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Aim & Scope

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Endoscopic Endonasal Approach for Growth Hormone Secreting Pituitary Adenomas: Preliminary Report of Biochemical Remission in 49 Patients Using 2010 Consensus Criteria

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Abstract

Background & Aim: Transsphenoidal surgery in the setting of acromegaly is quite challenging due to the enlarged soft tissue mass, bony overgrowth, and bleeding. Since the 1990s, endoscopic transsphenoidal surgery for pituitary adenomas has increased in popularity. In this retrospective study, we reviewed our experience with endoscopic endonasal approach (EEA) in biochemical remission rates using the 2010 consensus criteria.

Methods & Materials/Patients: The authors retrospectively analyzed data from 49 consecutive patients with acromegaly who underwent pure EEA. The criteria of biochemical remission were GH levels ≤ 1 ng/mL randomly, ≤ 0.4 ng/mL after oral glucose tolerance test and normal IGF-I levels for age and sex at least 3 months after surgery. Also, demonstration of the total removal of the tumor on MRI studies obtained after administration of contrast material at the 3-month postoperative follow-up visit. There was no noticeable residual tumor mass even in patients without remission.

Results: Biochemical remission was achieved in 90% of microadenomas (n=10) and in 29 of 39 macroadenomas (74.4%). The total remission rate was 78% (38 of 49 adenomas). In 3 cases (6.1 %), there was discordance between GH and IGF1 serum levels.

Conclusion: We used stringent consensus criteria from 2010 in a series which included a high proportion of GH secreting macroadenomas to show that EEA results in comparable remission rates to earlier studies which used less strict criteria. So, high disease control rates and a small number of complications are some of the most important points related to the technique.

Keywords: Acromegaly; Endoscopic; Endonasal Approach; Biochemical Remission

Application of Modified Dolenc-Kawase Approach in Specific Skull Base Tumors

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Abstract

Background & Aim: Skull base tumors of cavernous sinus, especially with its extension to the upper third of the clivus and ventral brainstem are still a challenging issue in neurosurgery. Dolenc extradural approach or other variants of this procedure have been used routinely for cavernous sinus involvement. Although, the traditional Kawase approach provides a 10 × 5-mm fenestration at the petrous apex of the temporal bone between the 5th cranial nerve and internal auditory canal, and is an accepted procedure for lesions in upper third part of the clivus and ventral midbrain and upper pons. The modified Dolenc- Kawase (MDK) approach has been introduced lately for having a larger and more accessible surgical corridor to the upper third of the clivus and ventral brainstem as well as cavernous sinus involvement.

Methods & Materials/Patients: We used MDK approach for three skull base tumors involving both cavernous sinus and ventral part of upper brainstem in three female patients. We did this approach with use of regular and very routine instrument that could find in every academic neurosurgical operation theater around Iran. We did not have navigation, or MRI or any other sophisticated surgical instrument except ultrasonic aspirator. But we managed to do the procedure relatively safe regarding the anatomical landmarks.

Results: There was no mortality or severe disability, and interestingly early cranial nerve deficit was improved over the time. We could reach to significant near total resection in all patients.

Conclusion: We reported the results of these operations and discussed the cons and pros of this modified approach in specific skull base tumors.

Keywords: Skull Base Tumors; Dolenc Approach; Kawase Approach; Modified Dolenc-Kawase Approach

Transcanal Transpromontorial Approach to the Internal Auditory Canal: a New Step toward Tailored Surgery for Vestibular Schwannoma

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Abstract

Background & Aim: Numerous neurosurgical procedures are widely used for the treatment of vestibular schwannoma in clinical practice, the most popular ones are retrosigmoid, trans-mastoid-translabyrinthine and middle fossa approaches. All of these approaches give an indirect access to the internal auditory canal and require wide external incisions and a certain amount of bone removal. Since the 1990s endoscopic techniques have been introduced for the treatment of middle ear pathologies, and gradually have become popular. Advances were made in the exploration of the internal ear with the endoscope, until appropriate procedures with combined endoscopic and microscopic techniques were clinically applied as a therapeutic option to treat selected patient with vestibular schwannoma.

Methods & Materials/Patients: We analyzed a series of 21 patients operated in our Institution from September 2015 to August 2016 for vestibular schwannoma, using fully endoscopic transcanal transpromontorial approach or enlarged microsurgical approach to the internal auditory canal.

Results: Gross-total resection was achieved in all patients. No major complications such as cerebrospinal fluid leak, hemorrhage or surgical wound infection were reported. In 17 out of 21 (80%) patients facial nerve function was normal immediately after surgery (HB I), the other 4 patients suffered a transient moderate facial nerve palsy right after surgery (HB grade II or III) but experienced complete recovery during the subsequent follow-up. In 14 out of 21 (70%) patient we experienced the post-operative onset of vertigo which recovered during post-operative period before discharging of the patients. We had no other morbidity nor any mortality related to this procedure.

Conclusion: The transcanal transpromontorial approach is a promising technique and provides a valid new option for vestibular schwannomas in selected patients. This approach proved to be successful for the removal of small vestibular schwannomas in the auditory canal with no extensive involvement of the cerebello-pontine angle, with low rates of complications and without wide skin incisions. With the introduction of this route and the cooperation with the otolaryngologists, we can provide a tailored surgery for selected group of patients, not only for vestibular schwannomas, but we have a new view that provides a potential for more extensive applications in lateral and posterior skull base surgery.

Keywords: Auditory Canal; Vestibular; Schwannoma; Approach

Evaluation of Clinical Manifestation, Risk Factors and Prognosis of Stroke in Children

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Abstract

Background & Aim: Stroke in a children is a complex issue with a variety of etiologies which are different from ones in adults. The aim of this study is to determine the clinical manifestation and the most common risk factors of stroke in children.

Methods & Materials/Patients: We conducted a retrospective descriptive case study of patients aged 1 month to 18 years discharged from department of pediatrics, Ghaem Hospital with final diagnosis of stroke during a 5-year period. The aim of this study was to determine the clinical manifestation, outcome and risk factors of stroke in the pediatrics. A total of 94 patients were included in the study.

Results: Among 94 children with confirmed stroke, 51.1% were male and 48.9% were female with the mean age of 4.6 years. Hemiparesis was the most common clinical presentation in 69 (73.4%) patients. Convulsive disorders was the most prevalent risk factor in 37 (39.4%) patients following meningoencephalitis and congenital heart disease each one in 21 (22.3%) patients.

Conclusion: Despite the other area of the world which infections and cardiac disorders are the most common risk factors for pediatric stroke, Convulsive disorders are the most common determined risk factors of cerebral stroke in children in Khorasan-Razavi province, Iran.

Keywords: Stroke; Pediatric; Hemiparesis; Risk Factor

Neuro Imaging Methods for Pre-surgical Planning

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Abstract

Recently available neuroimaging methods, employing various functional and structural neuroimaging modalities provide more knowledge from human brain functions and its mechanisms. These strategies include fMRI, diffusion (and DTI tractography), perfusion, MRS, physiological measures, and structural neuroimaging techniques. Moreover, investigate of neural mechanisms in many disease conditions are possible by these new imaging techniques. Safe neurosurgical approaches are also promising using functional and structural visualization of the eloquent cortices and subcortical bundles. Beside the common lesion-induced displacements and brain plasticity, the extent of tumor resection along with minimizing the risk of intra-operative injury to eloquent structures can be expected using these new strategies. We hypothesized and showed that individualized pre-surgical brain mapping is a critical prerequisite for neurosurgical interventions. Nowadays, increasing number of neurosurgeons use functional magnetic resonance imaging (fMRI) and diffusion tensor imaging (DTI) as convenient non-invasive methods before the surgery. All these methodologies have been implemented in our multi-disciplinary group where a large number of neurosurgeons are routinely receiving widespread services.

Keywords: Neuroimaging; fMRI; Surgery; Planning

Surgical Treatment of Internal Carotid Artery-Ophthalmic Segment Aneurysms; a Single Center Experience from Southern Iran

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Abstract

Background & Aim: Ophthalmic segment aneurysms present unique technical challenges because of their proximity to the optic nerve and the anterior clinoid process. The current study was performed to report the results of surgical treatment of these aneurysms in a single referral center in southern Iran.

Methods & Materials/Patients: This cross-sectional study was performed during a 6-year period from 2009 to 2015 in Namazi hospital, a tertiary neurovascular healthcare center affiliated with Shiraz University of Medical Sciences. We included all the patients with internal carotid ophthalmic segment aneurysms (ruptured and unruptured) that were operated in our center during the study period. We used lateral supraorbital approach for all the operation and the neck was exposed in majority of the patients in order to have access for temporary clipping of the common carotid artery. Temporary clip was placed on internal carotid in some patients. Anterior clinoidectomy was performed in all the patients. Four-vessel angiography with cross-compression was performed in all the patients in order to evaluate the circulation between both carotid arteries. Patients were followed for at least 6-months.

Results: Overall we included 30 patients with mean age of 52.6 ± 12.8 (ranging from 26-80) years. There were 9 (30.0%) men and 21 (70.0%) women among the patients. About 21 (70.0%) patients presented with subarachnoid hemorrhage and had ruptured aneurysms while 9 (30.0%) were unruptured and were detected incidentally by headache or decreased visual acuity. Three (10.0%) had more than one intracranial aneurysm and 1 (3.3%) had superior hypophyseal aneurysm. Seventeen (56.6%) patients did not have hydrocephalus while 5 (16.6%) had mild, 5 (16.6%) moderate and 4 (10.2%) severe hydrocephalus. Ventriculoperitoneal shunt was inserted in 3 (10.0%) patients. The visual acuity decreased after operation in 2 (6.66%) patients while it was improved in 6 (20.0%) patients postoperatively. The mortality was recorded in 2 (6.66%) patients who had GCS on admission of 7 and 11.

Conclusion: Surgical clipping of the internal carotid ophthalmic segment aneurysm is among the most challenging procedures of the neurosurgery. The results of the current study demonstrate that the outcome of these operations is acceptable in Shiraz and is comparable with international literature.

Keywords: Intracranial Aneurysm; Ophthalmic Segment; Internal Carotid; Surgical Clipping

The Computational Hemodynamics Analysis of an Anterior Communicating Aneurysm Treated with Woven Endobridge

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Abstract

Background & Aim: The Woven EndoBridge (WEB) aneurysm embolization device is a recently developed intrasaccular flow disruptor committed to intracranial wide-neck aneurysm occlusion; thus far, Fluid dynamic assessment of hemodynamic indices in WEB Single-Layer (WEB-SL) has not been reported. The hemodynamic profiles of an aneurysm treated with WEB were analyzed to determine the factors implicated in the performance of the WEB.

Methods & Materials/Patients: 3D computational fluid dynamics (CFD) of an Anterior Communicating Aneurysm (ACoA) were performed based on the specific angioarchitecture to simulate hemodynamic parameters including velocity streamlines, wall shear stress (WSS) and wall pressure distributions before and after WEB deployment. MIMICS, ANSYS ICEM 15.0 and ANSYS FLUENT 15.0 were used to construct the aneurysm geometry, generate tetrahedral grid and numerical simulation of the blood flow, respectively.

Results: Following WEB deployment, we observed the velocity magnitude significantly decreased within the aneurysm sac, which promoted the formation of blood clot. High WSS along the vulnerable areas before treatment and pressure gradient on the aneurysm wall were remarkably reduced after WEB insertion.

Conclusion: Hemodynamic indices that were calculated via CFD techniques had a tight correlation with WEB treatment performance. CFD could be potentially beneficial as a planning tool for neurointerventionists by simulating an optimized WEB deployment strategy before the procedure and assessing was carried out about post treatment outcome regarding measured hemodynamic factors.

Keywords: Woven EndoBridge; WEB; Computational Fluid Dynamics; Cerebral Aneurysm; Interventional Neurosurgery

Fung's Model Constants for the Intracranial Blood Vessel of Human Using Biaxial Tensile Test Results

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Abstract

Background & Aim: Mechanical properties of cerebral arteries are relevant to cerebrovascular diseases.

Methods & Materials/Patients: To acquire these properties, eight samples were obtained from the middle cerebral arteries of human cadavers, whose deaths were not as a result of injuries or cerebrovascular diseases, and were tested within twelve hours after resection, by using a precise biaxial tensile test device specially developed for this study. The dimensions, sensitivity and anisotropic nature of samples were considered. The resultant stress stretch curve was plotted and, subsequently, fitted to a hyper elastic three-parameter Fung model.

Results: It was found out that the arteries were noticeably stiffer in circumferential direction than in axial direction. It was also demonstrated that the use of multi-parameter hyper elastic constitutive models was useful for mathematical description of behavior of cerebral vessel tissue.

Conclusion: The reported material properties were a proper reference for numerical modeling of cerebral arteries and computational analysis of healthy or diseased intracranial arteries.

Keywords: Anisotropic Tissue; Cerebral Blood Vessels; Fung; Model; Nonlinear Material; Plain Stress

Updated Indications for Deep Brain Stimulation Surgery

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Abstract

Deep brain stimulation (DBS) surgery can be used in many patients with chronic neurological disorders. Now the most common usage is in Parkinson's disease but recently it is widely used in many other neurological diseases such as dystonia, obsessive compulsive disorder, tic and Tourette's syndrome.

Recently more fields of DBS surgery has been added for other chronic neurological or psychological disorders such as cluster headache, anxiety, depression, dementia and Alzheimer's disease, epilepsy, vegetative state and also schizophrenia.

Although the experience about these new fields is limited, these topics are so attractive and motivate many neuro-research centers to focus on these new fields.

The author will explain the details of indications in all fields of DBS surgery and also expectations and limitations. Also more details will be discussed about clinical details of the patients who need DBS surgery.

Keywords: DBS; Functional Neurosurgery

Endoscopic Endonasal Approach in the Management of Skull Base Chordomas-Clinical Experience on 19 Patients

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Abstract

Background & Aim: Skull base chordomas represent very interesting neoplasms due to their rarity, biological behavior, and resistance to treatment. Their managements are very challenging. Recently, the use of a natural corridor through the nose and the sphenoid sinus improved morbidity and mortality allowing also for excellent removal rates.

Methods & Materials/Patients: In our study, we described 19 patients with chordoma of skull base who underwent an expanded endonasal endoscopic approach for resection of tumor from upper clivus region and sella to C2. We highlighted the technical consideration in special cases, prognosis and outcomes.

Conclusion: The main surgical goal is to achieve maximal tumor removal with minimal morbidity. In recurrence cases, surveillance was significantly improved. The Development of the expanded endoscopic endonasal approach improved surgical and prognostic results of skull base chordomas.

Keywords: Endoscopy; Chordoma; Skull Base

En Bloc Resection of Sacral Tumors via a Posterior-the Only Approach without Nerve Root Sacrifice: A Report of 10 Cases

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Abstract

Background & Importance: Sacral tumors are rare primary bone neoplasms. The best long-term prognosis is achieved via complete tumor excision, but this feat is challenging in the spine due to the proximity of blood vessels and nervous tissue. Sacral tumors have been removed in an en bloc fashion via combined anterior/posterior approaches, oftentimes with the nerve root sacrifice. The purpose of this article is to present 10 cases of a single-staged, posterior-only approach for en bloc resection of sacral tumors without the nerve root sacrifice.

Case Presentation: We operated 10 patients with sacral mass, including giant cell tumors (3 patients), chordoma (2 patients), plasmacytoma (2 patients), and schwannoma (3 patients). They presented with a variety of symptoms such as intractable low back pain and leg pain (100%), lower extremity weakness (10%), and sphincter problem (30%). They underwent biopsy, computed tomography (CT) scans, and magnetic resonance imaging (MRI). A posterior-only approach without nerve root sacrifice was done to achieve an en bloc resection, followed by lumbopelvic reconstruction.

Conclusion: Sacrectomy via the single-staged posterior approach with the nerve root preservation is a challenging yet feasible procedure for the treatment of sacral tumors in carefully selected patients.

Keywords: En bloc; Sacrat; Tumor; Surgery

Intramedullary Spinal Cavernoma

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Abstract

Background & Aim: Intramedullary spinal cavernoma (ISC) is a rare entity and accounts for approximately 5%–12% of all spinal vascular pathologies. The purpose of the present study was to examine the influence of clinical presentation, localization, and different surgical approaches on long-term outcome in patients treated for ISC.

Methods & Materials/Patients: The authors performed a retrospective single-center study of 18 cases treated microsurgically over the past 8 years. Analyzed factors included preoperative clinical history, microsurgical strategies, neurological outcome (American Spinal Injury Association [ASIA] grade, Epstein and Cooper grade), and the occurrence of postoperative spinal ataxia. Univariate analysis was performed to identify factors influencing long-term outcome.

Results: Preoperatively, 18.8% of all patients experienced a slowly, progressive decline in neurological function and 33.3% suffered from repetitive episodes of acute neurological deterioration over a time period from months to years. Moreover, 16.7% noted the sudden onset of a severe neurological deficit, whereas 25% experienced the sudden onset of symptoms with a subsequence of gradually progressive decline in neurological function. On long-term follow-up after treatment (mean \pm SD, 79.3 \pm 35.2 months), 70.8% of patients showed no change in neurological function, 6.3% suffered from a decline, and 22.9% improved neurologically. Thoracolumbar localization ($p = 0.043$), low preoperative Epstein and Cooper grade for the lower extremities ($p < 0.001$), and a low preoperative ASIA grade ($p < 0.001$) were identified as factors associated with an unfavorable outcome (ASIA Grade A–C). The rate of spinal ataxia related to surgical approach was 16.7%.

Conclusion: Postoperative neurological function in ISC patients was determined by the preoperative neurological status. In the long-term follow-up after microsurgical treatment, 93.7% of patients presented with a stable or improved condition (ASIA grade); thus, definite microsurgical treatment should be considered as long as patients presented with only mild symptoms after the diagnosis of symptomatic ISC.

Keywords: Cavernoma; Spinal; Surgery

Determining the Biomechanical Properties of Human Intracranial Blood Vessels through Biaxial Tensile Test and Fitting them to the Hyperelastic Model

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Abstract

Background & Aim: Understanding mechanical properties of healthy and unhealthy cerebral vessels is the key element in the development of their science and the relevant clinical diagnosis, prevention and treatment.

Methods & Materials/Patients: Thirteen healthy samples were obtained from 23 middle cerebral arteries. The changes of force and deformation were recorded using a biaxial device until the vessel rupture. Thereafter, the stress-strain curve was plotted and fitted with a hyper elastic five-parameter Mooney-Rivlin model and the model parameters (C1, C2, C3, C4, and C5) were determined according to the best fit. For statistical comparison, the samples were divided into three age and two gender groups and subjected to non-parametric statistical analyses.

Results: The comparison of obtained results for different age groups showed that there was a significant difference between the "old" group and the other two groups (middle-aged and young). There was no significant difference between male and female groups. Therefore, the results demonstrated the changes of blood vessel wall properties with aging. The results also depicted that the arterial wall was stiffer in the circumferential direction than the axial direction. Anisotropy of cerebral vessels was confirmed by all of the tests. Therefore, the significance of the biaxial tests was in the spot light in the derived data. Moreover, good fitting of data illuminated that the use of multiple-parameter constitutive models was useful for mathematical demonstration of cerebral vessel tissue behavior.

Conclusion: Good fitting of data illuminated that the use of multiple-parameter constitutive models is useful for mathematical demonstration of cerebral vessel tissue behavior.

Keywords: Biomechanical; Cerebral; Artery; Tensile

The Anatomical Variation of Internal Carotid Artery in Endoscopic Transsphenoidal Approaches

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Abstract

Regarding the increasing use of endoscopic transnasal approaches, the anatomic variations of the ICA course along the skull base should be considered as the very relevant information for this type of surgery. Endoscopic orientation of internal carotid artery from the lacerum (C3) to clinoid (C5) segments can be helpful for the neurosurgeons to clarify the relationships between the artery and its surrounding structures during the surgery. The space between the ICA and the pituitary gland varies depending on the normal and pathological anatomy of both structures. Injury to the ICA can be one of the most devastating events for the patients in microscopic or endoscopic transsphenoidal approach. A more recent meta-analysis highlighted the vascular injury as an uncommon but the important potential complication of transsphenoidal approaches. It is necessary to pay attention to the course of the carotid artery through the parasellar region to minimize complications in endoscopic procedure and also define potential endoscopic corridors in endoscopic transsphenoidal surgery.

Keywords: Internal Carotid Artery; Endoscopy; Transsphenoidal

Predictive Value of Pathobiological Biomarkers in Patients with Glioblastoma Multiforme

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Abstract

Background & Aim: Glioblastoma multiforme (GBM) is the most common primary tumor of the brain. Several biomarkers have been proposed to be related to the treatment response and ultimate prognosis of these tumors. In this study, we have evaluated the role of some important biomarkers in prediction of the clinical outcome of glioblastoma.

Methods & Materials/Patients: This is a prospective cohort study that enrolled 18 patients with newly diagnosed GBM. All of them were operated with the aim of maximal safe resection, and the extent of resection was documented along with neurologic outcome. After confirmation of the histopathologic diagnosis of GBM, six biomarkers of BRAF mutation, TERT (telomerase reverse transcriptase) mutation, MGMT (O6-methylguanine-methyltransferase) methylation, EGFR (epidermal growth factor receptor) amplification, (isocitrate dehydrogenase) IDH1, and IDH2 mutation were checked. All the patients were followed for one year at 1, 3, 6, and 12 month visits after the operation.

Results: Eighteen patients with GBM including 8 female and 10 male patients were evaluated, whose the mean age was 48.5 (ranging from 28 to 69 years old). The extent of resection (EOR) ranged from 55% to 100% with the mean EOR of 77.5%. 2 patients died in the first month after surgery due to medical reasons. At the last follow up, (1 year) 14 patients were alive and 2 died from tumor progression. Among those who were alive, 11 patients had at least one reoperation for tumor re-growth, while 3 did not experience any clinical and/or radiologic evidence of tumor progression. All the three of these non-recurring patients had MGMT methylation and IDH1 mutation, whereas the other biomarkers were negative. Overall, MGMT methylation was negative in 5 cases (20.8%). Only four cases (16.6%) had TERT mutation, and none of them had EGFR amplification. IDH-1 mutation was observed in 45.8%, and IDH-2 mutation was not found in any of the patients. Mutation of BRAF oncogene was found in only one patient who was the single one and experienced early recurrence (1 month after first surgery) in our series.

Conclusion: Pathobiological biomarkers play an important role in integral management of patients with GBM. In this small series, the best clinical outcome was seen in patients with maximal resection who had MGMT methylation and IDH-1 mutation without EGFR amplification and TERT and BRAF mutations. The worst scenario was seen in one patient with BRAF mutation despite remarkable resection at the first surgery.

Keywords: Biomarker; Glioblastoma; Outcome

Current Endovascular Treatment of Acute Ischemic Stroke

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Abstract

Stroke is one of the main causes of death worldwide. It is the third leading cause of death in the United States, with more than 200,000 people dying from strokes each year. Stroke is also the main cause of devastating, long-term disability in North America and worldwide. Each year, 795,000 people suffer a stroke. About 600,000 of these undergo the first attacks and 185,000 suffer from recurrent attacks.

About 80% of all acute ischemic strokes are due to intracranial arterial occlusion, most commonly with thromboembolic sources. Revascularization of occluded territories is the cornerstone of acute ischemic stroke treatment, as it appears to be the most beneficial of all therapeutic strategies. Thrombolysis for ischemic stroke has been systematically studied in large randomized trials since the 1990s. To date, thrombolytic therapy for ischemic stroke has been investigated in over 25 randomized controlled clinical trials enrolling more than 9,000 patients.

Although the result of IMS-3 was very disappointing, the development of modern imaging technologies and sophisticated endovascular tools has revolutionized the treatment of acute stroke. Recent Multicentric RCTs like REVASCAT, SWIFT PRIME, ESCAPE, EXTENDED IA, and MR CLEAN all showed significant clinical benefits for the addition of intervention especially with Solitaire retrieval stent.

In patients with acute ischemic stroke due to large vessel occlusion rapid endovascular treatment using stent retriever is now the standard of the care.

In this survey, I will review current endovascular techniques and will critically compare the major related studies.

Keywords: Endovascular; Treatment; Stroke; Ischemic

The Analysis of the Angio-Architectural Factors Affecting Early and Late Clinical and Angiographic Outcome after Treatment of Brain Aneurysms Using Pipeline Flow-Diversion Stents

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Abstract

Background & Aim: Angio-architectural factors affecting early clinical and angiographic outcome after treatment of brain aneurysms using pipeline embolization device (PED) has not been fully studied.

Methods & Materials/Patients: Aneurysm size, aspect ratio (AR), aneurysm segment tortuosity (AST), aneurysm transition (junctional vs mid-segment), aneurysm-parent artery angle (APA), and the number of pipeline curvatures (after deployment) were evaluated to see their impacts on the primary outcome measure and early stagnation. Based on the duration of contrast stagnation inside the aneurysm after deployment of the pipeline, we graded stagnation status as follows: grade 1: arterial phase; grade 2: capillary phase; grade 3: venous phase; grade 4: persistence of crescent after end of venous phase, and grade 5: complete occlusion. Effect of aneurysm segment tortuosity on intraoperative and postoperative complications was further evaluated using a Chi2 method for the categorized data analysis. A multivariate analysis was also performed to report adjusted statistical outcomes.

Results: Forty-five patients were studied with fifty-six aneurysms with the mean age of 56.25 (± 9.74) years, of whom 84.9% were females, and a mean aneurysm size of 8.93 (± 6.11) mm and average aspect ratio (AR) of 1.75 (± 1.12) were included in this analysis. Larger size of aneurysm and higher aspect ratio were both significantly associated with higher grades of early stagnation in both crude and multivariate analysis ($p < 0.01$). On the other hand, aneurysm transition ($p = 0.892$), APA ($p = 0.513$), AST ($p = 0.337$), and the number of pipeline curvatures ($p = 0.592$) were not significantly associated with higher rate of early stagnation. Moreover, AST was not also significantly associated with intraoperative complications or postoperative neurological deficit ($p = 0.226$, $p = 0.259$, respectively). The Mean stagnation grade significantly increased from 3.54 in early postop period to 4.33 after a mean follow up of 5.14 months (Paired t-test $p < 0.01$). However, there was no significant association between early and late stagnation grades ($p = 0.17$).

Conclusion: Aneurysm size and aspect ratio are the only angio-architectural factors affecting the early stagnation status after treatment of brain aneurysms using flow diversion stents. Long term Follow up will be required to see if stagnation translates into continued occlusion of aneurysms.

Keywords: Aneurysm; Angioarchitecture; Outcome; Flow

Early Steps in Mechanical Thrombectomy at Mashhad University of Medical Sciences

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Abstract

Background & Aim: rtPA injection is a routine and common therapeutic approach in treatment of ischemic stroke patients. But its use has been limited because of contraindications and limited time span and because of low success in resolution of thrombus in MCA and ICA arteries. The novel and complementary approach is opening main arteries by mean of mechanical thrombectomy.

Methods & Materials/Patients: 22 patients with ischemic stroke underwent mechanical thrombectomy during January 2014 to July 2016 at Ghaem Hospital catheterization lab.

Results: Patients including 8 women and 14 gentlemen underwent thrombectomy. The mean age of patients was 58.5 years. Mean NIHSS and ASPECT of the patients were 17.1 and 6.2, respectively. Mean time of stroke accident to sheath insertion was 6.2 hours. Mean NIHSS and mean mRS, 72 hours later, were 11.6 and 3.3, respectively.

Conclusion: It seems that our results are in concordance with similar studies in the USA and European countries, that where reported 40 to 50 % success rate in their investigations.

Keywords: Thrombectomy; Mashhad University of Medical Sciences

360 Degree Procedure for Cervical Trauma (When, Why, Tips, and Tricks)

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Abstract

Many patients refer to our trauma center for spine injuries, and we have more patients with cervical trauma such as whiplash injuries, fracture, fracture and dislocation and finally some are with locked facet, which cannot be reduced with cervical traction even with maximal forces and then needs operation in one or two stages (360-degree procedure). There are many factors for deciding about the time and priority the anterior or posterior approaches. We report a series of 25 patients treated during the past 2 years and discuss the kind of operations and complications and some tips and tricks in managing of these patients.

Keywords: Cervical; Trauma; Fusion

Endovascular Treatments for Middle Cerebral Artery Aneurysms

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Abstract

We will review pertinent anatomic, clinical, radiological, and technical aspects of contemporary endovascular treatment of MCA aneurysms and will show different endovascular techniques, which may be used to treat either M1 segment or bifurcation MCA aneurysms through case presentations. Despite increasing acceptance by the neurosurgeons that endovascular embolization has been the preferred treatment strategy for most intracranial aneurysms since the publication of the International Subarachnoid Aneurysm Trial (ISAT), MCA aneurysms remain treated primarily by surgical clipping. Multiple factors contribute to the rationale for this treatment strategy, including the particular anatomic characteristics of these aneurysms (which often have wide necks and branches arising from the neck), a perceived long reach for endovascular catheters and devices, and the relative proximity of these aneurysms to the cerebral surface. As the endovascular devices and techniques continue to be improved and evolved at an incredible pace, some of these assumptions are being challenged by recent literature reports describing safe and effective endovascular treatment strategies for MCA aneurysms. Further technical developments in the field that can be anticipated in the near future are likely to make the case for endovascular treatment even more compelling.

Keywords: MCA; Endovascular; Treatment

An Educational Review of Post-surgical Neurovascular Complication Associated with Foramen Magnum Hemangiopericytoma

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Abstract

Background and Importance: Foramen magnum meningioma in our recent experience seems to be a benign pathology with a malignant behavior regarding its anatomical location, histopathology and neurovascular engulfment, but more exciting is another tumor located in foramen magnum indistinguishable from meningioma preoperatively (image-wised), which histopathologically designated as hemangiopericytoma. Frequently this mass is operated as meningioma and after histological diagnosis, the surgeon finds out the reality of tumor's nature. It is really believable that the diagnosis and management of foramen magnum meningioma or hemangiopericytoma are inclusive of insidious events, so we should have some factors in mind which impress treatment process and prognosis. These factors are age (middle age / old age), histopathology and opiate addiction of the patient. It seems to be productive if we reevaluate our experience and review a multispecialty literature content including anatomy, physiology and histopathology relevant to clinical course of these insidious presenting masses. The post-operative expected and unexpected events especially in opiate addiction should be emphasized.

Case presentation: A 44-year-old man presented with Progressive quadriparesis and headache recently. MRI showed a huge homogenously enhancing mass located in the ventral part of foramen magnum. We operated on the patient, by using Lt Far-lateral approach. The pathology was hemangiopericytoma. The patient got better until he was deteriorated at the end of the second week of postoperative period and became quadriplegic. MRI showed infarction in bilateral pericallosal territory. We evaluated the patient meticulously and considered the differential diagnosis and managed the patient.

Conclusion: we encountered cerebral venous occlusion (retrograde sagittal sinus thrombosis) postoperatively, which was related to anatomic outflow of cerebral veins despite adequate anticoagulant usage and high opiate addiction which increase the prevalence of vascular accident. In addition, the age of involvement is an important factor and whatever these tumors happen in lower age, the possibility of progressive signs, symptoms and deficit becomes more pre-op and post operatively.

Keywords: Hemangiopericytoma; Foramen Magnum; Cerebral Venous Occlusion; Age; Histopathology

Aneurysmal Subarachnoid Hemorrhage in Patients with very Small Aneurysms, Microsurgical Treatment versus Endovascular Treatment

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Abstract

Background & Aim: Treatments for intracranial aneurysms mainly include surgical and endovascular managements. There are many studies on large intracranial aneurysms, but the treatment of very small aneurysm is still a challenging topic in both surgical and endovascular management. The aims of this study were representing our experience and surveying management strategies for rupture of these aneurysms.

Methods & Materials/Patients: Patients with aneurysmal subarachnoid hemorrhage due to very small aneurysm (VS<3.5 mm) in anterior circulation are included in the study. The demographic data, complications, procedural-related death and overall outcome of these aneurysms were assessed. Outcome of patients was assessed using modified ranking scale (mRS) at 6 months by a postal questionnaire and telephone interview.

Results: From 49 patients with VS 18 cases underwent microsurgical treatment and 31 underwent endovascular therapy (EVT). There was no significant difference between microsurgical group and EVT group for age ($p=0.267$), sex ($p=0.180$), and thick SAH ($p=0.519$). The patients with clipping had more good WFNS than patients with EVT (100% v 68%, $p=0.007$). There was no difference in good outcome (mRS=0-2) between microsurgical and EVT groups (94% v 81%, $p=0.183$).

Conclusion: Despite EVT of very small aneurysms represent therapeutic challenge; our study showed that the outcome of EVT of these aneurysms was similar to microsurgical treatment.

Keywords: Very Small Aneurysm; Subarachnoid Hemorrhage; Outcome; Rupture; Neurosurgical Procedures; Endovascular Therapy

Enhanced Patient's Safety with Spinal Cord Protection in Spine Deformity/Spine Instrumentation Surgeries

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Abstract

Background & Aim: Iatrogenic paraplegia during spine surgery is a devastating complication. Preventing such complications is important. (IOM) serves to help such patients/surgeons with successful surgeries and better post-op outcome using the IOM modalities.

Methods & Materials/Patients: A retrospective data review was done on 153 consecutive patients. Somatosensory-Evoked-Potentials (SSEPs), Transcranial-Motor-Evoked-Potentials (TcMEPs), Electromyograms (EMGs) & Triggered-Electromyograms (TEMGs/screw stimulation) were studied.

Results: 153 patients (n=104 females, n=49 males) with average age of 17 years and cob-angle ranged between 40-140 degrees were studied. TcMEP changes were noticed in n=56, 36.6%. TcMEP change resulting from surgical maneuvers n=43, 28.10%. TcMEP changes resulted from direct injury to the cord n=16, 10.45% & mechanical intervention (decompression/hemivertebrectomy/correction) n=15, 9.80%. Mal-positioned screws n=12, 7.83%. Within this group n=9, 5.8% presented with both SSEP and TcMEP changes. Changes in TcMEP, due to anesthesia n=10, 6.53%. EMG irritation lasting >15 seconds in lumbar roots, n=14, 9.15%. Within this group, TcMEP drop noticed in 4 patients suggesting 25% predictability were observed. TEMG changes in n=81, 52.9%, where in n=42, 27.4% screws were <6mA. TcMEP change, n=12, 7.83%, all fell under this group of screws below 6mA. 3018 screws were placed in 153 patients with 19.73 screws/ patient. 89 screws, 2.94% fell under dangerous/severe category.

Conclusion: Our data showed that enhanced safety with comprehensive IOM in deformity surgeries, hence IOM was extremely important during such procedures.

Keywords: Intra-operative Neurophysiology Monitoring; Somato-Sensory-Evoked-Potentials; Transcranial-Motor-Evoked-Potentials; Spinal-cord-protection; Electromyograms; Triggered Electromyograms-Screw Stimulation

Challenging Issues of Thrombolysis with Alteplase in Iran

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Abstract

Thrombolysis with administration of intravenous (IV) recombinant tissue plasminogen activator (rtPA) has been performed in some tertiary care hospitals in Iran in recent decade. Ministry of Health and Medical Education of Iran has approved a new management strategy which covers the cost of Alteplase since 2015. This is a great advance in increasing the chance for Iranian stroke patients to get the treatment. Delay in performing triage and CT and laboratory tests is another limiting factor which can be decreased by defining special team members for thrombolysis. Most of the Iranian neurologists are not expert enough to perform the management. This limitation can be managed by continuous thrombolysis workshops. However, many of the Neurologists may not be interested doing the thrombolysis due to its risks and lack of financial benefits for responsible doctors. Most of the contraindications for thrombolysis with tPA originated as the exclusion criteria in the major stroke trials. These were derived from expert consensus for the National Institute of Neurological Disorders and Stroke (NINDS) trial. Despite the fact that the safety and efficacy of IV rtPA has been repeatedly confirmed in large international observational studies over the past 20 years, most patients with acute ischemic stroke still disappointingly do not receive thrombolytic treatment. Some of the original exclusion criteria have proven to be unnecessarily restrictive in real-world clinical practice. It has been suggested that the application of relaxed exclusion criteria might increase the IV thrombolysis rate up to 20% with comparable outcomes to thrombolysis with more conventional criteria. We review the absolute and relative contraindications to IV rtPA for acute ischemic stroke, discussing the underlying rationale and evidence supporting these exclusion criteria. There are two therapeutic strategies for selecting the contraindications and exclusion criteria. The first is ignoring some absolute or partial exclusion criteria as illustrated above. This method will increase the probability of symptomatic intracerebral hemorrhage and death and may increase the numbers of legal condemnations for treating physician. The second strategy is the prohibition of violations from standard protocols of thrombolysis which decreases both the numbers of managed patients and thrombolysis contraindications. Physicians who prefer the first therapeutic strategy refer to the data of published articles and guidelines of American and European stroke societies. There are two points of view; first, the Iranian neurologists do not have thrombolysis experience as well as western neurologists. For instance a low number of Iranian neurologists have enough experience for detection of ASPECT score. Second, due to some social factors, the number of legal needs, due to medical malpractice has hugely increased in recent two decades in Iran. Based on these points, the second strategy is wiser for Iranian neurologists. The speaker has made a standard protocol of thrombolysis based on international guidelines and his experience. This standard protocol which is designed according to the second strategy is available by search in Google engine and is provided in Persian language.

Keywords: Challenges; Thrombolysis

Three-dimensional (3D) ICG Angiography with the Hand-made Device: A Preliminary Report

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Abstract

Background & Aim: There are several methods for intraoperative assessment of flow and integrity of vessels during neurosurgical procedure. Indocyanin green (ICG) angiography is a common method used for this purpose. The microscopes equipped with camera detecting illumination of ICG are expensive. We assemble a hand-made device for ICG application and use it for 3D ICG angiography.

Methods & Materials/Patients: Our device constituted from two camera, special lenses and recorder. We add 3D lenses for 3D imaging. We use mouse omental vessel for imaging. With standard method mouse anesthetized and the omental vessel dissected. ICG injected and 3D ICG video angiography performed.

Results: We can record 3D ICG video angiography with acceptable results. To our best knowledge, this is the first report of 3D ICG angiography in the literature. In this examination we recognize some flaws in our device and our device is evolving.

Conclusion: Indocyanine green video angiography is a non invasive, easy to use and a very useful tool for various neurosurgical procedures. 3D ICG angiography help in better understanding of anatomy of cerebrovascular structure.

Keywords: ICG; Angiography; Intraoperative

Endoscopic Endonasal Approaches to the Craniocervical and Lower Clivus Region, Technical Aspects and Author's Experience

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Abstract

Access to the lesions which are located in the craniocervical and lower clival area have been defined as one of the most complicated and challenging operations in the neurosurgery. The multiplicity of the surgical mortality and morbidity in this area make the neurosurgeons have low interest to take part in the open surgical methods around the anterior cranicevical and clival area. Endoscopic endonasal techniques provide the safer route for landing and working in these cases. Although the primary learning curve seems to be long, after passing this stage, working on this area looks comfortable and easily accessible for the surgeon and is not "no man land" anymore. In this article we are going to explain our technical points and results for the ten cases who have been operated from 2013 to 2016 in our institute.

Keywords: Approach; Clivus; Endoscopy

The Prevalence of Vascular Pathologies in Patients with Vascular Lesions of Head, Neck and Spinal Cord, Referring to Endovascular Neurosurgery Department of Firoozgar Hospital

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Abstract

Background & Aim: Endovascular neurosurgery is widely accepted as a useful current modality for the management of neurovascular disorders. The aim of this retrospective study was to evaluate the causes of diagnostic and therapeutic neurovascular procedures, and the prevalence of vascular pathologies seen in these procedures.

Methods & Materials/Patients: Endovascular neurosurgery department of Firoozgar hospital is a referral center of neurovascular disorders from all of country. The activity of this center was started in February 2013 and has continued until now, as the most active center for the management of neurovascular disorders. In this study, we analyzed the causes and results of 761 neuroendovascular procedures done on 598 patients, during the 18 month period of February 2013 to September 2014 in Firoozgar Hospital in Tehran, Iran. The mean age of the patients was (44.83 ± 18.73) years and 50.3% of them were females.

Results: In total, 761 diagnostic and therapeutic neuroendovascular procedures were done on 598 patients in the first 18 months' activity of this center. The mean age of the patients was (44.83 ± 18.73) years and 50.3% of them were females. The most prevalent cause of these procedures was spontaneous intracerebral hemorrhages (27.6%). After that, ruling out vascular lesions (14.2%) due to suspicious MRI, and focal neurologic defects (11.2%) were the most common causes.

This study also showed that 26 out of 598 patients were treated for trigeminal neuralgia, 14 patients were treated for retinoblastoma, and 14 patients were treated for radiculopathies symptoms. The vascular angiographies done on the remaining 544 patients were due to diagnosis and treatment of vascular lesions of whom, 167 patients had normal angiographies and 377 patients had neurovascular pathologies. Intracranial aneurysms, AVMs and carotid stenosis formed respectively the most common types of vascular malformations in our study.

Conclusion: Descriptive studies are basic for the complementary research and evaluation of results in referral centers and other new centers. In the first 18 months of activity of our center, favorable results were obtained, since about 70% of diagnostic angiographies showed vascular pathologies.

Keywords: Endovascular Procedure; Vascular Malformation; Intracerebral Hemorrhages

The Endoscopic Resection of Third Ventricle Colloid Cyst in 120 Consecutive Cases

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Abstract

Background & Aim: Here we report a retrospective review of all patients treated for neuro-endoscopic removal of the third ventricular colloid cyst at Loghman Hakim and Day General Hospitals between 2003 and 2015. The patients' notes were reviewed to determine presenting conditions, treatment, morbidity and current functional and medical status.

Methods & Materials/Patients: The total number of 120 patients underwent neuro-endoscopic surgery in this interval. Of the patients, 69 were males and the other 51 patients were females. These patients ranged in age from 16 to 71 years (mean, 39.76 yr). The most common chief complaint was headache in 88%, followed by complaining of nausea and vomiting in 54%. Visual impairments, pupil edema and gait disturbance were the other common presenting conditions.

A rigid lens endoscope was used for all procedures. An entry site was selected with 5-6 cm anterior to coronal suture (at hairline), and 3-4 cm lateral to midline on frontal bone. More commonly, we entered lateral Ventricle from the right side (88%), but in some occasions the side of entrance was on left (12%).

Results: The operations were practiced in a range of 22 and 135 minutes with the mean time of 45 min. Two patients needed permanent shunting after removal of the cyst. Meningitis was seen in 5 patients. 2 of the patients had seizure that could be simply controlled. 32 of the patients showed small intra ventricular hemorrhage on the very first imaging post operation. Memory impairments or focal neurologic deficit were not reported about any of the patients.

Discussion: A colloid cyst, a neuro-epithelial originating cyst, is a slow-growing, benign tumor that occurs in the anterior third ventricle. The cyst typically blocks the foramen of Monro, causing obstructive hydrocephalus which involves the lateral ventricles. Several therapeutic options have been proposed as treatment of the 3rd ventricular colloid cyst by removing the cyst or relieving the hydrocephalus: non-surgical treatment with control of sequential images, shunting of cerebrospinal fluid (vp-shunting) and stereotactic aspiration or excision using endoscopic or microsurgical techniques

Conclusion: Our result showed a great success in neuro-endoscopic removal of the 3rd ventricular colloid cyst. The endoscopic approach to the treatment of colloid cysts was safe, effective and well accepted by patients.

Keywords: Third Ventricle; Colloid; Cyst

The Result of Interdisciplinary Surgical Approach to Enplaque Meningioma

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Abstract

Background & Aim: Sphenoid wing en plaque meningiomas are a subgroup of meningiomas defined by their particular sheet-like dural involvement and its disproportionately large bone hyperostosis. En plaque meningiomas represent 2-9% of all meningiomas, and they are mainly located in the sphenoid wing. Total surgical resection is difficult and, therefore, these tumors have high recurrence rates.

Methods & Materials/Patients: Seventeen patients with sphenoid wing en plaque meningiomas who were surgically treated with interdisciplinary approach with aggressive resection between January 2013 and December 2016 were included. Clinical, surgical, and follow-up data were retrospectively analyzed.

Results: The mean age was 52.2 years and 68% were females. 8 patients presented the extension of dural component into the orbit and 3 patients presented cavernous sinus infiltration. Two patients were recurrent cases. After a mean follow-up of 2 years, 2 patients developed tumor recurrence & two patients were submitted to surgical treatment. Immediately post operative proptosis wasn't seen in any of patients and visual acuity was similar to pre operative status in all cases and improved in one case. One patient died because of MCA injury during drilling of SOF. Patients without tumor extension to cavernous sinus or orbital cavity had the best prognosis treated with surgery alone. When tumor extension involves these locations, the recurrence rate is high, especially in cases not submitted to adjuvant radiation therapy.

Conclusion: Interdisciplinary surgical approach to enplaque meningioma and aggressive resection of orbital structure resulted in decline in recurrence, better cosmetic outcome and lower complications.

Keywords: Cavernous Sinus; Meningioma; Orbital Tumor; Proptosis; Sphenoid Wing

Effects of Cerebrolysin on Functional Recovery in Patients with Severe Disability after Traumatic Brain Injury; A Prospective Cohort Study

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Abstract

Background & Aim: An attempt was made To determine the effects of cerebrolysin on functional recovery in patients with severe disability after traumatic brain injury (TBI).

Methods & Materials/Patients: This was a prospective cohort study being performed during a 2-year period in a level I trauma center in Southern Iran including all the adult patients (>16 years) with severe disability (GOS of 2 and 3) 1-month after trauma. Patients received cerebrolysin (n=65) or nothing (n=64) based on their preference. They were matched regarding the baseline characteristics including age, gender, GCS on admission, pupil reactivity and Rotterdam score. Cerebrolysin was administered intravenously in 10 mL dosage daily for 30 days. Patients were followed for 3 and 6 months and Glasgow Outcome Scale Extension (GOSE) was recorded. The outcome scales were compared between the two studied groups.

Results: Overall, we included 129 patients with severe disability 1-month after TBI. The baseline characteristics were comparable between groups. We found out that GOSE in 3-months (p=0.017) and 6-month (p=0.009) was significantly higher in those receiving cerebrolysin. Cerebrolysin administration was associated with lower mortality rate, and higher good recovery after 6 months of therapy (p=0.024). Cerebrolysin administration was also associated with more favorable outcome (p=0.043). Cerebrolysin was associated with higher seizure rate (p=0.042).

Conclusion: Cerebrolysin administration in patients with severe disability after TBI is associated with improved functional recovery; It decreases mortality rate and increases favorable outcome. Seizure is important side effect of cerebrolysin administration in TBI patients.

Keywords: Traumatic Brain Injury (TBI); Cerebrolysin; Functional Recovery; Prognosis; Severe Disability

Restoration of Hand Function in People with Tetraplegia after Spinal Cord Injury

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Abstract

56% of spinal cord injuries result in quadriplegia, with C5 being the most common injury level. they will lose simple daily activities.

Increased arm and hand function is an important rehabilitation goal for most individuals with quadriplegia. Most of patients with cervical level SCI felt that gaining arm and hand function would significantly improve their quality of life and prioritized it over regaining sexual function, trunk stability, bowel and bladder control, and walking. Surgical techniques have been established to increase upper extremities function for these individuals. The use of traditional tendon transfers to improve upper extremity function in cervical spinal cord injury (SCI) patients is limited. So the use of peripheral nerve transfers in this setting is feasible and has a low perioperative complication profile.

Surgical techniques have been established to increase upper extremity function for tetraplegics, focusing on restoring elbow extension, wrist movement, and hand opening and closing. Additionally, more innovative treatments that have been developed (nerve transfers) provide more options for improving the function and quality of life.

The International Classification for Surgery of the Hand in Tetraplegia (ICSHT) was specifically developed to identify candidates for upper extremity restoration. This classification provides information about the number of voluntary muscles available for surgical transfer to provide another function lost due to paralysis. The strength of the key muscle for each level of the classification must be rated as grade 4 in order to receive that designation.

Keywords: Brachial Plexus; Injury; Hand; Restoration

Return to Work after Surgical Treatment for Subarachnoid Hemorrhage and Berry Aneurysm

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Abstract

Background & Aim: Surgical treatment for subarachnoid hemorrhage and berry aneurysm might have the following disability in some cases. Returning to work is a major fact in occupational medicine, and prevention of disability is important. the Objective of this study is the assessment of return to work after surgical treatment for subarachnoid hemorrhage and berry aneurysm.

Methods & Materials/Patients: In a review article with evidence based medicine, it was searched in special literature and scientific journals and websites such as national institutes for occupational safety and health, centers for disease control and prevention and return to work facts showed the important and useful results.

Results: Most patients in heavy physical work with surgical treatment for subarachnoid hemorrhage, and berry aneurysm needs at least the absence for two months, but some of the patients with lower symptoms could return to work after a few weeks. They are forbidden from doing some special and high risk work for two years in prevention from epileptic seizure and falling; such as work with moving machines, driving industrial automobile for example lift truck and jobs are done at height. After returning to work, patients must use personal protective equipment and devices such as special helmet or safety hat.

Conclusion: Return to work after neurosurgery could be done with some precautions and preventive methods.

Keywords: Return to Work; Subarachnoid Hemorrhage; Berry Aneurysm

Spinal Dural Arteriovenous Fistulas: Intraoperative Neurophysiological and Microvascular Doppler Monitoring

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Abstract

Background & Aim: Data on intraoperative neurophysiological (IOM) and microvascular doppler monitoring (IMDM) during microsurgical obliteration of spinal dural arteriovenous fistulas (SDAFVs) are lacking. The purpose of this study was to evaluate the role of IOM and IMDM during surgical treatment of SDAFVs.

Methods & Materials/Patients: From March 2007 to March 2013, 12 patients had microsurgery with IOM and IMDM for SDAFVs. The IOM included somatosensory evoked potentials (SEPs), motor evoked potentials (MEPs), and D-waves. All patients were evaluated at admission and at follow up (6,12 and 24 months) with the Aminoff-Logue Disability Scales (ALS) for Gait (G-ALS), Micturition (M-ALS) and Gait + Micturition (G+M-ALS).

Results: During surgery, we registered absence of significant modifications of evoked potential in 9 cases (75 %), while improvement of MEPs occurred in 3 cases (25 %). The mean score G+M-ALS before surgery was 6.00 ± 1.53 , whereas at 24 months follow-up there was a statistically significant improvement of 1.75 ± 1.12 ($p=0.03$). At univariate analysis, the G+M-ALS score was directly associated with duration of symptom before the surgery ($p=0.024$), higher preoperative G-ALS ($p=0.02$), M-ALS ($p=0.022$), G+M-ALS scores ($p=0.045$) and improvement of IOM after temporary occlusion of the fistula ($p=0.025$). In all cases, microDoppler confirmed the location of the fistula and revealed an arterial spectrum on the redundant dorsal medullary veins. After the clipping of the feeder of the arteriovenous shunt, the intraoperative monitoring documented a complete disappearance of the arterial spectrum and the reappearance of the venous pattern.

Conclusion: In our series no significant worsening of evoked potentials occurred and subsequently the surgical strategy was not changed by IOM. However, no false negative was registered and IOM predicted absence of new post-operative neurological deficit in all patients. Patients with improvement of IOM parameters after occlusion of the fistula have greater chances of postsurgical improvement. Intraoperative use of microDoppler is an easy, non-invasive monitoring technique. It confirms the interruption of the feeding vessels revealed by angiography and may prove useful where initial identification of the feeder is uncertain.

Keywords: Intraoperative; Doppler; Microsurgical; Dural Arteriovenous Fistula

Predictors for Development of Adjacent Segment Disease after Lumbar Fusion

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Abstract

Background & Aim: The degeneration at the mobile segment next to a lumbar fixed level leads to increased pain, revision surgery and costs. Understandings of the risk factors are important to determine the predictors and to improve the outcome.

Methods & Materials/Patients: The radiographs of patients who received the first lumbar fusion for degenerative indication were retrospectively assessed to examine sagittal parameters (pelvic incidence (PI), lumbar lordosis (LL) L1-S1 and L4-S1, pelvic tilt (PT), SVA, L4 slope) before and after fusion. The T test was used to evaluate the risk of developing ASD on the basis of one or more predictors.

Results: A consecutive series of 108 patients (65♀43♂) who had undergone lumbar spinal fusion of 2 or fewer segments to treat degenerative lumbar disease was identified. The mean age at index operation was 66 years, and the follow-up period was at least 2 years. All patients were treated by TLIF with posterior instrumentation. The development and changes of adjacent level including lumbar stenosis, disc degenerative changes and segmental instability was evaluated. ADS was identified in 15 cases. Revision was performed in 6 cases. In the group of ASD was the average of LL-PI= -14,3 (p=0.03) and the average of L4 slope= -10,7(p=0.05). In the asymptomatic group was the average of LL-PI=-8 (p=0.03) and the average of L4-slope -6.4 (p=0.04).

Conclusion: Patients with postoperative sagittal imbalance have a statistically significant increased risk of ASD. L4 slope and PI-LL was identifying as predictor for ASD in lumbar fusion.

Keywords: Adjacent Level; Fusion; Lumbar; Sagittal

Epilepsy Surgery: Perioperative Investigations of Intractable Epilepsy

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Abstract

Recent advances in our knowledge of the basic mechanisms of epilepsy have derived from increasing ability to carry out detailed investigations on patients surgically treated for refractory epilepsy. Clinical as well as experimental perioperative investigations divide into three phases: before the surgical intervention (pre-operative studies), during the surgical intervention (intra-operative studies), and on the period when the brain tissue that has to be removed is available for further studies (post-operative studies). Before surgery, structural and functional neuroimaging methods could be used to study the pathophysiological mechanisms of seizures in patients with intractable epilepsy. During epilepsy surgery, it is possible to insert electroencephalogram electrodes and microdialysis probes into the brain tissues to evaluate constituents of micromilieu and study brain bioelectrical activities. Surgical resection provides tissue that can be used for electrophysiological, morphological, and molecular biological investigations. To take advantage of these opportunities, carefully designed experimental and clinical protocols are crucial to compare the data from various studies to characterize abnormalities in the epileptic brain in order to improve our understanding of intractable epilepsy as well as brain function.

Keywords: Epilepsy; Intractable; Microdialysis

The Advantages and Limits of Virtual Magnetic Resonance Techniques in Planning Surgery for Microvascular Decompression

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Abstract

Background & Aim: The aim of this study was to evaluate the advantages and limits of virtual magnetic resonance techniques in planning surgery for microvascular decompression in patients with neurovascular conflict.

Methods & Materials/Patients: Between December 2010 and December 2011, we prospectively observed 32 patients (30 with trigeminal neuralgia and two with hemifacial spasm), with a suspected clinical diagnosis of neurovascular conflict. To assess the contact between nerve and vessel, magnetic resonance imaging (MRI) by three-dimensional (3D) constructive interference in steady state (CISS) and high-resolution MR angiography (MRA) were performed in all cases. Moreover, we performed presurgical simulation of microvascular decompression using MR two-dimensional image fusion and virtual cisternography. The neuroradiological findings were compared with the surgical findings.

Results: In all cases, we demonstrated the anatomical relations between cranial nerves and offending vessels with an optimal correlation between radiological and surgical patterns.

Conclusion: Advanced virtual MRI techniques, such as image fusion and virtual cisternography, are able to depict the complex anatomical relationships between neural and vascular structures within the cisternal spaces of the skull base. These techniques can be considered an optimal presurgical tool to support traditional MRI evaluation of this region.

Keywords: Microvascular Decompression; MRI; Outcome; Surgery

Early Tracheostomy in Patients with Severe Traumatic Brain Injury; A Cohort Study from a Level I Trauma Center

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Abstract

Background & Aim: Early tracheostomy has been shown to be effective in reducing complications associated with prolong mechanical ventilation of the trauma patients. Although several studies have addressed the role of early ET in management of patients with multiple trauma, data in patients with severe traumatic brain injury (TBI) is scarce. The aim of the current study was to determine the role of ET in outcome of patients with severe TBI.

Methods & Materials/Patients: This prospective cohort study was conducted in a 2-year period from 2012 to 2014 in Rajaei Level I trauma center (Shiraz). We included patients with severe TBI (GCS<9) who were admitted to our center during the study period. The short-term (hospital and ICU length of stay, mortality rate, ventilator associated pneumonia) and functional (Glasgow outcome scale extended) was compared between those who underwent early (≤ 6 day) or late (> 6 days) tracheostomy.

Results: We included 152 patients with mean age of 39.14 ± 19.2 years. There were 136 (89.5%) men and 16 (10.5%) women among the patients. Overall 53 (34.9%) patients underwent early and 99 (65.1%) late tracheostomy. The hospital length of stay (46.4 ± 11.6 vs. 38.6 ± 9.4 days; $p=0.048$), ICU length of stay (34.9 ± 10.4 vs. 26.7 ± 8.4 days; $p=0.003$). However we could not find any significant difference between two study groups regarding the ventilator associated pneumonia rate ($p=0.492$), mortality rate ($p=0.996$) and 6-month functional outcome ($p=0.346$).

Conclusion: Early tracheostomy in patients with severe TBI is associated with decreased hospital and ICU length of stay but does not affect the mortality rate, ventilator associated pneumonia and final functional outcome.

Keywords: Traumatic Brain Injury; Early Tracheostomy; Functional Outcome; Short-term Outcome

Venous Respect in Meningioma Surgery

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Abstract

Background & Aim: The purpose of this presentation to present our data in evaluating whether venous indocyanine green (ICG) videoangiography has any potential for predicting the presence of a safe collateral circulation for veins that are at risk for intentional or unintentional damage during surgery.

Methods & Materials/Patients: We performed venous ICG videoangiography during 153 consecutive neurosurgical procedures. On those occasions in which a venous sacrifice occurred during surgery, whether that sacrifice was preplanned (intended) or unintended, venous ICG videoangiography was repeated so as to allow us to study the effect of venous Sacrifice. A specific test (clipping test) to predict the presence of venous collateral circulation was also applied in 21 of these cases.

Results: Venous ICG videoangiography allowed for an intraoperative real-time flow assessment of the exposed veins with excellent image quality and resolution in all cases. The veins observed in this study were found to be extremely different with respect to flow dynamics and could be divided in 3 groups: 1) arterialized veins; 2) fast-draining veins with uniform filling and clear flow direction; and 3) slow-draining veins with nonuniform filling. Temporary clipping was found to be a simple and reversible way to test for the presence of potential anastomotic circulation.

Conclusion: Venous ICG videoangiography is able to reveal substantial variability in the venous flow dynamics. "Slow veins," when they are tributaries of bridging veins, might hide a potential for anastomotic circulation that deserve further investigation

Keywords: Meningioma; Venous; Outcome; Surgery

Therapy of Cerebral Aneurysms from a Hybrid's Point of View (Why to Acquire Experience in both Techniques?)

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Abstract

Some of us may remember the first appearance of endovascular techniques for the treatment of aneurysms. After the inconclusive detachable balloons in the 80s and free coils shortly after, Guglielmi's detachable coil system and the successors allowed for a reasonable packing of those aneurysms showing a shaped and narrow neck. For all other aneurysms, surgery remained the treatment of choice, until the keystone study ISAT influenced the opinion of the neurovascular community towards "endovascular therapy for brain aneurysms whenever possible".

To overcome the drawbacks of aneurysm architecture unfeasible for simple coil packing, several supportive techniques were developed, like remodelling balloons, temporarily placed in the parent artery; or stents, permanently deployed in the parent vessel across the neck to prevent coils from bulging into the vessel's lumen. Improvements in stent technology, like micro-porous or close-meshed stents raised expectations for intelligent flow diversion, blocking the flow into the aneurysm while keeping arterial branches open. But the need for high grade and long term anticoagulation due to the endovascular stent material stands in contradiction to the therapeutic goal of aneurysm cure, i.e. thrombosis of the aneurysm. Furthermore it was shown, that the development of endothelium on the inner stent surface is hindered if the stent is not in contact with the vessel wall, thus making the abdication of anticoagulation questionable. Therefore recent developments of endovascular devices designed to bridge broad aneurysm necks try to minimize the amount of metal in the vessel lumen or to reduce the time of disposition, thereby reducing the level of anticoagulation and the inherent risks. The opinion that today every brain aneurysm can be successfully embolized as long as the most sophisticated tools are used, is widely promoted, not only by commercial advertisements.

Vascular Neurosurgery had lost the former priority for brain aneurysm treatment, at least since the ISAT study, especially in centers without a large neurovascular caseload. Consequently, training capacity and also experience and skills were widely lost. Even if today the majority of aneurysms can be treated successfully by embolization, a certain percentage of cases with complex anatomy would, if embolized, require the use of multiple stents and therefore take significant risks. In many of those cases, the microsurgical way could provide a stable result without the need for long-term anticoagulation. However, the argument for such endovascular therapeutic decision frequently is surgical reluctance!

Personal experience in both techniques may increase the awareness of this situation; but today the insight is increasing also in Vascular Neurosurgery. Comprehension arises for the need to promote training programs in aneurysm surgery in centers of competence to provide patients with high quality surgery for those cases where it – for the time being – represents the safer and more reliable therapy.

Keywords: Cerebral Aneurysm; Treatment

“Endovascular Neurosurgery”

A Fiction or a Forward-looking Concept?

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Abstract

Neurosurgery, like other surgical disciplines, has during the past years developed branches, where beside open surgery (microsurgery) other techniques are in use. Examples are Functional Neurosurgery or Endoscopic Neurosurgery. The driving force behind this development was the intention, to find approaches to deep seated fragile structures by the least invasive way. Applying those techniques, the Neurosurgeon has learned, to focus a screen while maneuvering his instruments, a technique already experienced while working through a microscope, where the movements of the fingers are not controlled by direct sight. Endovascular work, i.e. the approach to a certain spot inside the lumen of a vessel through the endovascular route, is a similar technique, allowing to reach the target through a minimal invasive, non traumatic way.

When endovascular techniques for cerebro-spinal territories arose in the 70-ties, the approach by puncture of the femoral artery in the groin was not commonly in use. Cerebral angiography (an important and frequently used technique before the age of CT and MR) was performed in Vienna through puncture of the carotids (and vertebrals!) done by Neurosurgeons. Consequently, around 1980 the first endovascular approaches through these vessels were done by Neurosurgeons. In Europe, during the following years mainly (Neuro)Radiologists, but also some Neurologists were attracted by this new technology. The tools used were balloons and liquids, the targets mainly AVM's and fistulas. Aneurysms did not show stable results with those tools.

In those days, AVM and Aneurysm surgery represented the “crown discipline” in Neurosurgery. Vascular Neurosurgeons needed outstanding skills and great experience to clip complex aneurysms and to resect AVM's of all types. Was it this status or the high challenge what let the majority refuse to accept the new “endovascular approach”?

Consequently, in Europe endovascular treatments were further developed and applied by Neuroradiologists, a subspecialty of Radiology. Only in few places, like in Vienna, Neurosurgeons succeeded to develop and perform neuro-endovascular procedures by themselves.

The current situation (as described in my first presentation) shows the necessity for neuro-endovascular therapy by neurosurgical hands in a different light. The overwhelming appearance of new endovascular tools, many of them requiring long term anticoagulation, may bring decision making for brain aneurysms out of balance, eventually resulting in an endovascular treatment with a higher risk level than microsurgery.

The key to avoid such situations is the detailed knowledge about the advantages and pitfalls of each tool. Perfect bilateral knowledge can only be acquired by bilateral personal and practical experience. Whereas the acquisition of such dual training is standard in other continents, in Europe there is a certain reluctance from the side of Radiology to let Neurosurgeons systematically undergo endovascular training. Nevertheless, there is light on the horizon: The Neurosurgical community, especially colleagues with special vascular interest, have understood, that dual training is not only the key to remain involved into vascular therapy, but also a way to offer to patients balanced therapeutic proposals.

Organizations like sections of EUMS and recently ESMINT have started to build bridges and to create training concepts to provide structured education in technical Neuroradiology for Neurosurgeons and neuro-clinical elements for Neuroradiologists. But this are just first steps on a way to a balanced decision making for the therapy of brain aneurysms. Today, for the young Neurosurgeon with the aim to become a vascular Neurosurgeon, the way must be to get dual training on a personal basis, in places accepting devoted Neurosurgeons. A second, but not less important step is, to create structured access for (finally trained) Neurosurgeons to angiography units in their home- hospitals.

Keywords: Endovascular; Neurosurgery; Microsurgery

Biocompatibility Evaluation and Clinical Investigation of Novel Synthetic Bone Graft Substitute, OsvehOss®

A Prospective, Randomized Study with a 6-month Follow-up

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Abstract

Bone grafts after blood transfusion are second place in organ transplants in the world. In recent years, importance of bone grafts in fractures, delay union, mal union and bone defects is progressively take attention in clinical fields. The iliac crest bone grafting (ICBG) technique for lumbar posterolateral fusion surgery is widely used; however, donor site problems such as pain and sensory disturbance have been reported. Local bone is available for fusion surgery, but its reliability as a graft has not been fully reported. In addition, there has been a focus on finding suitable substitutes for autogenous iliac crest bone graft to promote spine fusion. The selection of a specific bone graft substitute can be a daunting task for the surgeon. In current single blind random assigned clinical trial study, we examined single level instrumented posterolateral fusion with OsvehOss® bone grafts (OBG) versus MBCP (synthetic bone grafts with similar structure) (MBG) in a prospective randomized study. In this research, 19 patients diagnosed with L4-L5 degenerated spondylolisthesis underwent instrumented posterolateral fusion with an OBG (L4-L5 level, left) and MBG (L4-L5 level, right). Radiologic and clinical outcome and postoperative complications and transfusion time were investigated. Study result showed that one and three months later post-operative based on radiography, there was higher ossification and fusion rate on OBG group than similar products. No complications were observed in the OBG and MBG group. Clinical investigations confirmed the potential of OsvehOss® synthetic bone grafts in success of spinal fusion surgery.

Keywords: OsvehOss®; Synthetic Bone Grafts; Clinical Investigation; Spine Fusion

Transnasal Endoscopic Approach to the Cavernous Sinus Cavernous Hemangioma: A Case Report with Favorable Outcome

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Abstract

Background & Importance: Cavernous hemangiomas within the cavernous sinus (CHCS) are different from cerebral cavernous malformations clinically and radiologically, and in favor of their responses to the treatment. Complete removal through a trans-cranial route often causes ocular motor palsies. Since the cranial nerves in the cavernous sinus are lateral to the carotid, a medial approach to the cavernous sinus may be less traumatic to the cranial nerves.

Case Presentation: A 23 year-old man with mild right side ptosis, intermittent visual obscuration, with MRI demonstrating a pure right cavernous sinus enhancing mass.

Intervention: A near total removal of a cavernous sinus hemangioma was performed through an extended endoscopic transnasal approach.

Conclusion: In our study, we realized that a near total resection of a CHCS via an extended endoscopic transnasal approach can highlight the importance of advances in minimal invasive neurosurgery to the treatment of such complicated lesions of the skull base. The endoscopic transnasal approach to the medial cavernous sinus may be more favorable than the transcranial route based on the lateral location of the cranial nerves.

Keywords: Cavernous Sinus; Cavernous Hemangioma; Transnasal; Endoscopic Surgery

Primary Central Nervous System Melanomatosis; a Case Report

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Abstract

Primary melanoma is a rare tumor of central nerves system (CNS). We presented a 14-year-old girl with history of headache and progressive paraparesis. Brain and spine MRI showed diffuse leptomeningeal involvement with contrast enhancement. Definite diagnosis was made according to the results of open biopsy of the arachnoid and nerve roots in lumbar spine. Diffuse meningeal melanomatosis and nerve roots invasion was seen in the pathology. The patient was alive only six months later.

Keywords: Melanoma; CNS; Biopsy

Clinical Outcome for Surgical Treatment of Chiari Type 1 Malformation in Symptomatic Adult Patients

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Abstract

Background & Aim: Chiari malformation type 1 is characterized by more than 5 millimeter downward displacement of the cerebellar tonsils from foramen magnum.

Methods & Materials/Patients: In a retrospective study, 46 adult patients (16 female and 20 men) with clinical and radiologic signs of Chiari malformation type 1 were entered to our study between April 2009 and March 2015. They were all examined, diagnosed and operated (suboccipital decompression with or without duraplasty) in Ghaem hospital, Mashhad, Iran. Primary presentation and clinical outcome were reviewed in 24 patients that were subsequently followed.

Results: Mean age of our patients were 36.4 years (range 18-52 years). Median duration of symptoms before the surgery was 50.12±63.6 months. Headache and neck pain and sensory deficit were the most common clinical presentations. At follow up, 83 percent of patients (18/24) had good clinical outcome. Statistical analysis revealed no statistical difference between suboccipital decompression surgery with duraplasty and without duraplasty. (P=0.82) Postoperatively, headache and neck pain and voice abnormality showed highest improvement.

Conclusion: Although Chiari Malformation is not common, the disease should be consider in the differential diagnosis in patients with nonspecific headache and neck pain. Clinical outcome in the patients is favorable.

Keywords: Chiari Malformation Type 1; Suboccipital Decompression; Outcomes; Complications,

Rare Case of Filum Terminale Artery Aneurysm after Spinal Myxopapillary Ependymoma Surgery

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Abstract

Background and Importance: Spinal myxopapillary ependymomas (MPEs) are slowly growing ependymal gliomas with preferential manifestation in young adults. Aneurysms of spinal arteries after tumor surgery are uncommon. As our knowledge there is no report about aneurysm of feeding arteries in spinal tumors. We describe a 10 years old boy with ependymoma that developed feeding artery aneurysm after tumor resection.

Case presentation: A 10-year-old boy with no history of any disease referred to our center with complaint of back pain radiated to the left leg and gradually distributed to both legs. Preoperative MRI showed a tumor in L2-L3 segments. Patient underwent spinal surgery and tumor resection. Pathological evaluation of the tumor revealed myxopapillary ependymoma. Six months later, patient came with back pain radiating to both legs with no other neurological deficit. Postoperative MRI revealed a spinal mass located in L2-L3 segments (the same location of his myxopapillary ependymoma). The second surgery and pathology study showed an aneurysm of filum terminale artery in the site of last spinal myxopapillary ependymoma surgery.

Conclusion: Myxopapillary ependymoma is a type of spinal cord tumor that most commonly arises in the lumbosacral spinal cord and filum terminale. Aneurysm in the filum terminale arteries is rare. Clinicians should consider it in recurrent low back pain after tumor surgeries in spine.

Keywords: Aneurysm; Ependymoma; Filum Terminale

Fuzzy Based Prediction of Modified Rankine Scale (mRs) of Patients With Intracranial Aneurysm

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Abstract

Background & Aim: Subarachnoid hemorrhage (SAH) resulting from ruptured intracranial aneurysm (IA) is a still major cause of death and disability. Early prediction of outcome after SAH lacks accuracy since there are many factors and uncertainties in the patient's clinical status. It is essential to determine the severity of SAH for managing the surgical procedures. Statistical techniques cannot process these uncertainties simply. Fuzzy logic approach can be used as an efficient predictor.

Methods & Materials/Patients: This study was conducted retrospectively in 423 patients who admitted to Ghaem hospital of Mashhad with the diagnosis of SAH due to IA between December 2012 and April 2016. The patients were assessed by ten significant variables; including World Federation of Neurological Surgeons scale (WFNS), rebleeding before operation, age, severespasm, External Ventricular Drainage (EVD), ischemia, modified Fisher scale (mFisher), infection, hydrocephalus and the operation method whether it was clipping or coiling. The fuzzy system predicts modified Rankine scale (mRs) based on table look up scheme which converts conscious and subconscious knowledge of the expert into fuzzy IF-THEN rules.

Results: In this study, 300 patients is used for constructing the fuzzy rule base and 123 patients were assessed for verification of the fuzzy system. Fuzzy logic predictions correlate with the patients' real mRs.

Conclusion: Accurate and early outcome prediction of the patient is necessary for any medical decision making. It is investigated that the outcome of the patient with IA could be predicted efficiently by fuzzy logic methodology. Thus, this research can pioneer new studies in neurosurgery area.

Keywords: Subarachnoid Hemorrhage; Intracranial Aneurysm; Fuzzy Based Prediction; Modified Rankine Scale

Neurovascular Surgery in Shiraz; 10 Years of Subspecialty Experience

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Abstract

The Surgical treatment of neurovascular diseases in Shiraz has been carried out for more than 50 years. But since 2006, Shiraz department of neurosurgery started subspecialty program. Since then, more than 1000 patients with neurovascular diseases have treated in this department. Annually about 100 patients with intracranial aneurysms, 15 patients with arteriovenous malformations (AVMs) and 150 patients with hypertensive intraparenchymal hemorrhage are treated surgically, and about 20 patients with neurovascular anomalies are treated through endovascular approaches. Currently Shiraz Namazi Hospital has turned to the referral center for neurovascular diseases of southern areas of Iran. The neurovascular surgery department is equipped with 2 intensive care units (ICU) with 10 beds in each and a 30 bed ward. The neurovascular operating room is fully equipped with high-tech surgical microscope (ICG Angiography), microneurosurgery set, bypass set, vascular clip set and intraoperative Doppler sonography. Endovascular procedures are performed in Namazi Cat. Lab, which is equipped with digital subtraction angiography machine in collaboration with neuroradiologists and cardiologists. The results of the patients are favorable and comparable to the international literature.

Keywords: Neurovascular; Surgery; Epidemiology

Endovascular Coiling versus Neurosurgical Clipping in Patients with a Ruptured Basilar Tip Aneurysm

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Abstract

Background & Aim: This study was conducted to compare endovascular coiling with microsurgical clipping of ruptured basilar bifurcation aneurysms.

Methods & Materials/Patients: Patients and aneurysms characteristics, procedural complications, and clinical and anatomical results were compared retrospectively in 22 coiled patients, and 22 patients were treated by clipping. The odd ratios for poor outcome (Glasgow outcome scale 1, 2, 3) adjusted for age, clinical condition, and aneurysm size was assessed by logistic regression analysis.

Results: In the endovascular group, 11% of patients had a poor outcome v/s 30% in the surgical group; the adjusted odd ratio for poor outcome after coiling v/s clipping was 0.28 (95% confidence interval, 0.08 to 0.99). Procedural complications were more common in the surgical group. Optimal or suboptimal occlusion of the aneurysm was achieved in 93% of patients immediately after coiling. Clipping was successful in 91% of patients.

Conclusion: The results suggest that endovascular coiling should be the preferred treatment for patients with ruptured basilar bifurcation aneurysms.

Keywords: Coil; Clipping; Aneurysm; Basilar Tip

Unruptured Vertebral Artery Dissecting Aneurysms

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Abstract

Background & Aim: The natural course of unruptured vertebral artery dissecting aneurysms (VADAs) remains unclear. The purpose of this retrospective study was to develop a strategy for treating unruptured VADAs based on a long-term follow-up.

Methods & Materials/Patients: Our study population consisted of 100 patients with unruptured VADAs; in 66 patients, the initial symptom was only headache, 30 patients presented with ischemic symptoms, and 4 patients presented with mass effect. All patients underwent magnetic resonance imaging and magnetic resonance angiography at the time of admission, and at the intervals of 2 weeks and 1, 3, 6, 12, and 24 months. If the dissection site was demonstrated to be enlarged on magnetic resonance imaging and magnetic resonance angiography without the manifestation of new symptoms, the patients received additional treatment to prevent bleeding.

Results: Of the 30 patients, 4 underwent early intervention because of symptom exacerbation. The other 96 were initially treated conservatively; during the follow-up, 5 manifested lesion enlargement on magnetic resonance angiography. Nine patients received additional treatment; 1 underwent direct surgery with the trapping of the dissection site, and 8 underwent coil embolization. The other patients continued to be treated conservatively; the dissection length remained unchanged in 22, improved or healed in 5 patients, and disappeared in 1 patients. We treated patients with recurrent ischemic attacks with antiplatelet therapy. None of the patients experienced bleeding or permanent neurological deficits during the follow-up.

Conclusion: The nature of an unruptured VADA is not highly aggressive. However, if the dissection site enlarges without the manifestation of new symptoms, it should be occluded. In patients with recurrent ischemic attacks, antiplatelet therapy should be considered.

Keywords: Cerebrovascular Disease; Dissection; Vertebrobasilar Disease

Recanalization after Endovascular Treatment of the Intracranial Aneurysms

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Abstract

Background & Aim: The aim of this study was to evaluate the outcome of endovascular surgery; aneurysm regrowth, recanalization and need for re-embolization.

Methods & Materials/Patients: A retrospective analysis was performed on 64 aneurysms, which have been treated by endovascular surgery from 2011 to 2016. Of those aneurysms 44 were asymptomatic and 20 were ruptured. The risks of endovascular therapy, aneurysm regrowth, recanalization and the need for remobilization were evaluated.

Results: The mean observation time was 13 months (ranging from 180 days to 420 days). Complete occlusion at initial intervention was achieved in 50 of 64 aneurysms (78%), 80-85% occlusion was seen in 9 aneurysms (14.2%), <80% occlusion in 5 aneurysms (7.8%). Among 50 aneurysms with complete occlusion, 3 (6%) showed recanalization or neck regrowth at follow up. Among partially occluded aneurysms, 2 (14.2%) showed recanalization or neck regrowth. 2 (40%) of 5 aneurysms with less than 80% occlusion, underwent recoiling.

Conclusion: The initial degree of aneurysm occlusion seems to have an influence on likelihood of recanalization.

Keywords: Recanalization; Endovascular; Aneurysm

Complex Cerebrovascular Lesions in Children

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Abstract

Background and Importance: Vascular lesions are rare pathologies that affect the blood vessels in the brains of newborns, infants, and growing children. Their symptoms tend to appear rather abruptly, and the condition can be alarming and potentially life-threatening. Unfortunately many of them do not have clear treatment. We here present 3 cases that presented with unusual and challenging vascular lesion.

Case presentation

Case 1: A 2-year-old girl that referred to our clinic with complained of large head circumference. She had mild developmental delay and a head size more than average normal age. In her brain sonography she had an external hydrocephalus. After several examinations, we detected an unusual form of occipital arteriovenous malformation and an abnormal connection to galenic venous system, which caused venous hypertension. Unfortunately we were not able to treat the patient because of complexity of the lesion.

Case 2: A 5-year-old girl presented with intermittent claudication. She had the history of progressive neurological symptoms from 5 months ago. Brain MRI revealed a frontoparietal vascular lesion, which was angiographically occult. The lesion had widely extended to the corpus callosum and deep cerebral structures. After several investigations and consultation with neurovascular surgeons, podiatrists and oncologists, we started high dose of intravenous corticosteroid for her with good clinical response.

Case 3: The parents of a 2-day-old boy consulted with us about because of high cardiac output heart failure. In his brain sonography, a vascular lesion with the proximity to the galenic structure was detected. After vascular workup, a high flow lesion with multiple arterial flow to aneurysmal galenic venous system was found. The patient was treated with endovascular approach successfully.

Conclusion: Intracranial vascular lesions of pediatric age group are rare, but they usually emerge abruptly and need careful diagnosis and treatment. For treatment of these lesions, the case should be decided individually.

Keywords: Complex; Cerebral Vascular Lesion; Pediatric

Pial Arterio-Venous Fistula (AVFs): A Complex Pial AVF in a Young Girl

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Abstract

Background and Importance: Arteriovenous fistula is a rare type of vascular malformations, which occurs due to direct connection between cerebral or dural arteries with great veins or sinuses.

Intracranial pial arteriovenous fistulas (AVFs) are rare cerebrovascular malformations. Pial AVFs have poor natural history, the clinical suspicion of pial AVFs, followed by prompt appropriate treatment is important. Here, we present a case of pial AVF in a 9-year-old girl that was treated surgically.

Case Presentation: Our case was a 9-year-old girl that developed with sudden onset decreased level of consciousness during playing in school. In our hospital, she was admitted with GCS as 6/15. In her first brain CT scan, she had intraventricular hemorrhage and hydrocephalus. She also had abnormal vascular lesion in frontotemporal area. So ventriculoperitoneal shunt was placed. After the good postoperative care in neurocritical care units, she underwent spiral brain CT angiography, and a giant abnormal vascular malformation in right frontotemporal area was detected. After detailed vascular studies, a large abnormal connection between pial arteries and a cortical vein was detected. Finally with the impression of pial, AVF craniotomy was done and, after microsurgical dissection, successful obliteration of fistula was carried out.

Conclusion: Intracranial pial AVFs are comprised of a single venous channel in communication with one or more arterial connections from pial or cortical arteries, and, unlike true cerebral arteriovenous malformations, they do not have a true intervening nidus. According to a series reported by Halbach, pial AVF accounts for 1.6% of all intracranial vascular malformations. They have a single or multiple arterial connections to a single venous or sinus channel. They differ from dural AVFs in that they derive their arterial supply from pial or cortical arteries and are not located within the dura mater. Pial AVFs can be congenital (because of different origins of vascular supply of paky and leptomeninge) or result from a traumatic injury. Abnormal angiogenesis may play a role in the formation of pial AVFs, and it is also possible that an embryological misstep could produce these lesions. Early diagnosis and treatment of the lesion are critical points in this pathology.

Keywords: Arteriovenous Fistula; Microsurgical Treatment

Ossification of Ligamentum Flavum with Myelopathy Diagnosis and Outcome, a Case Series

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Abstract

Background & Aim: The Ossification of the ligamentum flavum is a known cause of myelopathic condition. The most common sites of ossification are the thoracic and cervical regions. There is not a distinct border between ossified and calcified cases.

Methods & Materials/Patients: We studied 11 patients with ossification of ligamentous flavum retrospectively presenting with myelopathic symptoms. Patients were assessed preoperatively by using computerized tomography scanning and magnetic resonance imaging. All patients underwent decompressive laminectomy along with complete excision of the ossified segment. Patients were followed up for a mean of 3 years.

Results: The Mean age of the patients at the time of operation was 6.1 ± 56 years. The mean (SD) duration of symptoms before operation was 4.9 ± 29 months. Simultaneous disc herniation was found in three patients (27%). All patients had motor involvement at the time of the surgery; sphincter involvement was found only in three patients (27%). Laminectomy was done for all patients. At the final follow up, JOA (Japanese orthopedic association) recovery score showed excellent results in 5 patients (46%), good in 4 (36%), fair in 1 (9%), and poor result in one patient with adhesion to the dura.

Conclusion: Axial MR images are suitable to determine the side of involvement, while sagittal images are good to determine the longitudinal extension of ossification. There was not any deterioration or recurrence of symptoms during midterm post-operative follow-up. Complete decompression of the canal with ligamentum flavum thinning without rupturing the dura is a predictor of favorable midterm results.

Keywords: Ossification; Ligamentum Flavum; Myelopathy

Introducing a New Sign in Cervical Spinal Cord Injury

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Abstract

Clinical signs are an important part of the evaluation of a patient and his/her disease course. Although in modern era tremendous technological developments have obviated this demand particularly in critical conditions, it is still an irrevocable part of any clinical examination.

We are going to present cases of mid- and high cervical spinal cord injuries for which tracheostomy has been applied for better respiratory care and is supporting with mechanical ventilator. In such a condition, the patients, who are completely alert and have no possibility to communicate, use their mouth, lips and tongue to make sound and call their relatives or medical care personnel. The sound produced, in our culture (Iranian) is usually used for the presentation of sorrow. We also noticed that the final outcome of these groups of patients was poor and most of them had no motor improvement and were ventilator dependent, so we called it "sorry sign".

Keywords: Cervical Cord; Injury; Sign

The Effect of Local Steroid Injection on Prevertebral Soft Tissue Swelling Following Anterior Cervical Discectomy and Fusion

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Abstract

Background & Aim: Prevertebral soft tissue swelling (PSTS) following anterior cervical surgery, may proceed to airway compromise which is potentially lethal. We plan to evaluate the effect of local steroid injection to reduce PSTS after anterior cervical discectomy and fusion (ACDF).

Methods & Materials/Patients: This randomized clinical trial was conducted in Shohada Tajrish Hospital between February 2015 and December 2015. Seventy-six patients who underwent ACDF involving one to three segments due to radiculopathy or myelopathy were enrolled and randomly divided to two groups. Patients in the case group (N=38) received local injection of 80 mg methylprednisolone in operation site, while no similar intervention was done for the control group (N=38). Prevertebral soft tissue thickness to mid anteroposterior vertebral body diameter (S/V) ratio was defined to assess PSTS. Patients in both groups underwent simple lateral cervical radiography before operation, and also immediately after operation, on days 1, 2, 5, 7, 14 and also at the end of the 6th month. In addition, dysphagia and pain at surgery site was evaluated using Bazaz dysphagia scale and Visual Analogue Scale (VAS) respectively, on 1st, the 5th and 10th post-operative days. Data were analyzed by using statistical T-student, Chi-square and Mann-Whitney tests. Also, Tukey-Kramer method was used to compare PSTS at different time points.

Results: S/V ratio in C3 to C7 showed no significant difference in both groups on pre-operative day. In the case group, S/V ratio in C3 and C4 was significantly lower immediately after operation compared to control group (P value <0.05). On the first post operative day, S/V ratio was significantly lower in C3 to C5 in the case group. We observed significantly lower S/V ratio in all studied vertebrae, except C6 on the second postoperative day in the case group. On the 5th post operative day, the same results were observed as they were on the first post operative day in the case group. On the 1st and 2nd post operative weeks, the ratio in the case group was significant for C4 and C6 in comparison to control group. Although no significant difference for S/V ratio of C7 in the 1st post operative week was observed between the two groups, the mentioned ratio was significantly lower in the 2nd postoperative week in the case group. At the end of the 6th month, there was no significant difference for S/V ratio in any level in two groups. The Severity of dysphagia was significantly lower on the 1st, 5th and 10th post operative day in patients in case group. (P value<0.05) Also, patients in the case group experienced significantly less severe odynophagia on the 1st, 5th and 10th post-operative day, which was assessed by VAS. (P value<0.05)

Conclusion: The use of local methyl prednisolone in prevertebral space is a simple and effective method to reduce PSTS and the severity of dysphagia and odynophagia. Furthermore, this method was not associated with any adverse effects.

Keywords: Prevertebral Soft Tissue Swelling; Anterior Discectomy and Fusion; Local Steroid Injection; Visual Analogue Scale

The Value of Partial Thromboplastin Time and Prothrombin Time in Functional Outcomes in Patients with Aneurysmal Subarachnoid Hemorrhage

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Abstract

Background & Aim: Partial thromboplastin time (PTT) and prothrombin time (PT) are elevated during acute stages of aneurysmal subarachnoid hemorrhage (SAH) and may be associated with poor functional outcomes. However, the mechanism, in which PTT and PT elevation on admission affects functional outcomes, remains unknown. The aim of this study is to clarify whether PTT and on admission are correlated with systemic complications after aneurysmal SAH, and to investigate their additive predictive value on conventional risk factors for poor functional outcomes.

Methods & Materials/Patients: In a cohort study, a total number of 150 patients with aneurysmal SAH from Isfahan, the central province of Iran were retrospectively analyzed. The Correlations of PTT and PT on admission with patient characteristics, initial presentation, neurological complications, and systemic complications were identified. We also analyzed the additive value of PTT and PT elevation on admission for poor functional outcomes by comparing predictive models with and without PTT and PT.

Results: PTT and PT elevation on admission was associated with increasing age, female sex, and severity of SAH. The Patients with higher PT and PTT had increased the likelihood of nosocomial infections ($P = 0.03$), serum sodium disorders ($P = 0.02$), and cardiopulmonary complications ($P = 0.01$) on multivariable analysis. PTT and PT elevation was an independent risk factor of poor functional outcome ($P = 0.01$).

Conclusion: Elevated PTT and PT on admission were independently correlated with systemic complication, and had an additive value for outcome prediction on conventional risk factors after aneurysmal SAH.

Keywords: Subarachnoid Hemorrhage; Partial Thromboplastin Time; Prothrombin Time

Cavernous Hemangioma of Cavernous Sinus, Report of 3 Cases

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Abstract

Cavernous hemangiomas which occur within the cavernous sinus, are different from cerebral cavernous malformations (CMs) clinically, on imaging studies, and in their response to treatment. Cavernous hemangiomas very rarely occur in the cavernous sinus and are difficult to diagnose preoperatively.

We have studied 3 cases of cavernous hemangioma of cavernous sinus. In one case there was a huge intracranial cavernous hemangioma with extracranial invasion to the skin. We discussed the sign and symptoms, radiologic features, surgical technique and outcome of patients.

Keywords: Cavernous Malformation; Cavernous Sinus

The Utility of Dual-Energy Computed Tomographic Angiography for the Evaluation of Brain Aneurysms after Surgical Clipping: A Prospective Study

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Abstract

Background & Aim: The purpose of this prospective study was to compare a novel dual-energy CTA (DECTA) method for the post operative assessment of clipped brain aneurysms to detect aneurysm remnants and parent artery patency, with catheter-based digital subtraction angiography (DSA).

Methods & Materials/Patients: Patients who underwent microsurgical cerebral aneurysm repair were prospectively evaluated after surgery by both DECTA and conventional DSA. CTA was performed using a novel dual-energy method with single source and fast kilovoltage switching (Gemstone Spectral Imaging, GSI). DSA was performed by using biplanar cerebral angiography. An experienced neuroradiologist and neurosurgeon both blinded to the original radiological results reviewed the images.

Results: Patients who underwent microsurgical cerebral aneurysm repair were prospectively evaluated after surgery by both DECTA and conventional DSA. CTA was performed using a novel dual-energy method with single source and fast kilovoltage switching (Gemstone Spectral Imaging, GSI). DSA was performed by using biplanar cerebral angiography. An experienced neuroradiologist and neurosurgeon both blinded to the original radiological results reviewed the images.

Conclusion: Dual energy CTA is a promising non-invasive alternative to conventional catheter-based angiography for the identification of aneurysm remnants and assessment of adjacent arteries following the surgical clipping of brain aneurysms treated by two or fewer clips. It allows for far more rapid image acquisition than DSA, and is more cost effective; moreover, it is widely available at clinical centers.

Keywords: Aneurysm Clipping; Computed Tomographic Angiography (CTA); Digital Subtraction Angiography (DSA); Dual Energy

Cavernous Malformation of Anterior Perforating Substance Presented as Olfactory Epilepsy and Sudden Paresis

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Abstract

Background & Aim: Olfactory epileptic auras are rare, constituting about 0.9% of all auras, and are typically considered unpleasant. They have usually been associated with tumors, but, in some recent studies, they have not. In very rare condition it can be associated with cavernous malformation that is located at olfactory pathway.

Methods & Materials/Patients: A young man presented with acute mild right hemiparesis and history of transient unpleasant odor for several years. Imaging shows a heterogeneous interparancymal hemorrhage in medial temporal lobe compatible with anterior perforating substance area.

Results: The patient underwent surgery and a small rubbery mass totally resected. Hisopathologic sytudy confirmed cavernous malformation. 3 months after surgery, hemiparesis completely recovered and olfactory epileptic was not repeated.

Conclusion: This report shows olfactory epilepsy as an unusual presentation of cavernoma. Regarding anatomy, any abnormality in olfactory pathway can be manifested as olfactory epilepsy.

Keywords: Olfactory; Epileptic Aura; Cavernous Malformation

Surgical Treatment of Vertebral Artery-posterior Inferior Cerebellar Artery Junction Aneurysms; Outcome of 4 Patients

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Abstract

Background & Aim: The management of vertebral artery-posterior inferior cerebellar artery (VA-PICA) saccular aneurysms is challenging because of anatomy and function of posterior circulation. The aim of our study was to evaluate the outcome of patients with VA-PICA saccular aneurysms after treatment.

Methods & Materials/Patients: This was a retrospective series of 4 patients with a VA-PICA saccular aneurysm operated at our institution.

Results: Among 4 patients, 2 patients presented with subarachnoid hemorrhage, and 2 patients had non-specific presentation for aneurysms. In one case, we sacrificed nondominant vertebral artery and in 1 patient, aneurysm was ruptured during surgery and clipped but the patient died because of locked-in syndrome and pulmonary thromboembolism 3 weeks after surgery, and 3 cases were discharged without new neurological deficit.

Conclusion: VA-PICA aneurysms are rare and require multidisciplinary management. Microsurgical treatment should be discussed when the PICA originates from the aneurysmal neck and when aneurysm is located at dominant vertebral artery.

Keywords: Vertebral; Artery; Posterior Inferior Cerebellar Artery

Hemorrhagic MCA Aneurysm Mimicking Brain Mass

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Abstract

A 53 year old Iraqi man with headache and right hemiparesis was evaluated with brain CT scan and MRI. In imaging hemorrhagic mass was found in left frontotemporal heterogeneous hemorrhage and peripheral edema in CT scan and mix hyperintence to isointence signal in T1 imaging and mix hypointence to hyperintence signal in T2 imaging. He referred for surgery with primary diagnosis of brain tumor. In brain CT angiography a MCA bifurcating aneurysm with superior projection was found and then, with left pterional approach, clipping was done. He was discharged 1 week later with good recovery in follow-up.

Vascular evaluation is necessary in hemorrhagic mass for vascular etiology.

Keywords: Headache; Hemiparesis; CT Scan; MRI

The Assessment of Clinical Benefits and Accuracy of the Neuronavigation in Neurosurgery

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Abstract

Background & Aim: Neuronavigation improves intraoperative topographical orientation in neurosurgery. We wanted to have better definition of practical value of this technique in relation to the pathology operated on and the types of cranial and spinal surgery which may benefit the most from it.

Methods & Materials/Patients: Twenty-five patients with pituitary tumors, 14 Trigeminal Neuralgia (TN), 6 with Hemifacial Spasm (HFS), 10 patients with the skull base tumors, 4 vascular cases, and 30 patients with spinal problem requiring the spinal instrumentation underwent preoperative 3TMRI, which included thin-sectioned 3D space T2, 3D Time of Flight and MPRAGE sequences for brain cases and Thin-sectioned CT scan in spinal cases. An independent expert neuroradiologist reviewed images. Imaging sequences were loaded in BrainLab iPlanNet or Stryker for segmentation and pre-op planning. After the patient's registration at the intra-op neuronavigation system and surgical exposure, each segmented neural or vascular element was validated by manual placement of the navigation probe. In cases of pituitary tumors, the pulses of the bilateral ICA were confirmed via using micro-doppler.

Results: In skull base tumors, strong correspondence between image-based segmentation and microscopic view was found at the surface of the tumor and tumor-normal brain interfaces in all cases. The accuracy of the measurements was 0.45 ± 0.21 mm (mean \pm SD). In TN and HFS, Perfect correspondence was found between image-based segmentation and endoscopic and microscopic images and videos (Dice coefficient of 1). Measurement accuracy was 1 ± 0.21 mm (mean \pm SD). Pre-operative segmentation of the ICA and cavernous sinus matched with the intra-operative endoscopic and micro-Doppler findings in all cases. The measurement and directional errors were less than 1 mm in cases of spinal instrumentation. Radiation dose was significantly less when using navigation in spinal instrumentation.

This information reassured the surgeon and prevented from vascular injury intraoperatively. Preoperative segmentation of the related cranial nerves was possible in 80% of cases and helped the surgeon localize the involved cranial nerves in all cases.

Conclusion: Neuronavigation, especially with image-based pre-operative vascular and neural element segmentation with 3D reconstruction is highly informative preoperatively and could increase the vigilance of neurosurgeons for preventing from neurovascular injuries during different varieties of neurosurgical cases. It significantly increases the accuracy of pedicular screw and decreases the radiation dose. Additionally, the accuracy found in this study is superior to previously reported measurements. This recommendation applies to any neurosurgeon familiar with the technique and managing neurosurgical cases requiring precise topographical orientation where normal anatomic landmarks are missing.

Keywords: Neuronavigation; Neurosurgery; Benefit; Clinical

Cavernous Malformation of Upper Midbrain Presented as Horror and Sympathetic over Discharge

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Abstract

Background & Aim: Recent advances in microsurgical techniques facilitate surgical resection of brainstem lesions, which were previously considered inoperable. In this article we have presented a usual presentation for cavernous malformation of upper midbrain and explain our surgical approach for her.

Methods & Materials/Patients: A 13-year-old girl presented with a history of acute progressive quadriparesis. On magnetic resonance imaging, a relatively large cavernoma involved the upper midbrain. After recovery, she experienced attacks of hypertension, tachycardia, horror and agitation and hyperhidrosis. We operated her through transallosal-transinterforncial approach.

Results: The total removal of the lesion was achieved and the histopathological findings were consistent with a cavernoma. The preoperative signs and symptoms were noticed 3 months after surgery without new neurological deficit.

Conclusion: This report shows unusual presentation of brain stem cavernoma and show direct surgical removal of a cavernous hemangioma in the midbrain via this approach and can be useful in some cases that may be unavailable through classic approach to upper midbrain.

Keywords: Microsurgical; Resection; Brainstem Lesions

The Endoscopic Management of Pineal Region Tumors and Associated Hydrocephalus in Loghman Hakim Hospital between 2009 and 2013

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Abstract

Background & Aim: Obtaining an adequate tissue sample for histological diagnosis is an important aspect of treatment planning for pineal region tumors. Open craniotomy can be applied; however, the risk of permanent associated morbidity approaches 10%. Stereotactic biopsy sampling is a less invasive technique, but sampling error, due to the heterogeneous nature of tumors in the region, has been noted to be a significant problem. Neither of these procedures, however, especially addresses hydrocephalus associated with mass in this area.

Methods & Materials/Patients: This study is a type of studies collection case-series and the Hospital Base. All of the patients with hydrocephalus were diagnosed with physical examination and imaging techniques ventriculomegaly. Tumor markers such as alpha fetoprotein and human chorionic gonadotrophin beta of blood samples of patients are captured. In this case, the negative markers of patients undergoing surgery of neuroendoscopy were noted. Outcome of surgery included bleeding, infection, mortality, need for open surgery, and the need for shunt insertion in hydrocephalus patients. Symptoms before discharge were considered and included in the data collection forms.

Results: ETV and biopsies were carried out in 25 patients (10 women and 15 men) with tumors of the pineal with hydrocephalus, with a median age of 18 years and mean age of $25 \pm 19/3$ years (minimum 5 and maximum 65 years). 16 patients (64%) had no complications during and after ETV surgery did not show, 9 patients (36%), intraoperative and postoperative complications in patients follow up were different. In this study, mortality rate was zero. 12 patients (48%) of patients with germ cell tumors, gliomas, 10 patients (40%) and 3 patients (12%) had ependymoma.

Conclusion: Due to the lack of mortality in the patients and the reduction of the side effects during and after the use of the surgical technique ETV, this technique can be a safe method of surgery in the pineal gland tumor combined by hydrocephalus.

Keywords: Endoscopy; Pineal; Tumor; ETV

Challenges in Treatment of Carotid-ophthalmic Aneurysms; the Report of 2 Cases

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Abstract

Background & Importance: Aneurysms of the carotid-ophthalmic artery present unique challenges to cerebrovascular neurosurgeons given their proximity to vital anatomic structures. Surgical clipping of ophthalmic segment aneurysms is more technically challenging than the other anterior circulation aneurysms.

Case Presentation: We reported 2 cases of ophthalmic artery aneurysm with 2 different presentations; one of them presented with subarachnoid hemorrhage and the other was an incidental finding in MRI.

Conclusion: Surgical approach and techniques used during operation and its complication and challenges about decision making and choosing best treatment were studied.

Keywords: Aneurysm; Carotid-ophthalmic Artery; Cerebrovascular

Study of Cerebral Venous Sinus Thrombosis Patients with Interventional rtPA Method at Mashhad University of Medical Sciences

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Abstract

Background & Aim: CVST is a neurologic emergency that leads to high morbidity and mortality. There is no approved definite therapeutic approach for CVST patients, but interventional rtPA injection is one of the methods, which is still under investigation.

Methods & Materials/Patients: Three patients with refractory CVST (patients with no clinical or imaging improvement after 48 hours of anticoagulant therapy) from October 2014 to May 2015 underwent the intrasinal rtPA injection.

Results: One of the patients fully recovered, one patient died and one of them has been in persistent vegetative state.

Conclusion: Investigations around the world shows contradictory outcomes in morbidity and mortality, and it seems it needs further investigations especially in refractory patients.

Keywords: CVST; rtPA; Intervention; Mashhad University of Medical Sciences

Decision-making for Diagnosis and Management of Hemorrhagic Cystic Lesions in Eloquent Area of the Brain

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Abstract

Background and Importance: Eloquent areas of the brain are classically defined as the part of the brain and the brain-stem which cannot be easily manipulated because of the high possibility of the development of one or several new neurologic deficits or even life-threatening complications.

An example of an eloquent area is the anteromedial part of the posterior-fossa (CPA - premeatal region) which is composed of compactly aggregated vital structures, including cardio-respiratory centers, long tracts and cranial nerves nuclei. The development of a cystic hemorrhagic lesion of any size in the posterior-fossa (if tolerated by the patient before diagnostic and therapeutic maneuvers) will be potentially fatal if any careless manipulation is done. We want to present our case and also recommend a logical step-wise approach to reach a fruitful outcome.

Case presentation: A 48-year-old woman referred with headache, unsteadiness, and ataxia, frequent vomiting, right-facial and sixth-nerve paresis and hearing difficulty. In her brain CT scan and MRI, a round well-defined lesion of about 8 cm³ containing fluid-fluid level without hydrocephalus was found in the left side of the brain stem premeatally. Despite the wide spectrum of differential diagnosis after excluding the vascular lesions with normal brain CT-angiography, we focused on hydatid cyst, hemorrhagic arachnoid cyst and tumor cyst; we finally decided on stereotactic aspiration and cyst wall biopsy as the best management approach, which was successfully done. We aspirated 9 mL liquefied bloody fluid and we washed the cyst with 7 mL hypertonic saline to rich the clear washed fluid. Cytological and histopathology studies were negative for malignancy and the patient recovered completely during the first day after operation and was discharged with acceptable post-op brain CT. We will follow up our patient one month later by brain MRI.

Conclusion: The main etiologic causes of such cystic lesions in posterior-fossa are vascular lesions, hemorrhagic arachnoid cysts and hydatid cysts; however, acoustic tumors and congenital cystic lesions should also be of primary consideration, which each of them has its own characteristic therapeutic options. So when we encounter any round cystic lesion of the brain stem we should have in mind these differential diagnosis and we should do logical step-wise approach to get the best result.

Keywords: Eloquent Areas; Hemorrhagic; Cystic Lesions

The Utility of Dual-Energy Computed Tomographic Angiography for the Evaluation of Brain Aneurysms after Surgical Clipping: A Prospective Study

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Abstract

Background & Aim: The purpose of this prospective study was to compare a novel dual-energy CTA (DECTA) method for postoperative assessment of clipped brain aneurysms to detect aneurysm remnants and parent artery patency, with catheter-based digital subtraction angiography (DSA).

Methods & Materials/Patients: Patients who underwent microsurgical cerebral aneurysm repair were prospectively evaluated after surgery by both DECTA and conventional DSA. CTA was performed by using a novel dual-energy method with single source and fast kilovoltage switching (Gemstone Spectral Imaging, GSI). DSA was performed by using biplanar cerebral angiography. An experienced neuroradiologist and neurosurgeon both blinded to the original radiological results reviewed the images.

Results: On DSA, 8 out of 15 aneurysms (53%) had a remnant after clipping. All of these remnants were <2 mm except one. The only residual aneurysm >2 mm was clearly detected by GSI CTA. Of those 7 DSA-confirmed <2 mm remnants, 5 were detected by GSI CTA. Metal artifacts compromised the image quality in 2 cases. The sensitivity and specificity of GSI CTA for remnant aneurysm <2 mm detection in single clip-treated patients were 100%. In all patients, these were 71.4 % and 100%, respectively. GSI CTA was 100% sensitive and 77% specific to detect parent vessel compromise, with associated positive and negative predictive values of 60% and 100%, respectively.

Conclusion: Dual energy CTA is a promising non-invasive alternative to conventional catheter-based angiography for the identification of aneurysm remnants and assessment of adjacent arteries following surgical clipping of brain aneurysms treated by two or fewer clips. It allows for far more rapid image acquisition than DSA, which is more cost effective, and is widely available at clinical centers.

Keywords: Aneurysm Clipping; Computed Tomographic Angiography (CTA); Digital Subtraction Angiography (DSA); Dual Energy

The Rare Case of Filum Terminale Artery Aneurysm after Spinal Myxopapillary Ependymoma Surgery

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Abstract

Background and Importance: Spinal myxopapillary ependymomas (MPEs) are slowly developing ependymal gliomas with preferential manifestation in young adults. Aneurysms of spinal arteries are uncommon after tumor surgery. As our knowledge, there is no report about aneurysm of feeder artery in spinal tumors. We describe a 10-year-old boy with ependymoma that developed feeder artery aneurysm after tumor resection.

Case presentation: A 10-year-old boy with no history of any disease referred to our center with the complaint of back pain radiated to left leg and gradually distributed to both legs. MRI, which was performed before surgery, showed a tumor in L2-L3 segments. The Patient underwent spinal surgery and tumor resection laminectomy and then resection of tumor during surgery. Pathological tumor evaluation revealed myxopapillary ependymoma diagnosis of tumor. Six months later, the patient came to us with back pain that radiated to both legs but with no other neurological deficit. Performed MRI revealed a spinal mass located in L2 L3 segments (the same location of his myxopapillary ependymoma). The Second surgery and pathology study showed an aneurysm of filum terminal artery in the site of last spinal myxopapillary ependymomas surgery.

Conclusion: The most common site of myxopapillary ependymoma tumor in spinal cord is lumbosacral and filum terminal. Aneurysmal artery in filum terminal is a rare case that clinicians should consider in recurrent of low back pain after tumor surgeries in spine.

Keywords: Spinal Myxopapillary Ependymomas; Aneurysm; Filum Terminale

The Assessment of Incidence Trend of Aneurysmal Subarachnoid Hemorrhage (aSAH), Five Consequent Years. Experience in Fars

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Abstract

Background & Aim: Aneurysmal subarachnoid hemorrhage (aSAH) is a ruing event with a high rate of morbidity and mortality. aSAH plays an important role in the loss of potential life as its sufferers are usually of young age. We aimed to investigate the incidence trend of aSAH in Fars- a large province located in the south of Iran.

Methods & Materials/Patients: In this prospective study the data of all diagnosed referred aSAH patients in Fars province, were collected prospectively after the patients' admission, and after surgery anonymously. The data of the last national country census were used for calculation of incidence. The data were analyzed using SPSS software version 16. The significance level was set at 0.05.

Results: According to the official estimation of population size from March 21, 2011 to March 20, 2016 (equal to 5 successive solar years), the incidence of aSAH was 1.653, 1.701, 1.706, 1.816, 1.672 per 100000 persons respectively, and the differences were not significant (p value >0.05). The trend of incidence of aSAH was relatively stable; however, in 2014 the incidence was a little higher than that in the other years. There was no significant difference between the prevalence of risk factors in different years Diabetes Mellitus (DM) (p value= 0.51), smoking (p value=0.21), HTN (p value=0.19)).

Conclusion: The Evaluation of incidence or incidence trend of aSAH in other geographical areas of Iran as a multi-center study is recommended. There is necessary to identify the major bottle necks in referring patients with primary symptoms of aSAH(which occurs as sentinel headache) and to sensitize health care workers and primary health care workers for risk of re-bleeding and even death after sentinel headache.

Keywords: Incidence; Subarachnoid Hemorrhage; Aneurysmal; Iran

Intraoperative Neurophysiological Monitoring in Spine Surgery in Shiraz University of Medical Sciences

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Abstract

Intraoperative neurophysiological monitoring (IONM) is a technique which has been used to assess the functional integrity of the nervous system during the spine surgery. Using current multimodality monitoring techniques has made it possible to intraoperatively assess the functional integrity of efferent ventral spinal cord motor tracts, afferent dorsal sensory spinal cord tracts, and nerve roots that cause a reduction in postoperative neurological complications. The well-trained neuromonitoring team was able to coordinate activities with those of the surgical and anesthesia teams and to provide the surgeon feedback in the real time for preservation of the neural function during the spine surgery. Somatosensory evoked potentials (SSEPs), transcranial motor evoked potentials (Tc-MEPs) and spontaneous electromyography (sEMG) were the most frequently used modalities for spinal procedures. SSEPs assess the functional integrity of sensory pathways from the peripheral nerve through the dorsal column to the sensory cortex. The selective and specific assessment of the functional integrity of descending motor pathways, from motor cortex to peripheral muscles, is performed by using MEPs. In order to monitor selective nerve root function during spinal cord surgery, sEMG was used. In contrast to the data taken from MEPs and SSEPs, sEMG was “real-time” recording from peripheral muscles. In this study, we report the results of 10 patients who went spine surgery using intraoperative neurophysiological monitoring in Chamran Hospital, affiliated to Shiraz University of Medical Sciences.

Keywords: Monitoring; Neurophysiologic; Spine

Aneurysmal Subarachnoid Hemorrhage, Surgical Results

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Abstract

Background & Aim: Subarachnoid hemorrhage (SAH) caused by the rupture of intracranial aneurysms is a devastating event. One of the standard and major treatments for intracranial aneurysms is craniotomy. The aim of this study was to represent the clinical results of microsurgical clipping approach in management of cerebral aneurysmal SAH in our hospital.

Methods & Materials/Patients: This retrospective study was conducted in 162 consecutive patients with SAH undergoing clipping of ruptured aneurysm, between March 2011 and December 2015. The following data of patients were collected from patients' charts: age, sex, the level of consciousness classified by WFNS grading, pattern of SAH in admitted CT-scan, aneurysm characteristics in CT-angiography or cerebral DSA. Modified Rankin Scale (mRs) was assessed at the discharge time and 6 months later by a postal questionnaire and telephone interview.

Results: In total, 131 patients (81%) had good WFNS (grade 0-3) and 31 (19%) had poor WFNS. A total of 142 (88%) patients had one aneurysm and 20 (12%) had multiple aneurysms. Thirty-seven patients (23%) experienced complication during the surgery. In 162 patients treated by microsurgery, 19 (12%) suffered from infection, 8 (5%) suffered from severe vasospasm, and 21 (13%) ischemia; moreover 15 patients (9%) underwent external ventricular drain (EVD). Twelve patients (7%) had hydrocephalus and 9 (6%) required a ventriculo-peritoneal shunt for the management of hydrocephalus. In total, 110 patients (68%) had good prognosis (mRs 0-2) and 52 (32%) had poor outcome. Out of 131 patients with good WFNS, 84% had good mRs. Twenty five patients (15%) died. The poor outcome was associated with poor WFNS, occurrence of ischemia, and high modified Fisher.

Conclusion: This study showed that patients with WFNS grade 0-3 aneurysms could undergo successful clipping microsurgery after SAH.

Keywords: Aneurysm; SAH; Surgery

ICG Angiography of Cerebral Vessels in Cadaver with the Hand-made Device

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Abstract

Background & Aim: Neuroanatomical and microsurgical training have become an important part of neurosurgical training. The knowledge of the complex anatomy of the cerebral vasculature coupled with a precise and accurate microsurgical technique is the mainstay for success in cerebrovascular surgery. ICG is a valuable tool to assess intraoperative details in vascular neurosurgical procedures. The objectives of this study were to use ICG angiography to image cadaver brain vascular system.

Methods & Materials/Patients: The fresh brain of cadavers was extracted and the vessels were injected with ICG. The imaging with the hand-made device equipped with 3D lens performed after the dissection. We introduced a new technique for ICG application in the cadaver.

Results: We recorded ICG angiography video of cerebrovascular structure. This was the first report of ICG application in the cadaver brain. The images were very useful for learning anatomy of cerebrovascular structure.

Conclusion: The knowledge of microvascular anatomy of the brain needs to be understood for diagnosis and microsurgery of brain vascular disease. ICG angiography of cadaver may help students and residents for better understanding of anatomy.

Keywords: ICG; Angiography; Cerebral

Giant MCA Aneurysm Advance Clipping

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Abstract

Giant intracranial aneurysm is defined as the one larger than 2.5 cm in diameter. Giant aneurysms represent 2% to 5% of all intracranial aneurysms. Most patients who become symptomatic in the fourth through sixth decades of life are found in all locations; 5-18% of them presented in middle cerebral artery (MCA) morphology. Morphology of giant aneurysms can be either fusiform or saccular.

Significant proportion of giant aneurysms has been associated with intraluminal thrombosis. As many as 60% in some series may initially be evaluated for SAH, signs and symptoms related to a mass effect develop in approximately two thirds. Mass effect can be manifested as pain, visual field and acuity defects, and extra ocular dysfunction. Dementia and mental disturbances, as well as hemiparesis and epilepsy, have also been described.

Current treatment options for these lesions include direct surgical techniques, endovascular techniques, and combined approaches. Indirect surgical techniques include proximal occlusion and trapping of the aneurysm using clips or ligature above and below the lesion. If the patient is unable to tolerate occlusion of the parent vessel in relation to a giant aneurysm, an extracranial to intracranial bypass procedure can be performed with subsequent trapping or proximal occlusion of the vessel.

A 32-year-old woman presented with acute severe headache and mild hemiparesis in emergency ward. Her brain CT scan showed subarachnoid hemorrhage with giant right temporal mass effect. Brain MRI and angiography showed partial thrombosed giant aneurysm without visible neck.

The patient was checked in supine position and slight head rotation and extension. Curvilinear right incision, then pterional craniotomy was done and then dura was opened. After that, brain relaxed with CSF drainage. Sylvian cistern was opened widely. Then with intermittent proximal control neck dissection was done and clipping with advanced clipping (creeping) was done little by little and then after the removal of temporary clip, the aneurysm wall and clot was resected and then the papaverin used. Patient was recovered and post-operative CT angiography showed any residue or vessel compromise.

Keywords: MCA; Aneurysm; Giant; Clipping

The Traumatic Aneurysm of Internal Carotid with Epistaxis after Basilar Skull Fracture

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Abstract

The posttraumatic aneurysm of the internal carotid artery (ICA) is an uncommon but potentially fatal cause of epistaxis. The majority of patients are the development of delayed, massive epistaxis. Time course for presentation of delayed life-threatening epistaxis ranged from 5 days to 9 weeks. Patients exhibited the classic triad of unilateral blindness, orbital fractures, and massive epistaxis. We present two traumatic aneurysm with delayed epistaxis.

Case 1

An 18-year-old boy with diffuse axonal injury and base skull fracture was admitted in ICU and then was discharged after 40 days, he presented with recurrent massive epistaxis without ocular symptom. In workup was found to be saccular aneurysm in left intracavernous portion that was clipped successfully

Case 2

A 20-year-old girl with base skull fracture, after 4 weeks, presented massive epistaxis with transfusion in ENT ward. In workup, we found aneurysm in ascending segment of intracavernous internal carotid that projected into sphenoid sinus. She was treated with initially endovascular approach, which was unsuccessful and was then treated with carotid endovascular entrapment

Keywords: Trauma; Aneurysm; Epistaxis

Neglected Conus Filum Terminalis AVM in the Setting of the Patients with Lumbar Canal Stenosis

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Abstract

Vascular malformations of the spinal cord and dura compose 3-4% of spinal cord masses. Due to their rare nature, these lesions are not often considered in the differential diagnosis of patients presenting with spinal cord masses or progressive myelopathy.

Our patient was a 56 year old man that underwent lumbar spine laminectomy because of signs of canal stenosis 5 years ago. After surgery, his signs and symptoms progressed. The Forces of lower limbs decreased and finally his gait was disturbed and sphinctric incontinency appeared. On examination, Babinski sign and paraparesis were seen. The patient underwent W/U and MRI revealed degenerative changes in lumbar spine and signal changes in lower thoracic spinal cord and conus. In our W/U, AVM was detected on spinal arteries angiography. He was candidate for surgery. We saw vascular malformation of filum terminale and low lying of conus. Because of degenerative changes and instability of lumbar spine we did fusion and fixation in addition to resection of AVM. After surgery, the signs and symptoms of the patient improved.

Therefore, in patients with myelopathy or spinal cord masses, vascular malformation is one of DDxs, which we have not missed.

Keywords: AVM; Filum Terminal; Lumbar

Auditory Brain Stem Implant in Neurofibromatosis Type 2 Patients; the Review of 11 Patients

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Abstract

Background & Aim: Neurofibromatosis type 2 (NF2) is an inherited disease which cause benign Schwann cell tumors on many cranial nerves, in particular on the vestibular portions of the VIIIⁿ bilaterally. In these patients bilateral hearing loss is frequently caused by the disease or results from its treatment. Auditory brain stem implant (ABI) has been developed to restore serviceable hearing in these patients. We report our experience and results by using ABI in 11 patients with bilateral vestibular shwanowa causing deafness.

Methods & Materials/Patients: Patients underwent surgery for resection of tumors via retrosigmoid approach and after resection of second tumor ABI was placed in the lateral recess of fourth ventricle. We evaluated demographic data including age at implantation, the number of tumor resections before implantation, tumor size, surgical approach, and postoperative surgical complications. The ABI auditory results were then evaluated for a number of functioning electrodes and channels, hours per day of use, nonauditory side effect profile and hearing results.

Results: No surgical complications caused by ABI implantation were revealed and Electrode paddle migration did not occur in our patients. A range of auditory performance was reported

Conclusion: ABIs are safe, do not increase surgical morbidity, and allow most patients to experience improved communication as well as access to environmental sounds. Although the factors leading to improved performance are not completely clear, these new results show that excellent hearing is possible for NF2 patients with the ABI

Keywords: Brainstem; Auditory; NF2; Monitoring

Intracranial Pial Arteriovenous Presenting with Seizure: A Case Report

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Abstract

The intracranial pial arteriovenous fistula (AVF) is a rare cerebrovascular malformation, which has a single or multiple arterial connections to a single venous channel without intervening nidus, and is different from arteriovenous malformation (AVM). We report on a case of a surgically treated pial AVF. A 28-year-old man with the history of a generalized seizure attack was referred to our clinic. Computed tomography (CT) showed a subcortical sub acute hematoma of approximately 24 ml in his right temporal lobe. Cerebral angiography showed an AVF supplied by the right middle cerebral artery with early drainage into the Sylvian vein. He underwent surgical treatment with feeding artery obliteration using a clip and hematoma removal. The patient was discharged without neurologic deficits. Despite the rarity of pial AVF, for correct diagnosis and treatment, neurosurgeons should recognize this condition. Pial AVF can be managed simply by the disconnection of the shunt by the surgery or endovascular treatment, and a good result can be achieved.

Keywords: Intracranial; Pial; Arteriovenous Fistula

The Spontaneous Extrusion of the Ventriculo-peritoneal Shunt through the Anus; a Case Report and Review of the Literature

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Abstract

Background and Importance: Ventriculoperitoneal (VP) shunt placement is the most common method of treatment of hydrocephalus especially in children. VP shunt insertion is associated with high rate of complications and malfunction mainly due to catheter obstruction or infection. About 20% of these complications are abdominal, when may occur at any time after shunt placement from 1 week to several years. We, herein, report a case of spontaneous extrusion of VP shunt through the anus.

Case Presentation: An 18-month old girl presented with spontaneous extrusion of VP shunt through the anus 1 day before admission (Fig. 1). She was the known case of aqueduct stenosis and subsequent hydrocephalus for which a right anterior VP-shunt had been inserted 7 months earlier. Shunt series revealed the perforation of the bowel and extrusion of the shunt through the anus. Thus the abdominal tip was removed and the abdomen was explored. As the CSF was not infected, the abdominal tip was changed and was placed in right pleural cavity. She was discharged with a good condition and was good on follow-up.

Conclusion: Bowel injuries during the shunt insertion procedure or chronic irritation of the bowel with the peritoneal tip of the shunt could be the possible mechanisms for this condition.

Keywords: Ventriculoperitoneal Shunt; Anus; Bowel; Shunt Series

Permethrin Toxicity Effects and Spinal Cord Injury in Rats

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Abstract

Background & Aim: The aim of the present study was to evaluate toxicity effects of permethrin as an industrial insecticide, on the spinal cord injury in rats.

Methods & Materials/Patients: For this purpose, 10 adult male Sprague–Dawley rats were divided into 2 controlled groups (5 rats) which received vehicle solution as epidural injection and two experimental groups: Dermal permethrin (Dermal group), and epidural permethrin (Epidural group). 1 ml of dissolved permethrin in 70% ethanol was applied directly to the skin in the back of the neck in the dermal group and 5 µl was injected directly in L4-L5 epidural space of spinal cord to get the desired concentration of test compound as 0.13 mg/kg body weight in each rat for 10 consecutive days.

Results: Neurological damages were observed in the 8th day of the treatment in epidural group and spinal cord injury resulted from both primary mechanical injury and secondary degeneration process. Our data indicated that the outcome of spinal cord injury depended on the extent of secondary damage mediated by a series of cellular, molecular and biochemical cascades, including reactive oxygen species-induced lipid peroxidation, oxidative stress in spinal cord and vascular events, and apoptosis.

Conclusion: It seems that permethrin as an industrial insecticide compound in usual dermal usage is a safe drug while epidural injection is able to affect spinal cord and induce caudal paralysis in an experimental animal model.

Keywords: Permethrin; Toxicity; Rats; Dermal; Epidural