

P.114**Flow diversion of bifurcation aneurysms is more effective when the jailed branch is occluded: an experimental study in a novel canine model**

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Background: Flow diverters (FDs) are increasingly used for bifurcation aneurysms. Failure of aneurysm occlusion may be caused by residual flow maintaining patency of the jailed branch along with the aneurysm. **Methods:** Sixteen wide-necked lingual-carotid artery bifurcation aneurysms were created in 8 canines. Patent aneurysms were randomly allocated 4 weeks later to flow diversion combined with jailed branch occlusion using coils and/or Onyx (n=6) or flow diversion alone (n=8). Angiographic results of aneurysm occlusion at three months were scored using an ordinal scale. Pathology specimens were photographed and neointimal coverage estimated. **Results:** Fourteen aneurysms were patent at one month. FD deployment was successful in all cases, but at 3 month follow-up, 3 devices had prolapsed into the aneurysm. None of the bifurcation aneurysms treated with FD alone were occluded at 3 months. Endovascular branch occlusion combined with flow diversion significantly improved aneurysm occlusion rates (median angiographic score of 2) compared to flow diversion alone (median score of 0: P=0.0137). Flow-limiting parent vessel stenosis was not observed in any arteries. Devices were covered with thick neointima in most cases. **Conclusions:** Treatment failures following flow diversion of bifurcation aneurysms can be caused by persistent flow to the jailed branch. Branch occlusion combined with flow diversion may improve angiographic occlusion of canine aneurysms.

P.117**Delayed contralateral presentation of a carotid cavernous fistula following trauma**

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Background: We present a rare case of a left-sided carotid cavernous fistula (CCF) that presented 15 months post initial trauma with right-sided ophthalmic signs and symptoms. Highlighted is a contralateral endovascular approach to treating this traumatic CCF. **Methods:** Described is a case of a left-sided CCF caused by a self-inflicted gun shot wound to the head that was initially treated conservatively by neurosurgery and ophthalmology. The patient presented 15 months later with headache, acute right-sided periorbital swelling, severe right eye and facial pain. **Results:** Angiography confirmed the presence of a left-sided CCF with preferential drainage into the right cavernous sinus and right superior ophthalmic vein. The left internal carotid artery (ICA) was shown to be narrow and irregular. Multiple attempts to navigate the micro catheter through the vessel were unsuccessful. Instead, the fistula was embolized using a contralateral approach through the right internal carotid artery and across the anterior communicating artery. Imaging post-operatively confirmed successful occlusion of the CCF. **Conclusions:** This case is a rare example of a left-sided ICA occlusion secondary to trauma presenting 15 months after the initial injury with right-sided ophthalmic signs

and symptoms. It is also one of only a few in the literature that describe successful treatment of traumatic CCF through a contralateral approach.

P.118**An experience with combined cerebral oximetry and stump pressure measurement to guide shunt insertion during carotid endarterectomy**

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Background: Cross-clamp ischemia during carotid endarterectomy (CEA) can cause perioperative stroke. Selectively shunting patients based on intraoperative monitoring modalities that assess risk for ischemia can reduce the occurrence of immediate stroke. An experience with combined cerebral oximetry and stump pressure measurement to direct selective shunting is presented here. **Methods:** Study comparing intraoperative monitoring data, the decision to shunt, and presence of immediate post-operative deficits. Patients were shunted if either cerebral oxygen saturation dropped by more than 10% by cerebral oximetry, or stump pressure during cross-clamping was less than 40 mmHg. Cross-clamp ischemia was determined by the presence of ipsilateral neurological deficit upon awakening. **Results:** 245 patients were included in this study. 22% were shunted. Patients who were not shunted were significantly more likely to have collateral blood flow detected on angiography. Immediate post-operative stroke was not encountered in any of the patients included in the study. One patient who met shunting criteria but was excluded since he could not have a shunt inserted due to difficult anatomy did suffer stroke. **Conclusions:** With the dual-monitoring criteria presented here, 22% of patients were shunted. With the exception of one patient who could not have a shunt placed, no immediate post-operative stroke was encountered.

P.119**Minimally invasive surgical disconnection of a spinal dural arteriovenous fistula with the use of intraoperative digital subtraction angiography**

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Background: Spinal dural arteriovenous fistulas (dAVF) are a significant but treatable cause of progressive myelopathy. The goal of treatment is disconnection of the fistula, which is often accomplished through an open surgical approach. We report two cases using a minimally invasive surgical (MIS) approach for dAVF ligation with intraoperative digital subtraction angiography (DSA) to confirm occlusion. **Methods:** Case report. **Results:** Two patients presented with progressive thoracic myelopathy and were identified to have fistulous connections at the left L1 and T8 levels respectively. Intraoperatively, a left femoral puncture was performed and a 5-French (40 cm) sheath was inserted. Patients were positioned prone and intraoperative spinal DSA was performed using the Siemens Zeego. Once the feeding radicular artery was visualized, image overlay and cross-hair laser was used to trace and localize the fistulous zone. A unilateral single level MIS hemi-laminectomy was performed. The fistulous zone and accompanying nerve root were exposed and small

hemostatic clips were applied followed by surgically disconnection. Finally, intraoperatively video angiography as well as spinal DSA were performed for confirmation. *Conclusions:* MIS disconnection with intraoperative DSA is a safe and effective technique for treating spinal dAVFs. Patients benefit from quicker recovery and shorter hospital stay.

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Open surgical trans-venous Onyx embolization of Rolandic arteriovenous malformations: case report and review of literature

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Background: Premature occlusion of draining veins during surgical resection of arteriovenous malformations (AVM's) can lead to disastrous consequences. Interestingly, some authors have recently demonstrated effective endovascular trans-venous Onyx embolization of select AVM's. *Methods:* Case report *Results:* A 71-year old female presented to the hospital with sudden onset right sided weakness and sensory change. Investigations revealed right fronto-parietal ICH secondary to a parasagittal Rolandic AVM with arterial supply from ACA and MCA branches. Drainage occurs via a single large cortical vein to the superior sagittal sinus. Partial intra-arterial embolization was initially performed. Surgical resection of the remaining nidus was deemed high risk. A craniotomy was performed and the large cortical draining vein was cannulated with a 4Fr micro-puncture system under direct visualization. A DMSO compatible micro-catheter was navigated retrograde close to the nidus. The draining vein was occluded using a surgical clip, and Onyx was immediately injected. Retrograde complete embolization of the AVM was observed. A total of 3ml of Onyx was injected, and the catheter was left in-situ. Patient was discharge 2 weeks later with minimal deficits. *Conclusions:* Open trans-venous embolization is a viable option for select AVM's with a single draining vein and are not favorable candidates for trans-arterial embolization, surgery or radiation.

PEDIATRIC NEUROSURGERY

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Restricted diffusion of white matter in infants with subdural hematoma

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Background: Inflicted head injury is a major cause of infant morbidity and mortality. The extent of traumatic brain injury in infants is often best characterized by diffusion weighted magnetic resonance imaging. In this cases series we describe four infants aged 6-19 months, with small unilateral subdural hematomas secondary to abusive head trauma accompanied by extensive areas of restricted diffusion weighted imaging isolated to the cerebral white matter. *Methods:* Retrospective, single-centre case series of four children

with small unilateral subdural hematomas with early and delayed MR imaging with diffusion weighted imaging. *Results:* In three cases there was acute diffusion restriction ipsilateral to the subdural, while in one case diffusion restriction was present bilaterally. All patients had multiple seizures and bilateral multilayered retinal hemorrhages. After non-surgical treatment, all patients survived albeit with significant motor and cognitive deficits and significant cortical atrophy on long-term followup imaging. *Conclusions:* These four cases highlight that relatively small subdural hematomas following child abuse can manifest with extensive white matter injury only evident at early stages with diffusion weighted imaging. We propose that selective white matter injury as a result of either reperfusion or axonal degeneration in response to the initial insult accounts for this novel pattern of infantile traumatic brain injury.

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Assessing level of awareness, attitudes and beliefs toward pediatric congenital neurosurgical conditions

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Background: Community awareness, attitudes and beliefs toward pediatric patients diagnosed with congenital neurosurgical conditions is not known in the Saudi population and the number of studies is few worldwide. Such attitudes have a direct impact on the quality of life of patients with these congenital conditions. This study aims to demonstrate the variation in awareness, attitudes and beliefs in the public and among health-care professionals towards patients diagnosed with congenital neurosurgical conditions and its associated factors. *Methods:* A survey consisting of 36 questions pertaining to Hydrocephalus, Brain Tumors and Spina Bifida awareness, attitudes and beliefs was distributed to Saudi citizens living in the eastern province older than 15 years of age among hospitals visitors, medical students, nutritionists, physicians, dentists, pharmacists, and nurses. *Results:* The analysis of the 1002 respondent of the questionnaire shows clear social stigmata and improper awareness, attitudes and beliefs toward pediatric patients diagnosed with congenital neurosurgical conditions. There are variable parameters on interest measured and analyzed and there are certain patterns observed as well. *Conclusions:* The analysis showed the importance of health education for the public to increase the level of awareness and it justifies why these factors should be addressed in the middle of patients' management, community awareness and health planning.

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Meta-analysis comparing predictors of good postoperative seizure control in children with dysembryoplastic neuroepithelial tumors and gangliogliomas

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Background: Dysembryoplastic neuroepithelial tumors (DNETs) and gangliogliomas are the most common cause of tumor-related seizures in children and adolescents. Little is known about predictors of surgical success, in terms of seizure freedom. All relevant papers since 1995 were identified. *Methods:* Over 4000 abstracts were screened on MedLine to identify data comparing tumor type (DNET vs. ganglioglioma)