO RETURN?

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Upper brachial plexus palsy is characterized by inability to perform elbow flexion, shoulder abduction, and external rotation. This study presents a comprehensive review of a 40-year experience with upper brachial plexus palsy surgery at a single center, outlining our surgical approach and current management trends.

Surgeries were typically performed between 3 and 6 months after the injury to allow for potential spontaneous recovery. During this period, a total of 1,473 procedures were carried out, targeting various nerve components: C5-C7 roots to upper/middle trunks (n=126), musculocutaneous nerve (n=661), axillary nerve (n=573), and suprascapular nerve (n=113). Functional recovery, defined as M3-M5, was achieved in 85.7% of the cases.

In some cases, exploring and repairing nerve lesions may be ineffective, leaving nerve transfers as the sole viable option. The decision-making process is significantly influenced by preoperative evaluations. When imaging confirms that structural continuity of nerve elements is preserved, preoperative electrodiagnostic testing may not effectively differentiate between preserved and disrupted

functional continuity. In contrast, when imaging reveals disrupted structural continuity, the absence of advanced imaging techniques complicates the confirmation of root avulsion and the differentiation between supraganglionic and infraganglionic root injuries.

Final surgical decisions are made intraoperatively, using neuromonitoring to assess the functional continuity of the nerve elements. If functional continuity is maintained, only supraclavicular exploration and decompression may be needed. For infraganglionic root avulsion, supraclavicular nerve grafting might be required based on the extent of the nerve defect. Nerve transfers are reserved for cases involving complete supraganglionic avulsion of all roots.

MACHINE LEARNING-BASED PREDICTION OF CLINICAL OUTCOMES IN MICROSURGICAL CLIPPING TREATMENTS OF CEREBRAL ANEURYSMS

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BACKGROUND

This study investigates the application of Machine Learning (ML) techniques to predict clinical outcomes in microsurgical clipping treatments of cerebral aneurysms. The goal is to enhance healthcare processes through informed clinical decision-making by utilizing a dataset of 344 patients' preoperative characteristics.

METHODS

Various ML classifiers were trained to predict outcomes measured by the Glasgow Outcome Scale (GOS). The dataset included 344 patients who underwent microsurgical clipping for intracranial aneurysms. Key features in the dataset included age, aneurysm diameter and neck, arterial hypertension, atherosclerosis, obesity, intubation, vasospasm, and hemorrhage. The study evaluated the models using ROC-AUC scores for outcome prediction and identified key predictors using SHAP analysis.

RESULTS

- **Model Performance:** The models achieved ROC-AUC scores of 0.72 ± 0.03 for specific GOS outcome prediction and 0.78 ± 0.02 for binary classification of outcomes.
- **Key Predictors:** SHAP analysis identified intubation as the most impactful factor influencing treatment outcome predictions. Other significant predictors included vasospasm and the Hunt and Hess Scale.
- **Patient Demographics:** The study included 344 patients with a mean age of 55.05 ± 11.45 years. Gender discrepancy was noted, with 219 females (63.7%).
- **Aneurysm Characteristics:** The mean aneurysm neck was 3.93 ± 1.64 mm. Most aneurysms were of the saccular or berry type, with 308 cases (89.5%) being ruptured and 311 cases (90.4%) presenting with hemorrhage.

CONCLUSIONS

The study demonstrates the potential of ML in predicting surgical outcomes of cerebral aneurysm treatments. The findings emphasize the need for high-quality datasets and external validation to enhance model accuracy and generalizability. The integration of ML into clinical practice can potentially improve patient management and treatment outcomes in neurosurgery. The study contributes to the ongoing efforts in the medical AI community, supporting the use of ML techniques to enhance clinical decision-making and patient care.

KEYWORDS

machine learning, ruptured intracranial aneurysm, SHAP analysis, neurosurgery

THE LONG-TERM SEQUELAE OF TBI IN SURGICAL
AND NONSURGICAL CASES.
OVER 10 YEARS OF FOLLOW-UP

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BACKGROUND

The acute effects of traumatic brain Injury (TBI) are well documented but there is no systematic quantification of its long-term sequelae in German-language literature. The purpose of this study is to compare the frequency of conditions linked to prior TBI with their frequency in the non-brain-injured population.

METHODS

A matched cohort study was carried out on the basis of routine data from the BARMER statutory health insurance carrier. The exposure group consisted of patients treated over the period 2006-2009 for TBI at a variety treatment intensities. The control group consisted of BARMER insurees without prior TBI who were matched with the patients in the exposure group for age, sex, and preexisting diseases. Late sequelae were sought in the routine data for a period of ten years after the injury. The outcome rates of the exposure and control groups were compared with Kaplan-Meier estimators and Poisson regression.

RESULTS

114,296 persons with TBI in the period of 2006-2009 were included. The mortality within ten years of TBI was 305 per 1000 individuals. The relative mortality in the exposure group was higher than that in control individuals of the same age and sex, with an

incidence rate ratio (IRR) of 1,67 (95% confidence interval (1.60;1.74). Immobility, dementia, epilepsy, endocrine disorders, functional disorders, depression, anxiety, cognitive deficits, headache, and sleep disorders were also more common in the exposure group. Person with TBI requiring high-intensity treatment including surgery displayed the highest relative incidence rates of the conditions studied over 10 years of follow-up.

CONCLUSION

Adverse sequelae of TBI can still be seen ten years after the exposure. These patients die earlier than person without TBI and suffer earlier and more frequently from associated conditions.

GAMMA-KNIFE RADIOSURGERY. AN EFFECTIVE TREATMENT FOR AVMS

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Clinical research to refine and minimize surgical interventions has continued to be one of the most important features of the neurosurgical development during the last half of the XX century. Prof. Lars Leksell, the inventor of the Gamma-Knife radiosurgery (GKRS), was a leader in stereotactic surgery. In addition, he coined the concept of radiosurgery more than 60 years ago. Leksell and his coworkers have defined the indications for radiosurgery and introduced stereotactic techniques into radiosurgery.

Today, GKRS is one of the three generally accepted treatment modalities in the treatment of cerebral AVMs together with microsurgery and endovascular techniques.

The authors present their experience in treating 461 patients harbouring cerebral AVMs with a Leksell Gamma-Knife unit between 2005 and 2023.

The follow-up schedule was a MR examination performed 6 and 12 months after the treatment in order to define if a radiation induced oedema had developed or not, as this represents the beginning and the end of the timer period in which the complications usually occur. If a radiation induced oedema was visible and the patient asymptomatic, the oedema was not treated. After that, a MRI and a MRA examination after two years to define

the timing of the angiogram are of need. If the 2-year MR suggests complete AVM occlusion, we always perform an angiogram to verify the occlusion, as we know that a small remnant cannot be definitely excluded by using MR examinations. If the 2-year MR examination reveals a persistent AVM nidus, we postpone the angiogram to 3 years after the treatment. Naturally, as for all patients, a neuroradiological examination can be prompted by clinical symptoms. The outcome of our patients following a GKRS in relation to their age can be summarized as follows:

- AVMs in children: cure rate 86% at 24 months, cure rate 100% at 36 months;
- AVMs in young adults: cure rate 81% at 24 months, cure rate 86% at 36 months;
- AVMs in adults: cure rate 41% at 24 months, cure rate 82% at 36 months.

Predilect areas for oedema were the Parietal lobe and the basal ganglia, and 5 of the 6 patients which developed it had AVMs in excess of 11 cm³.

The probability for AVM obliteration is dependent of the dose to the AVM periphery, the volume of the nidus and its localization, best results being recorded in children.

GAMMA-KNIFE RADIOSURGERY IN ACOUSTIC NEUROMA. FACTS AND CONTROVERSIES

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Lesions of the cerebellopontine angle (CPA) are frequent and represent 6%–10% of all intracranial tumors. Acoustic neuromas, which are also called vestibular schwannomas, along with meningiomas are the two most frequent lesions and account for approximately 85%–90% of all CPA tumors.

These benign lesions involving the middle ear comprise a diverse spectrum of local manifestations within the temporal bone. Despite their usually benign histopathological characteristics, these lesions may be locally destructive. Prompt diagnosis and treatment are therefore necessary to prevent progression of audiologic, vestibular, and facial nerve dysfunction, which may also be present.

Because of the surgically formidable anatomical location of these tumors, curative resection often proves challenging. Treatment options include surgical resection, stereotactic radiosurgery (SRS), hypofractionated stereotactic radiotherapy (SRT), alone or in combination.

Stereotactic radiosurgery is a minimally invasive option for management of skull base tumors. Brain stereotactic radiosurgery involves the use of precisely directed closed skull single fraction (one surgical session) radiation to create a desired radiobiologic

response within the target with minimal effects to surrounding structures or tissues.

Stereotactic radiosurgery is associated with a high rate of local tumor control and a low risk of neurologic complications for patients with skull base tumors. Stereotactic radiosurgery can be used as an up-front treatment or as an adjuvant therapy for patients with recurrent or residual tumor after surgical resection.

The superior safety efficacy of stereotactic radiosurgery over microsurgery in small- to middle-sized vestibular schwannomas is demonstrated in worldwide comparative studies. Normal motor facial nerve function and serviceable hearing are more likely to be preserved with radiosurgery as compared with microsurgery. In very large schwannomas, a combined approach with a deliberate subtotal removal with functional monitoring of the facial nerve followed by radiosurgery of the remnant dramatically reduces the risk of facial palsy as compared with radical removal.

Hypofractionation of radiosurgery (stereotactic radiotherapy or multisession radiosurgery) has failed until now to demonstrate any advantage over single-dose, high-precision radiosurgery.

Literature has documented the cost savings benefit of stereotactic radiosurgery versus invasive surgical procedures and the lower risk potential of bleeding, anaesthesia problems, infections, and side effects which may result in transient or permanent disabilities from open surgery.

At the same time, literature has demonstrated that the risk of radiation-associated intracranial malignancy after stereotactic radiosurgery was found to be similar to the risk of developing a malignant CNS tumour in the general population of the USA and some European countries as estimated by the CBTRUS and IARC data, respectively.

RISK FACTORS ASSOCIATED WITH STEREOTACTIC RADIOSURGERY FOR LARGE SKULL BASE BENIGN MENINGIOMAS

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PURPOSE

Skull base meningiomas represent a very challenging pathology due to relatively difficult surgical access. In contrast, stereotactic radiosurgery (SRS) proved to be an effective and more secure treatment technique based on the greater accuracy in delivering precise focused radiation into the target, sparing at the same time healthy surrounding tissues.

METHODS AND RESULTS

Our study, based on almost 20 years of experience in delivering SRS treatments using various models of Leksell Gamma-Knife units, reports a high tumor control rate for complex-shaped skull base meningiomas close to critical structures. We retrospectively evaluated the risk factors and complications after high-dose irradiation in patients undergoing single-fraction radiosurgery combined with clinical imaging criteria established using MRI scans (in T1 weighted imaging with gadolinium and the edema in T2 weighted sequences).

The mean volume of the tumors was 18.6 cubic centimetres (only tumors with a volume in excess of 15 cubic centimetres were included in the study). The median administered marginal dose was 12.5 Gy. Mean imaging follow-up was 112 months. Tumor control rate was not influenced by sex, age, tumor site, neurological status

of the patient or irradiated volume, even though larger meningiomas are associated with poor long-term local control in most published series.

The long-term follow-up data indicates tumor control in 88,5% of patients after 10 years, with low incidence of complications.

CONCLUSIONS

Current practice shows a slight potential increase in the incidence of meningiomas, the superiority of the individual techniques needing to be confirmed in prospective and methodologically rigorous studies with at least 20 years of follow-up.

KEYWORDS

skull base, meningiomas, risk factors, stereotactic radiosurgery (SRS)

NEUROSURGICAL PERSPECTIVE ON NON-
FUNCTIONING PITUITARY NEUROENDOCRINE
TUMORS MANAGEMENT:
A SINGLE-CENTER EXPERIENCE

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INTRODUCTION

Pituitary Neuroendocrine Tumors (PitNETs), formerly designated as „pituitary adenomas” (PA), represent a relatively common pathology in the neurosurgical field, accounting for approximately 5.1 cases per 100,000 population yearly. The term “non-functioning” defines all PitNETs that do not induce a hormonal syndrome, and they account for up to 30%. Notwithstanding many aspects regarding non-functional PitNETs that are controversial, like the management of remnants or recurrences, the neurosurgical approach is indisputably indicated in cases of tumoral syndrome.

MATERIAL AND METHODS

The authors of this study aimed to assess patients presenting with non-functioning PitNETs and their outcomes after surgery in the 3rd Neurosurgical Department of the Clinical Emergency Hospital “Bagdasar-Arseni”, Bucharest, for a period of 8 years, between 2016 and 2023. This study is based on a thorough appraisal of the patient’s demographic and clinicopathological data while focusing on the strategic role of the neurosurgical approach.

RESULTS

A total of 325 patients were identified with non-functioning PitNETs, that were treated in our department between the 1st of January 2016 and the 31st of March 2024, of which 193 (59.38%) were male and 132 (40.61%) were female. The mean age at admission was 50.70 years in the male group and 53.44 years in the female group, and the clinical manifestations were mostly those related to the tumoral mass effect, while more than half of the patients also presented with hypopituitarism. All of the patients included in this study underwent neurosurgery via a transnasal trans-sphenoidal approach and a gross-total resection was performed in 79% of cases (N=257). Surgical complications were described. Gamma-knife surgery was a postoperative neurosurgical option for 33 cases (48.5% of the patients with tumor remnants).

CONCLUSION

Non-functioning PitNETs usually have a slow development, which allows them to grow until the mass effect syndrome sends the patients to the doctor. Trans-sphenoidal surgery is greatly effective in providing symptomatic relief and if gross-total resection is performed, the chances of recurrence are smaller. However, the intervention should be performed by a neurosurgeon with extensive experience in trans-sphenoidal surgery, to raise the odds of success and minimize the risks of complications.

KEYWORDS

non-functioning pituitary adenoma, hypopituitarism, neurosurgery, gamma-knife surgery

THE OLFACTORY GROOVE MENINGIOMA. BEST APPROACH

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OBJECTIVES

This presentation aims to discuss the surgical approaches for resecting an olfactory groove meningioma in the hope of determining which one is the best.

Olfactory groove meningiomas (OGMs) are arachnoid cell neoplasms of the frontoethmoidal suture and lamina cribrosa. Arising along the midline of the anterior fossa, OGMs frequently impinge on the frontal lobes through mass effect. As the growth enlarges, displacement of adjacent brain regions leads to headaches, fatigue, seizures, and intracranial hypertension and most importantly, anosmia. In this presentation, the surgical approaches for resecting this kind of tumour are discussed in hope of determining which one is the best.

Surgical approaches to olfactory groove meningiomas vary based on the tumour's size, location, and relationship to surrounding structures. The choice of surgical approach depends on:

- a) Tumour size and location - larger or more complex tumours may require extensive transcranial approaches;
- b) The surgeon's expertise;
- c) The patient's health (considering the patient's overall health, recovery expectations, and potential risks).

METHODS

By conducting a PubMed search of the recent literature (2019-2024) and drawing on the expertise of the Department of Neurosurgery at Bucharest's Emergency Hospital, we examined the optimal surgical approaches for treating this type of tumor.

RESULTS

There are four main methods to consider when confronting an OGM, each one with its advantages and disadvantages.

1. Transcranial Approaches
 - A. The Subfrontal Approach (unilateral and bilateral)
 - B. Through an Eyebrow supraorbital keyhole craniotomy
2. The Endoscopic Endonasal Approach
3. Through a Pterional (Frontotemporal) Craniotomy
4. The Extended Bifrontal Approach

The key idea that was enhanced in most of the articles throughout our research is that each approach is suited in different circumstances and that, patient selection is one of the most important steps when dealing with an OGM.

CONCLUSIONS

Ultimately, the surgical approach is tailored to the individual patient's needs, balancing the goals of complete tumour removal with minimizing risks and preserving neurological function.

KEYWORDS

olfactory groove meningioma, craniotomy, endonasal, endoscopic, neurosurgery

THE ROLE OF NEUROSURGERY IN THE TREATMENT OF VERTEBRAL METASTASES

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INTRODUCTION

Vertebral metastases represent a significant clinical challenge due to their potential to cause severe pain, neurological deficits, and spinal instability. Neurosurgery plays a crucial role in the multidisciplinary approach to treating vertebral metastases, aiming to alleviate symptoms, maintain or restore neurological function, and stabilize the spine. This abstract reviews the current role of neurosurgery in the management of vertebral metastases, focusing on surgical indications, techniques, outcomes, and integration with other therapeutic modalities.

Neurosurgical intervention is typically considered in cases of intractable pain, progressive neurological deficits, spinal instability, or failure of non-surgical treatments. Advances in imaging techniques have enhanced the ability to accurately diagnose and plan surgeries, while innovations in surgical technology have improved the precision and safety of these procedures. Surgical options range from minimally invasive techniques, such as vertebroplasty and kyphoplasty, to more extensive decompressive and stabilizing procedures like laminectomy, corpectomy, and spinal fusion.

Outcomes of neurosurgical treatment are generally favorable, particularly when patients are carefully selected based on established criteria such as the Spinal Instability Neoplastic Score (SINS) and the Neurologic, Oncologic, Mechanical, and Systemic

(NOMS) framework. These tools assist in determining the most appropriate surgical approach and the timing of intervention. Moreover, neurosurgery is often part of a comprehensive treatment plan that includes radiation therapy, chemotherapy, and targeted biological therapies, which can enhance overall treatment efficacy.

A critical aspect of future radiotherapy strategies involves maintaining a minimum of 2 mm between nervous tissue and cancer cells. This margin is essential to prevent radionecrosis of nervous tissue, a serious complication that can arise from radiotherapy. Ensuring this safe distance can help protect neural structures while effectively targeting cancerous cells, thus optimizing therapeutic outcomes and minimizing adverse effects.

Despite the benefits, neurosurgery for vertebral metastases carries risks, including infection, bleeding, and potential for further neurological injury. Therefore, patient selection and preoperative planning are critical to optimize outcomes. Future directions in this field may include the development of more refined surgical techniques, enhanced integration of multimodal treatments, and better prognostic tools to guide therapy.

CONCLUSION

Neurosurgery remains a cornerstone in the management of vertebral metastases, offering significant symptomatic relief and functional improvement. Ongoing advancements in surgical methods and interdisciplinary care continue to enhance patient outcomes.

KEYWORDS

neurosurgery, vertebral metastases, spinal instability, surgical techniques, multimodal treatment

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ODONTOID FRACTURE TREATED WITH CEMENT-AUGMENTED DIRECT ANTERIOR SCREW OSTEOSYNTHESIS IN ELDERLY PATIENTS

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PURPOSE OF THE STUDY

The authors retrospectively evaluate data of a cohort of patients operated on with the same surgical technique over a 10-year period with a mean age of 81.7 years for odontoid fracture.

MATERIAL AND METHODS

Between 2012 and 2021 we performed cement-augmented direct anterior screw osteosynthesis in. The mean follow-up period was 2.7 years.

RESULTS

A total of 41 screws were inserted, 2 screws in 7 patients, Total of 33 patients (97%; N=34) odontoid type II fracture, 1x type III (1%; N = 34). We lost 5 patients from follow up.

Radiologically we found 20x fusion (69%; N = 29), 7x pseudoarthrosis stable (type I and II) (24.1%; N = 29), 2x loosening, failure (type III and IV) (7%; N = 29). We assessed as stable condition 27 times (93%; N = 29). On the follow-ups with no major reported pain VAS 2 (6.9 to 2 postoperatively) ($p < 0.05$), 26 (90%; N = 29) of living patients return to original activities at 1

year postoperatively. Perioperatively, we experienced 16 times cement leakage (47%; N=34).

CONCLUSIONS

In our institution, now the method of first choice for type II odontoid fractures in geriatric patients. It has a reasonable operative risk, preserve rotations of the upper cervical spine and quality of life of these patients (satisfaction 90%) and achieve stability of fracture in 93% of patients.

KEYWORDS

odontoid fracture, cement augmentation, elderly patients

CEREBRAL ANEURYSM CHARACTERISTICS AND SURGICAL OUTCOMES: AN IN-DEPTH ANALYSIS OF 346 CASES OPERATED USING MICROSURGICAL CLIPPING

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BACKGROUND

Intracranial aneurysms (IAs) represent life-threatening neurosurgical emergencies. This study aims to provide a comprehensive analysis of 346 patients with 416 IAs treated using microsurgical clipping between 2016/2022, focusing on demographic characteristics, aneurysm features, and surgical outcomes.

METHODS

This retrospective study involved patients from the National Institute of Neurology and Neurovascular Diseases in Bucharest, Romania. Variables examined included aneurysm localization, diameter, neck dimensions, rupture status, and postoperative complications. The study employed statistical analysis using Python and adhered to the Declaration of Helsinki principles (2013).

RESULTS

- Patient Demographics: 346 patients: mean age over 30 years. A gender discrepancy was noted, with a higher prevalence of IAs in females (3:1 ratio).
- Aneurysm Characteristics: Anterior communicating artery and middle cerebral artery (246 cases, 71% of total). Diameters ranged from 2-12.5 mm in 323 cases (93.3%), with neck dimensions primarily between 1-5 mm in 292 cases (84.4%).
- Rupture and Complications: A substantial prevalence of ruptured aneurysms was observed in 309 patients (89.3%). Hemorrhage was noted in 312 cases (90.1%), and 101 patients (29.2%) experienced vasospasm. The Fisher score distribution highlighted severity, with 142 cases (41%) at score 3.
- Surgical Outcomes: The Glasgow Outcome Scale (GOS) indicated favorable results in 261 patients (75.4%), while 84 patients (24.3%) succumbed postoperatively, with 70 patients (20.2%) due to neurological causes. Postoperative complications included 25 reoperations (7.2%) and 71 cases of osteomyelitis (20.5%).
- Predictive Factors: Significant risk factors included arterial hypertension (mostly grade II), atherosclerosis, obesity, and diabetes, influencing both intraoperative phases and postoperative infection rates.

CONCLUSION

The study underscores the critical nature of timely surgical intervention in IA cases, particularly for ruptured aneurysms. The findings emphasize the need for tailored, multidisciplinary treatment strategies and ongoing research to improve surgical protocols and patient outcomes. The comprehensive analysis of preoperative, intraoperative, and postoperative variables provides valuable insights into managing intracranial aneurysms, highlighting the complexities and challenges in treating this condition.

KEYWORDS

intracranial aneurysm, microsurgical clipping, subarahnoidal haemorrhage, outcome

MICROSURGICAL TREATMENT OF BRAIN
ARTERIOVENOUS MALFORMATIONS:
TIPS AND TRICKS

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Despite recent advances in endovascular and radiosurgical treatment, microsurgery remains the modality of choice for the treatment of brain arteriovenous malformations (bAVMs), with a high radiological cure rate. This presentation will demonstrate strategies for patient selection and timing for surgical treatment, as well as nuances of the microsurgical technique necessary for the adequate treatment of bAVMs. Selection of surgical approaches, extensive subarachnoid dissection, strategies for dealing with bAVMs in eloquent areas, how to handle deep feeding arteries, among other nuances will be demonstrated with case examples and surgical videos.

MICROSURGICAL TREATMENT OF MIDDLE CEREBRAL ARTERY ANEURYSMS

DOI: 10.33962/roneuro-2024-141

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Since the publication of the International Subarachnoid Aneurysm Trial (ISAT), there has been a significant change in the way cerebral aneurysms are treated. In many centers, there has been a drastic decrease in the number of cases treated by microsurgery, with endovascular treatment becoming the modality of choice. Middle cerebral artery (MCA) aneurysms, however, pose a real challenge to endovascular treatment, due to the tortuosity of the vessel and to the high rate of wide neck aneurysms in this location, often with branches originating from the neck of the aneurysm itself. Our study provides a literature review, comparing the results of surgical and endovascular treatment for MCA aneurysms. Additionally, case examples will be presented with surgical videos, showing the nuances of the microsurgical technique required to manage these aneurysms. The clinical and radiological results of more than 120 cases are presented and compared to the results of endovascular treatment in a large treatment center in Brazil.

TREATMENT OF PARACLINOID ANEURYSMS IN
THE FLOW DIVERTER ERA:
IS THERE STILL A ROLE FOR MICROSURGERY?

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Paraclinoid aneurysms are among the most complex for microsurgical treatment. Their proximity to the skull base, need for anterior clinoidectomy, lack of adequate proximal control, and frequent large/giant morphology make microsurgical treatment truly challenging. Recently, after the development of flow diverter stents and subsequent FDA approval for the treatment of paraclinoid aneurysms, microsurgery has virtually been abandoned as a treatment modality for these aneurysms in many centers. However, there are still cases in which open surgical treatment will be necessary, such as ruptured aneurysms, aneurysms with mass effect on the optic pathways, patients allergic to antiplatelet agents, and recurrence after endovascular treatment. In this presentation, case examples will be demonstrated with surgical videos highlighting nuances of the surgical techniques required to manage such lesions. Surgical results (clinical and radiological) of a series of more than 80 patients will be demonstrated.

PRESSURE MEASUREMENT IN MOYAMOYA BYPASS SURGERY

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Bin Xu

BACKGROUND

This study aims to elucidate the clinical and theoretical value of directly measuring donor and recipient arterial pressure pre- and post-superficial temporal artery- middle cerebral artery (STA-MCA) bypass in moyamoya disease (MMD) patients.

METHODS

DSA imaging data were prospectively collected from patients diagnosed with bilateral MMD who underwent STA-MCA bypass surgery between 2022 and 2023 and stratified according to the Suzuki stage. The mean arterial pressure (MAP) of the donor and recipient arteries was directly measured during the STA-MCA bypass procedure, and these data were statistically analysed and evaluated.

RESULTS

Among 48 MMD patients, Suzuki grading revealed that 43.8% were in early stages (II and III), while 56.2% were in advanced stages (IV, V, and VI). Predominantly, 77.1% presented with ischemic-type MMD, and 22.9% with hemorrhagic type. Pre-bypass assessments showed that 62.5% exhibited antegrade blood flow direction and 37.5% had retrograde. The mean recipient artery pressure was 35.0 ± 2.3 mmHg, with a mean donor-recipient pressure gradient (δP) of 46.4 ± 2.5 mmHg between donor and recipient arteries. Post-bypass, mean recipient artery pressure increased to 73.3 ± 1.6 mmHg. No significant correlation ($r = 0.18$, $P = 0.21$) was noted between δP and Suzuki staging.

CONCLUSION

While Suzuki staging offers a morphological description of the cerebral arterial system, preoperative decisions regarding the revascularization procedure in MMD patients should consider the pressure characteristics of the cortical arteries. Our findings provide objective criteria that choosing the anastomosis site in the downstream blood flow of the recipient is a reasonable choice.

DUAL MANIFESTATION OF INTRACRANIAL AND SPINAL CORD CAVERNOMAS: A CASE REPORT AND COMPREHENSIVE LITERATURE REVIEW ON AGGRESSIVE CLINICAL OUTCOMES

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INTRODUCTION

Cerebral and spinal cord cavernomas are vascular anomalies of the nervous system characterized by dilated vessels lined with a single layer of endothelium. They exhibit minimal blood flow and can occur in both the brain and spinal cord. They affect approximately 0.5% of the population and constitute 15% of cerebral vascular malformations. While spinal cavernomas are less common, they can cause significant morbidity due to the risk of hemorrhage and resulting neurological deficits. Surgical removal to completely eliminate the vascular abnormality is the preferred treatment.

MATERIAL AND METHODS

We present the case of a 66-year-old female patient who presented to our clinic with headache, dizziness, and left-sided hemiparesis, predominantly affecting the lower limb. Cerebral MRI revealed an intracranial mass in the left parietal lobe with signs of acute bleeding. Due to clinical symptom discrepancies and imaging findings, cervical MRI was performed, revealing an intramedullary tumor formation adjacent to the C4-C5 vertebral bodies. The

patient underwent two surgeries, achieving total ablation of the lesions.

RESULTS

Post-operative CT confirmed complete ablation of the cavernomas. No neurological deficits were reported after removal of the parietal cavernoma. One month after the first surgical intervention, the patient underwent a second surgery to excise the cervical tumor. Postoperatively, the patient experienced numbness in the left hand, which improved in the first week postoperatively.

CONCLUSIONS

The prevalence of associated intracranial cavernous malformations (CMs) in patients with spinal cord CMs was found to be 5 to 12% and typically observed in patients with the familial form of the condition. The coexistence of intracranial and spinal cord CMs is more likely to lead to aggressive disease progression. Therefore, it is imperative that both lesions are surgically removed within 30 days of each other. Managing cavernomas remains a complex clinical decision, often balancing intervention risks against potential neurological morbidity.

KEYWORDS

spinal cavernomas, intracranial cavernomas, cervical cavernomas, total ablation, familial form cavernomas

TARGETED SURGICAL APPROACH TO MULTIPLE CEREBRAL HYDATID CYSTS WITHOUT SYSTEMIC INVOLVEMENT: A CASE REPORT

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BACKGROUND

The adult *Echinococcus Granulosus* resides in the intestines of dogs. Infectious eggs are excreted in the feces. Hydatid infections can affect multiple organs, with the liver being the most commonly involved, followed by the lungs and spleen. Less frequently, the brain, spine, retroperitoneal space, kidneys, and musculoskeletal system can also be affected.

CASE PRESENTATION

A 55-year-old male from a rural area, who owns sheep and dogs, presented with symptoms such as poor coordination in his right hand, agraphia, and acalculia. One week prior to admission, he had a sudden loss of consciousness. CT and MRI scans revealed six distinct cystic lesions in the left parietal lobe, extending towards the lateral ventricle. These lesions were well-defined, non-enhancing, and showed minimal perilesional edema. Whole body CT scan showed no additional cysts.

RESULTS

After comprehensive investigations, the patient underwent surgery. A left parietal craniotomy was performed, followed by a C-shaped durotomy. Intraoperative ultrasound was utilized to

locate the cysts. A minimal corticectomy was made at the posterior border of the parietal lobe. This exposed a cluster of six hydatid cysts located 1 cm subcortically. The cysts were carefully dissected and individually removed using the Dowling-Orlando technique. The remaining cavity was then flushed with a hypersaline solution. The patient recovered well, with no new neurological. He received therapy with albendazole second day after surgical intervention. Histopathological examination confirmed the diagnosis of hydatid cysts. The patient was discharged on the 10th postoperative day.

DISCUSSION

The Dowling-Orlando technique is a highly effective surgical method for removing cerebral hydatid cysts without causing rupture. Magnification is recommended during the early stages of surgery to avoid damaging the fragile cyst wall and to establish the precise surgical plane. Saline solution is used to dissect the cyst wall from the brain tissue and aid in the removal of the hydatid. Tilting the operation table towards the lesion site and lowering the patient's head assists in the gravity-assisted removal of the cyst.

KEYWORDS

cerebral hydatid cyst, echinococcus granulosus, Dowling-Orlando technique, albendazole therapy, intraoperative ultrasound

RETROSPECTIVE STUDY OF THE SURGICAL RESULTS IN VESTIBULAR SCHWANNOMA

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INTRODUCTION

Vestibular schwannoma- benign intracranial tumor of the vestibulocochlear nerve. It rise from Schwann cells sheathof the vestibular portion of vestibulocochlear nerve. Most frequently form the inferior vestibular nerve. In less than 5 % of cases it starts growing from cochlear nerve.

AIM OF STUDY

To establish the incidence of acoustic neuroma development, and to establish the tactics and intraoperative approach.

METHODS AND MATERIALS

Retrospective study was conducted that included 65 patients with acoustic neuroma who were treated surgically, through the retrosigmoid approach, in two departments of Neurosurgery in the Republic of Moldova.

RESULTS

The study included a group of 65 patients, who were analyzed according to different criteria. One of the basic objectives was the presence of the neurinoma according to sexthus it was found that women are more prone to develop acoustic neurinoma compared to men. Another research criterion was the living environment of the patients, thus it was found that people from the urban environment have a higher risk of developing this pathology Analyzing the study, we also proposed an objective to analyze the

average prevalence of neurinomas, so people between 51-60 years of age constituted the largest part of the group. Another aim of the research was to analyze the presence of pain in these patients and what were the most frequent complaints, so headache is the main symptom, followed by sensorineural hearing, deafness and tinnitus, followed by paralysis of the facial nerve, vertigo and cerebellar ataxia. After evaluating the preoperative aspects, we also analyzed the post-operative condition of the patients thus, most of the group of patients presented paralysis of the facial nerve, followed by cerebellar syndrome and bulbar syndrome.

CONCLUSION

Mostly unilateral sensorineural hearing loss and deafness were the first complaints of the patients. All patients with unclear, alternating unilateral sensorineural hearing loss that does not respond to specific conservative treatment are suspected to have an acoustic neuroma that can be definitely diagnosed only by the MR with contrast. Surgical treatment approach depends on tumor size, localization and extent of the tumor and its symptomatology.

