INTRODUCTION
MGMT-promotor-gene methylation is a prognostic molecular biomarker for survival in glioblastoma (GB) patients. We studied “weak” versus “strong” MGMT-methylation using quantitative methylation-specific polymerase chain reaction (qMSP).

MATERIAL AND METHODS
A retrospective study was conducted in GB patients treated during 2003-2014 in two large Flemish hospitals (AZD and UZG). Only IDH-wildtype GB patients were included who were treated according to the Stupp-protocol. Stored tumor tissue was analysed for MGMT-methylation using qMSP after bisulfite conversion. Methylated MGMT was normalized to the copy number of the unmethylated control gene (beta-actin) and classified accordingly as “methylation negative”, “weak methylation” or “strong methylation”. Demographic data were collected from the electronic patient charts. Statistical analysis was performed using SPSS v25, generating Kaplan-Meier survival curves. P-value of less than 0.05 was considered significant.

RESULTS
173 patients were eligible for analysis. Mean age at diagnosis was 62 years. Surgical procedure consisted out of biopsy only in 43 patients (25%), subtotal resection in 78 (45%) and gross total resection in 52 (30%). MGMT-methylation was negative in 107 patients (62%), “weak” in 25 (14.5%) and “strong” in 41 patients (23.5%). Median overall survival (OS) was 10.7 months in the methylation negative group, 15.4 months in the weak methylation group and 18.8 months in the strong methylation group. The difference in median OS between methylated versus non-methylated GB patients was significant (P < 0.001) but not between the strong and weak methylation group (P = 0.725).

CONCLUSION
Although the small number of patients in the weak methylation group diminishes statistical power, there seems to be no difference in biological effect between “strong” versus “weak” MGMT-methylation status in IDH-wildtype GB patients.
**INTRODUCTION**
Glioblastoma remains the most malignant primary brain cancer in adults. In spite of intensive treatment, not a single current approach seems sufficiently effective to achieve major clinical improvements. Interpatient and intratumoral heterogeneity have been proposed as major contributors to the refractoriness of GBM. It remains largely unknown however, how each of the GBM tumor cell subpopulations respond to therapy in a patient specific way.

**METHODS**
Mass cytometry by time-of-flight (CyTOF), a method for high-dimensional, protein-based single-cell analysis, was used to interrogate the intrinsic capability of tumor cells to respond to therapy by simultaneously analyzing lineage features, molecular drug responses, signaling events and pathological markers in millions of single cells, before and after ex vivo treatment.

**RESULTS**
We identified a variety of protein-based tumor cell phenotypes, partially correlating to single-cell transcriptomic analyses. In addition, upon exposure to the MDM2-p53 interaction inhibitor AMG232 or radiation therapy (10Gy), we observed significant drug response heterogeneity comprising patient-specific fractions of intrinsically resistant tumor cell populations (range between 10-90%). This was not only observed in short-cultured patient-derived GBM cell lines, but also in freshly isolated, treatment-naive GBM tumor samples which were acutely, ex vivo exposed to therapy within 2 hours of surgical resection.

**CONCLUSION**
Acute functional drug response measurements using single-cell analysis therefore offer the opportunity to quickly identify actionable therapeutic strategies at unprecedented resolution in a patient-specific way, even in the absence of full mechanistic insights.
Title: Intratemporal Facial Nerve Schwannomas: A multicenter experience of 74 cases


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Keywords: Facial nerve, schwannoma, surgery

TEXT:

INTRODUCTION
Schwannomas are the most frequent tumors of the facial nerve; nevertheless they remain a rare entity. Previous reported series of facial nerve schwannomas are small, resulting in a lack of knowledge about this condition. We conducted a large, retrospective multicentre study about the clinical presentation, follow-up and management of this rare entity.

MATERIAL AND METHODS
A retrospective review of all patients diagnosed with facial nerve schwannomas in one of the European skull base centers between 1990 and 2018 was performed. We reviewed the patient demographics, side of the tumor, symptoms, audiometry, location, treatment strategy and growth.

RESULTS
We collected 74 patients (mean age 48 years). The most common symptom was a facial nerve palsy (68%), followed by hearing loss (62%), vertigo (26%) and tinnitus (23%). The extension of the schwannoma included more than one segment of the facial nerve in 55% of the patients and involved the ganglion geniculate (GG) in 69%, the tympanic segment in 49%, the labyrinthine segment in 40%, the mastoid segment in 32%, the internal auditory canal in 24% and the cerebellopontine angle (CPA) in 8% of the cases. Treatment strategy consisted of a wait and scan approach (62%), surgery (34%) or radiation therapy as initial treatment (4%).

CONCLUSION
Hearing loss at initial presentation was associated with a higher risk of radiographic growth during follow-up. Female patients had a higher risk of progression or development of hearing loss. The location of the schwannoma is a risk factor for the development of a facial nerve palsy.
INTRODUCTION

Discrimination between tumour and healthy brain tissue is of critical importance to achieve optimal surgical results and an improved prognosis. To maximize tumour resection and avoid postoperative neurological deficits, accurate characterization of tissue and delineation of resection margins is essential. The objective is to develop and validate a new mass spectrometry technique for molecular characterization of tumour tissue, thereby providing a direct assessment of tumour type and margin within seconds after incision. Ultimately, this technique can serve as an analytical device in image-guided medicine.

MATERIAL AND METHODS

An electrosurgical device is connected to a mass spectrometer (iKnife). Using this system, the ‘smoke’ created during electrosurgical procedure can be sent to the mass spectrometer to monitor the chemical profile of the sectioned tissue. This rapid evaporative ionization mass spectrometry (REIMS) technique is used to create a chemical profile database and develop a tissue recognition system based on machine learning.

RESULTS

We obtained very promising results by ex vivo REIMS analysis of resected brain tumour samples. A PCA model is built based on 30 samples with different types of brain tumour. Principal components are already roughly identified based on the mass to charge ratio.

CONCLUSION

We show that for brain tumour identification, the procedure of sampling the smoke, transfer to the mass spectrometer, analysis and feedback to the surgeon takes just a few seconds. Thanks to this real-time information during electrosurgical dissection, educated intra-operative decision-making becomes possible, possibly leading to a more accurate tumour removal in different intrinsic brain tumour types.
INTRODUCTION
Actual treatment algorithms of vestibular schwannomas (VS), advise active treatment in case of proven growth and large tumors. In small to medium sized tumors with growth, radiosurgery is preferred with the idea of preserving hearing. Surgery is restricted to large tumors because hearing preservation in these cases was considered problematic. In our surgical series, we saw a learning curve in hearing preservation. We present our results and tips on hearing preservation in VS surgery over the last years.

MATERIAL AND METHODS
In 223 surgical cases since 2008, we analyzed the last 4 years with focus on hearing. Initially we found hearing preservation difficult. We introduced intra-operative auditory monitoring and adapted our surgical strategy. From 2015 to 2018, 84 patients were operated for VS. We evaluated demographics, preoperative and postoperative hearing and the relation to tumor diameter.

RESULTS
The mean diameter of all tumors was 2.2cm. Translabyrinthine approach was used in 31%, retrosigmoid approach in all others. In these 58 other patients with a preoperative serviceable hearing, we preserved hearing in 28 cases (49%). Mean diameter of the tumors in these cases was 2.1cm. In the 30 cases with hearing loss, mean tumor diameter was 2.5cm.

CONCLUSION
Over time, we learned that intra-operative auditory monitoring, adapting microsurgical dissection and opening of the internal auditory canal improved the outcome of hearing in the microsurgical removal of VS. In patients with good preoperative hearing and tumors smaller than 2.2cm, we can now preserve this function in almost 50% of the cases. In tumors smaller than 1.5cm we achieve 66% of hearing preservation.
INTRODUCTION

Induction of secondary tumors after fractionated irradiation of the brain is a rare but well-known complication. We report a series of 4 patients who develop a secondary tumor several years after single-sesssion radiosurgical irradiation of the brain.

MATERIAL AND METHODS

Four patients were treated radiosurgically for a vestibular schwannoma (n=1), a pituitary adenoma (n=1), or a meningioma (n=2). The radiation dose ranged from 12 to 25 Gy. No short-term complication occurred after their treatment. After a period of 2.5 to 15 years (median 10 y), these 4 patients developed a second brain tumor: 3 patients developed a glioblastoma and 1 patient developed 2 meningioma. These tumors have required specific therapy.

RESULTS

These 4 patients met the criteria for radiation-induced neoplasms commonly used in the literature: 1) the second tumor occurs within the field of irradiation used to treat the primary disease, 2) the tumor is not present prior to irradiation, and 3) there has been a reasonable time interval between irradiation and development of the radiation-induced tumor.

CONCLUSION

Radiation-induced tumors in the brain can occur after radiosurgery, as well as it is for conventional fractionated radiotherapy. With the increasing rate of radiosurgical treatments in the last decades, the incidence of radiation-induced tumors will certainly increase significantly in the future. The occurrence of this rare but not exceptional and life threatening complication must be discussed with all patients before a decision for radiosurgical treatment is taken.
INTRODUCTION
Over the past decades, first line low-grade glioma (LGG) treatment rather evolved from watchful waiting to early maximal resection, based on increased survival rates. However, LGG typically affect young, otherwise healthy individuals with an active social and working life. Therefore, the importance of quality of life as a priority goal of the medical policy becomes obvious. In a systematic review, we aimed to assess the impact of the management of LGG on quality of life in adult low-grade glioma patients, either supporting or tempering the recent switch in low-grade glioma management.

MATERIAL AND METHODS
This systematic review was conducted according to Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines. Pubmed, Embase and Cochrane databases were searched from 1982 until December 2018. 454 articles were screened for eligibility. Additional sensitivity analysis using neurocognitive function and epilepsy was performed.

RESULTS
We identified five articles with a total of 428 brain-tumor patients, comprising 208 low-grade glioma patients. One study compared biopsy and resection, one study compared surgery (i.e. biopsy and resection) and watchful waiting, three studies assessed quality of life after resection. Three articles reported a sustained quality of life after resection, one showed quality of life improvement and one showed a worse quality of life after surgically treatment. Heterogeneity of study design prevented pooled analysis.

CONCLUSION
Early maximal resection did not compromise quality of life and neurocognitive function either recovered to baseline or even improved after early postoperative transient worsening. These findings further support the fundamental role of surgery in low-grade glioma management.
INTRODUCTION
Fluorescence-guided microsurgery using 5-aminolevulinic acid (5-ALA) is a well-established approach to improve the extent of resection in HGG. Many studies have been performed evaluating benefits in newly diagnosed HGG. However, less is known about the long-term survival and postoperative results in recurrent HGG. The primary objective of this work is to examine the benefits of 5-ALA in patients with recurrent HGG concerning diagnostic accuracy, extent of resection (EOR), safety and survival rate compared to white-light resection.

MATERIAL AND METHODS
We performed a systematic review from MEDLINE, EMBASE, Web of Science and TRIP database. Search terms include “glioma” and “aminolevulinic acid”. Additional studies were identified through checking the reference lists. This study is in conformity with the PRISMA and BMJ guidelines.

RESULTS
18 articles were selected and qualitatively assessed: 5-ALA shows similar results regarding diagnostic accuracy in recurrent HGG compared to newly diagnosed HGG, although specificity and negative predictive value seem lower. It shows added value in identifying tumor boundaries compared to MRI-neuronavigation. Diagnostic accuracy is not influenced by previous chemo- or radiotherapy. New neurological deficits proved to be similar and were in general only temporary. However, other adverse events were more common. Therefore, indications for repeat surgery should be followed strictly. 5-ALA increases overall survival in recurrent gliomas, but has no significant impact on progression-free survival.

CONCLUSION
5-ALA should be regarded as an indispensable and safe intraoperative addition to the surgical repertoire for recurrent glioma surgery.
INTRODUCTION
Atypical, WHO grade II meningiomas represent a therapy challenge once they progress after conventional standard therapies like surgical resection and radiotherapy. Repeated surgery or several lines of experimental medicinal treatments like hormonal, anti-angiogenic or chemotherapeutic regimens can be considered on a case-by-case basis but no standard of care exists for refractory atypical meningioma. More recently, targeted irradiation using peptide radionuclide radiotherapy (PRRT) is being explored on a small scale.

MATERIAL AND METHODS
A 45 year old male presented with a multifocal progressive recurrence of a WHO grade II, atypical meningioma after multiple surgical resections and external, fractionated radiotherapy (56Gy). Apart from subtle attention deficits and minor slowing of some frontal executional functions, the patient remained asymptomatic. Although he experienced epileptic seizures in the first 3 years of the disease, his last seizure dated back to more than 5 years ago. After screening with a Ga-68-Dotatate PET/CT and verification of good renal glomerular clearance using 51 Cr-EDTA, the patient received 4 cycles of 177-Lu-Dotatate. The therapy was well tolerated and after 4 cycles a growth stabilization was documented.

RESULTS
Lutetium-177-Dotatate is a therapeutic radiofarmacon that binds the somatostatin receptors (SSR) preferentially subtype 2. After comparative, quantitative screening of SSR expression in the tumor and the normal organs, candidates for irradiation by 177-Lu-Dotatate PRRT can be selected. Most experience has been gained in neuro-endocrine tumors but refractory meningiomas can theoretically be good targets as well.

CONCLUSION
A patient with refractory, multifocal recurrent atypical meningioma has been successfully treated with 177-Lu-Dotatate PRRT.
INTRODUCTION
Current Image-guided navigation systems in spine used intraoperative fluoroscopy or computed tomography (CT). All emit ionizing radiation. Ultrasonography (US) is the only non-ionizing imaging modalities available but do to the attenuation properties of bony structures is interest is considered as limited in spine surgery. We evaluated interest to fuse intraoperative ultrasound spinal imaging with preoperative lumbar CT scans to create a New Ultrasound-assisted spinal navigation system.

MATERIAL AND METHODS
Twenty-five patients admitted in our institution for a lumbar spine surgical procedure underwent a US-guided spinal navigation procedure to help the classical spinal procedure (minimally invasive or open). As first step, cortical borders of spinal structures were co-registered and fused with preoperative lumbar CT scans. The accuracy of this co-registration and the required time were evaluated. When the navigation was considered as accurate (less than 5mm), spinal procedures were realized.

RESULTS
The required time for an accurate co-registration was less than 10 minutes. Depending of the region targeted different anatomical landmarks were defined to obtain this accuracy. Surgical tools could be navigated with good accuracy helping percutaneous screws location or placement. Intradural lesions could be localized and optimal decompression of neural structure confirmed. No related complication was noted. The total radiation dose used was reduced (related to our classical non-navigate spinal procedures).

CONCLUSION
Based on this preliminary experience, we consider that realize a spinal procedure using an Ultrasound-assisted Navigation System is feasible, accurate, safe and helpful. A larger experience is still necessary.
INTRODUCTION
Although (partial) arthroectomy efficiently relieves radicular pain due to lumbar foraminal stenosis, it often requires lumbar arthrodesis. Long-term impact of lumbar arthrodesis on lumbar pain, adjacent disc disease and muscle wasting have been cause for concern. Less invasive procedures may be efficient and sufficient in many patients.

MATERIAL AND METHODS
17 cases (4 men and 13 women) of far-lateral foraminal stenosis were treated by posterolateral microsurgical foraminoplasty after at least 8 weeks of conservative treatment. Mean age is 64. Minimal follow-up was 6 months and mean follow-up was 11 months.

RESULTS
The origin of stenosis was bony (n=8), discal (n=2), capsular (n=3), mixt (n=2) or a fibrous band (n=2). Mean preoperative radicular pain score was 8,1/10 and was reduced to 1,5/10 postoperatively. Mean preoperative lumbar pain score was 6/10 and 4/10 postoperatively. Median Macnab Score after surgery was 1. No correlation was found between level (L3-L4, L4-L5 or L5-S1) or the cause of stenosis with the postoperative results on pain. 14 patients had preoperative weakness; after surgery, 89% were improved and 21% were stable. There was one complication (surgical site infection).

CONCLUSION
Far lateral spinal ganglion microsurgical decompression through a posterolateral approach was an effective treatment of radicular pain in this patient group. Results were best in patients who had never undergone lumbar instrumentation before. This positive experience indicates that there is potentially a place for procedures without instrumentation for lumbar foraminal stenosis. Future studies should evaluate the long-term outcome comparatively between procedures with and without arthrodesis and instrumentation.
INTRODUCTION
Management of patients with persisting pain after spine surgery (PPSS) shows significant variability, and there is limited evidence from clinical studies to support treatment choice in daily practice. This study aimed to develop patientspecific recommendations on the management of PPSS.

MATERIAL AND METHODS
Using the RAND/UCLA appropriateness method (RUAM), an international panel of 6 neurosurgeons, 6 pain specialists, and 6 orthopaedic surgeons assessed the appropriateness of 4 treatment options (conservative, minimally invasive, neurostimulation, and re-operation) for 210 clinical scenarios. These scenarios were unique combinations of patient characteristics considered relevant to treatment choice. Appropriateness had to be expressed on a 9-point scale (1 = extremely inappropriate, 9 = extremely appropriate). A treatment was considered appropriate if the median score was ≥ 7 in the absence of disagreement (≥ 1/3 of ratings in each of the opposite sections 1–3 and 7–9).

RESULTS
Appropriateness outcomes showed clear and specific patterns. In 48% of the scenarios, exclusively one of the 4 treatments was appropriate. Conservative treatment was usually considered appropriate for patients without clear anatomic abnormalities and for those with new pain differing from the original symptoms. Neurostimulation was considered appropriate in the case of (predominant) neuropathic leg pain in the absence of conditions that may require surgical intervention. Re-operation could be considered for patients with recurrent disc, spinal/foraminal stenosis, or spinal instability.

CONCLUSION
Using the RUAM, an international multidisciplinary panel established criteria for appropriate treatment choice in patients with PPSS. These may be helpful to educate physicians and to improve consistency and quality of care.
VASCULAR SESSION

Title : Protective STA-MCA bypass to prevent brain ischemia during high-flow bypass surgery: case series of 10 patients.
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Keywords : Aneurysm, Bypass, Surgery, Ischemia

TEXT :

INTRODUCTION
High-flow EC-IC bypass followed by parent artery occlusion may be the only valid treatment option for certain extraordinary aneurysms. Such procedures carry significant risk of brain ischemia. We evaluated the effectiveness of a protective STA-MCA bypass, performed prior to the high-flow bypass procedure, as a means of protecting the brain parenchyma.

MATERIAL AND METHODS
This prospective study included 10 patients treated for complex aneurysms using a combined STA-MCA and high-flow EC-IC bypass between June 2016 and January 2018. In these patients, endovascular or microsurgical exclusion was deemed too risky. Multiple imaging studies were performed to confirm bypass patency, measure flow in the anastomoses, detect ischemic lesions, and evaluate aneurysm occlusion.

RESULTS
Mean treatment age was 55 years old. Mean duration of the microsurgical procedure was 11 hours. In all patients, the high-flow bypass was patent intraoperatively and complete aneurysm occlusion was obtained. Neurological examination was unaltered in all but one patient, who suffered an acute epidural hematoma requiring surgical evacuation. No ischemic lesions were noted on early MRI.

CONCLUSION
We describe the use of a protective STA-MCA bypass, performed prior to high-flow EC-IC bypass, in order to reduce the risk of perioperative ischemic lesions without increasing the morbidity of the surgical procedure. This treatment paradigm was feasible in all ten patients without complications related to the STA-MCA anastomosis.
INTRODUCTION
We report a series of 5 patients who developed dramatic complications several years after radiosurgical irradiation of a vascular malformation in the brain.

MATERIAL AND METHODS
Five patients were treated with radiosurgery for a cerebral arteriovenous malformation (n=4) or a dural fistula (n=1). The mean age was 35.6y (range 16-50y). All patients have had a complete obliteration of their vascular malformation in the 3 years after irradiation. After 3 to 13 years following the irradiation (median 7.5y), these patients developed serious neurological symptoms: epilepsy (n=2), signs of intracranial hypertension (n=2), or neurological deficit (n=1). MRI showed development of major panhemispheric edema in all cases, associated with hydrocephalus for 2 patients, intraparenchymal cysts for 2 patients, and pseudotumor progression for 3 patients).

RESULTS
One patient was managed with corticoids only. The 4 other patients have been operated: shunt placement (n=2), cyst marsupialization/removal (n=3) associated with lesion removal (n=2). For one patient the lesion was located deep inside the basal ganglia and removal of the lesion could not be done, the patient died 3 days after surgery. For the other 4 patients the surgery has controlled the lesion progression and edema reaction. Three patients kept permanent neurological symptoms, the other patient is still under corticotherapy.

CONCLUSION
Edema, cystic degeneration and pseudoprogession are rare but highly disabling complications after radiosurgery for vascular malformations of the brain. These complications can occur at a long period following the irradiation, and many years after complete obliteration of the malformation. No risk factor has been found and no prevention is available to date.
INTRODUCTION
Indications of cerebral revascularization became extremely limited over time. Extra-intracranial anastomoses remain nevertheless useful in selected cases of complex aneurysms, in presence of brain hypoperfusion or skull base tumors requiring vessel sacrifice.

MATERIAL AND METHODS
8 cases operated on at Erasme hospital are reported.

RESULTS
8 patients with a mean age of 38.3 years (7.6-64.1) were operated on for cerebral aneurysms (3 cases: 2 giant aneurysms and 1 fetal PCom dissecting aneurysm) and cerebral hypoperfusion due to ICA dissection (1 case), MCA stenosis (1 case) and MoyaMoya disease (3 cases) for a total of 9 surgeries (one MoyaMoya patient operated on bilaterally) and 11 anastomoses. Preoperatively, all patients were symptomatic (intracranial hypertension (1 case), hemiparesis (1 case), CNIII palsy (1 case), TIA/stroke/hypoperfusion symptoms (5 cases). Extra-intracranial anastomoses consisted in STA-MCA bypasses, except one STA-PCA P2 segment bypass for a fetal PCom dissecting aneurysm. All anastomoses were confirmed to be patent at surgery with ICG videoangiography. On imaging controls, 9/11 remains patent with one bypass occluded out of 2 in the two cases with double anastomoses. After a mean follow-up of 3.9 years, all patients returned to a normal neurological condition and none experienced any subsequent event of TIA except one child with a MoyaMoya disease who presented a recurrent stroke on postoperative day 22 and died.

CONCLUSION
Extra-intracranial anastomoses remain useful in the armamentarium of neurosurgical procedures in cases of specific cerebro-vascular diseases. Indications remain limited to very selected cases.
INTRODUCTION
Several surgical techniques are described in the literature for the treatment Moyamoya angiopathy (MMA). The choice of procedure remains controversial. We present 16 consecutive patients treated with the multiple burr holes (MBH) technique.

MATERIAL AND METHODS
Between June 2001 and December 2018, 16 patients (11 adults and 5 children, average age 25 years), with a symptomatic and progressive MMA, underwent 23 procedures of revascularization by MBH technique. The initial stroke was ischemic type in all patients except one with cerebral hemorrhage. This method was performed bilaterally in seven patients (44%) and unilaterally in nine patients (56%). Fifteen to 40 burr holes with opening of the dura mater under microscope and arachnoids preservation, were performed in a hemi-cranial vault, depending on the extent of the disease. Radiological monitoring was obtained by cerebral 3D-magnetic resonance angiography (MRA) in all patients to assess the degree of revascularization.

RESULTS
The mean follow-up after revascularization was 59.5 months (min: 24, max: 195). Clinically, nine patients showed a progressive recovery of their deficit and 7 remained stable. Postoperative control, showed revascularization from collaterals from the external carotid artery through the burr holes in all patients except one. We did not observe any permanent complications, no cases of pseudomeningocele and no new ischemic stroke. A transient complication was observed in one patient.

CONCLUSION
Our results suggest that the MBH technique with dura opening and arachnoid preservation seem to prevent recurrent stroke. It's is a simple and effective alternative procedure with low-morbidity for the treatment of patients with MMA.
INTRODUCTION
Direct or indirect cerebral revascularization surgery in moyamoya patients is a proven treatment of this progressive occlusive cerebrovascular disease. Postoperatively, perfusion can be evaluated by CT and/or MRI perfusion imaging, but true quantification of the perfusion supplied by the bypass was not yet possible. Recently, selective mapping of the perfusion supplied by the bypass is possible using conventional 2D angiography in combination with a steady-state flat-detector CT perfusion imaging.

MATERIAL AND METHODS
Selective perfusion imaging was performed in eight moyamoya patients postoperatively; six after direct EC-IC bypass and two following indirect (multiple burr holes) bypass. Flat-detector CT scanning with parenchymal blood volume (PBV) imaging was performed on a biplane interventional angiography unit. Two consecutive injections were acquired with a 4 French catheter in the proximal extracranial part of the bypass artery, rendering two sets of 3 series of images: mask (“plain CT”), fill (“angio CT”) and full (perfusion PBV) run. Total injected volumes were 75 mL, 25 mL of iodinated contrast (300mg I/mL) mixed by 50 mL of saline, and 10 mL, 2 mL of iodinated contrast (300 mg I/mL) mixed by 8 mL of saline, respectively.

RESULTS
Visualization of the bypass-supplied areas were successfully made in all eight patients. Direct STA-MCA bypass provided larger perfusion volumes than indirect burr holes. In two patients, the STA bypass even provided contralateral flow.

CONCLUSION
The use of this new angiographic technique seems promising to quantify the perfusion area of supplied by the bypass.
Title: Multidisciplinary management of middle cerebral artery aneurysms: a retrospective single-center case series with 328 consecutive patients


Affiliations: UCL

Keywords: MCA aneurysms, clipping, coiling

TEXT:

INTRODUCTION
Objective: To analyze the results of multidisciplinary management of middle cerebral artery aneurysms in terms of efficacy and safety.

MATERIAL AND METHODS
We conducted a single-center retrospective study on 328 consecutive patients diagnosed with 421 MCA aneurysms in our institution between February 1996 and November 2016. Three hundred and fifty-two treatments were carried out after interdisciplinary discussion: surgical clipping (SC) was performed on 279 aneurysms (201 unruptured (UIA) and 78 ruptured (RIA)) and endovascular coiling (EC) on 73 aneurysms (53 UIA and 20 RIA).

RESULTS
Complete obliteration of UIA was obtained in 97% in the SC group and 45.3% in the EC group (p<0.0001). Total occlusion was achieved in 92.3% and 45% of RIA that underwent, respectively, SC and EC (p<0.0001). More intraoperative complications occurred in the EC group compared to the SC group for both UIA (21% versus 5%, p=0.0008) and RIA (25% versus 19%, p=0.55). No statistically significant difference was found in treatment-related morbidity and mortality, nor in clinical outcomes at discharge and follow-up, between both groups of treatment. Early retreatment, due to failure of procedure or initially incomplete occlusion, was 23.3% in the EC group and 0.7% in the SC group (p<0.0001). The recanalization rate was higher in the EC group (14.3% versus 6.1%, p=0.0007). Late retreatment of aneurysmal recurrences was necessary in 2.7% of embolized aneurysms and 1.4% of clipped ones (p=0.61).

CONCLUSION
We observed the superiority of SC over EC regarding short-term and long-term efficacy. The treatment strategy should be decided within a multidisciplinary framework and on an individual basis to ensure an optimal management.
FUNCTIONAL & MISCELLANEOUS SESSION

Title: Conscious sedation with dexmedetomidine during spinal cord stimulator lead placement increases optimal lead position.

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Keywords: Dexmedetomidine, spinal cord stimulator

TEXT:

INTRODUCTION
Implantation of paddle leads for spinal cord stimulation (SCS) in the treatment for neuropathic pain is mostly performed under general anesthesia. Because of this, the correct position cannot be confirmed by the patient. Regarding the need for perioperative evaluation of the stimulation pattern, we investigated the efficacy of dexmedetomidine as sedative in 25 patients. Being able to verify the stimulation pattern during electrode placement can minimize the chance of lead misplacement and hereby reduce the amount of revisions.

MATERIAL AND METHODS
25 patients who were treated for neuropathic pain with epidural SCS (Medtronic 565-paddle lead) were included. A perioperative infusion of dexmedetomidine was started. Guided by the feedback of the patient, the position of the electrode was changed to optimize the stimulation pattern.

RESULTS
24 out of 25 patients completed the procedure. In 46% of the patients (10 out of 24) the position of the electrodes needed to be adjusted because of inadequate stimulation pattern. No significant hemodynamic changes or cognitive effects were recorded. Generally, the procedure was well tolerated (Figure 1: Discomfort during the procedure.).

CONCLUSION
Dexmedetomidine has the remarkable quality of being able to sedate without negative effects on the respiratory function and can lead to a cooperative form of sedation. In most cases, there was an acceptable level of comfort for the patient despite the invasive procedure. Only one patient needed a more profound sedation. With cooperative sedation, the amount of revisions or suboptimal working neurostimulators can be decreased as compared to general anesthesia.
INTRODUCTION
Clinical trials investigating chronic pain often focus on pain intensity as primary outcome. However, pain researchers already demonstrated that pain intensity is not the most reliable measure of the success of chronic-pain treatment. Several research groups have proposed “core outcome domains”, such as measurements of disability, to assess the effect of an intervention in pain patients. Up till now, studies investigating the relation between pain intensity and disability in patients treated with spinal cord stimulation are lacking. Therefore, the current objective is to examine which pain-reporting strategy, routinely used in pain research, associates best with the degree of disability in these patients.

MATERIAL AND METHODS
Data of an ongoing registry (clinicaltrials.gov NCT02787265) in failed back surgery syndrome patients, treated with spinal cord stimulation, was used. Pain intensity was scored on an 11-point numerical rating scale (NRS) for leg and back pain, while disability was assessed with the Oswestry disability index. The association between both variables was investigated with Spearman’s correlation and Cramér’s V.

RESULTS
Significant associations for absolute differences, relative differences, cut-offs and minimal clinical important differences are found between several reporting methods of pain intensity and disability.

CONCLUSION
In this study we showed that the degree of disability was strongly associated with the pain intensity as measured using different methods. The standard method for reporting pain intensity reduction (50%) seems to associate the strongest with disability. However, a low degree of disability does not always reflect a low pain intensity.
INTRODUCTION
The stereotactic frame represents the mainstay of accuracy for targeting in stereotactic procedures. Any distortion of the frame may induce a significant source of error for the stereotactic coordinates.

MATERIAL AND METHODS
We analyzed the torques exerted on the fixation screws after frame placement in a series of patients treated stereotactically by an experienced team. We studied the risk for frame bending in an experimental model of stereotactic frame fixation, with increasing torque of fixation screws in a homogeneous and heterogeneous distribution of torques between the 4 screws. We assessed the impact of expanding dimensions of bending of the Leksell frame both on surgeries utilizing the stereotactic frame.

RESULTS
Frames were fixed clinically at a range of torques of 0.147 - 0.522Nm (mean = 0.348Nm). The torques did not vary significantly with time. Heterogeneity between the two opposite pairs of screws is often limited, but can reach 96.3%. Distortion of the frame may occur even at minimal levels of torque. Heterogeneity between the two opposite pairs of screws will significantly raise the amount of frame distortion. We found a straight connection between the amount of distortion of the frame and the importance of the deviation from the stereotactic target in clinical models of stereotactic procedures.

CONCLUSION
Stereotactic frames can be subjected to distortion due to the torque used for frame fixation. The risk of distortion increased with the torque used and the heterogeneity between the torques of the fixation screws. Distortion of the frame could be a significant source of inaccuracy of targeting for stereotactic procedures in clinical practice.
INTRODUCTION
In the last decades, mapping of function became mandatory during intracranial tumour resection in eloquent areas; in subcortical resection with underlying fascicles and in skull base tumours with hidden cranial nerves, alternation of mono- and bipolar stimulation on one single device can optimize the accuracy and the ergonomy.

MATERIAL AND METHODS
Since 2004, we use monopolar stimulation on the tip of the Ultrasonic Aspiration device. Since the tumour resection device coincides with the stimulation device, the accuracy is maximal (no switch of instruments), the stimulation-resection interval reduced to 0 and the ergonomy significantly improved. We have used this method in over 500 patients without any intra-operative complications. Since 2015, stimulation on tip of suction probe is commercially available; we started to use the combination of both probes for bipolar stimulation: the CUSA-tip as one pole, the suction tip as the other pole, with the classical Ojemann stimulation parameters. In supratentorial tumours, in the vicinity of CST, we use monopolar stimulation with the 1mm/1 mA rule. When non-motor fascicles are expected, we use bipolar stimulation.

RESULTS
We used combined mono- bipolar stimulation CUSA-tip/suction tip in 50 patients, during resection of supratentorial lesions. This method allows to resect the tumour up to the extreme functional limit for supratentorial lesions. The technique seems also very promising in resection of tumours near cranial nerves and in spinal cord tumours.

CONCLUSION
Combination of the high sensitivity monopolar stimulation and the specificity of bipolar stimulation with the usual instruments (CUSA-tip + suction tip) offers the possibility to maximize function-controlled resection and reducing surgery time.
INTRODUCTION

Arachnoid cysts result from the splitting of the arachnoid, generally during embryonic development. In most cases the volume of the cyst remains stable but in 10% it will grow and may cause mass effect. In the posterior fossa, which can notably lead to cranial nerves impairment, cerebellum related symptoms, hydrocephalus and intracranial hypertension. If necessary, the cyst can be treated by microsurgery fenestration, endoscopic fenestration and shunting.

MATERIAL AND METHODS

Between 1996 and 2018, 10 patients have undergone surgery for a posterior fossa arachnoid cyst in the department of neurosurgery (Cliniques Universitaires St-Luc, UCL). We have collected: the patients characteristics (age, sex, medical history…), the cyst characteristics (location, size, mass effect, associated abnormalities…) and details about the management (clinical assessment, imaging, surgery procedure, complications, follow-up…).

RESULTS

We have performed 4 microsurgical fenestrations (success rate = 75%), 2 endoscopic fenestrations (success rate = 100%) and 8 shunttings of the cyst (success rate = 63%). We have also done 2 ventriculostomies and 9 ventriculo-peritoneal shunts. Among those interventions, the success rate was relatively similar but we noted a difference in the reintervention rate of the shunts (76%) compared to fenestrations (33%). The two major causes of shunt reintervention were infection (38%) and obstruction (31%).

CONCLUSION

We recommend to perform endoscopic or microsurgical fenestration as a first option when it is possible, because of the high success and the lower reintervention rates. If it doesn’t work, then consider cyst shunting and pay careful attention to infection and placement-related obstruction risks.
INTRODUCTION
Vestibular schwannomas are benign intracranial tumors originating from the vestibular nerve. Most common initial symptom is unilateral hearing loss. Treatment policy modalities include observation, microsurgery, stereotactic radiosurgery and fractionated radiotherapy. The objective of this work was to perform a systematic review of current literature in treatment options for small vestibular schwannomas to provide best outcome in hearing preservation: microsurgery, stereotactic radiosurgery or scan-and-wait. This could provide a foundation towards creating universal treatment algorithms in hearing preservation management.

MATERIAL AND METHODS
Medline, Embase and TRIP databases were searched for publications that included MESH-terms ‘vestibular schwannoma’ or ‘acoustic neuroma’, in conjunction with ‘microsurgery’ and ‘radiosurgery’. Articles were manually screened using PRISMA-checklist, in/exclusion criteria to identify high quality papers. Included studies were matched by treatment and follow-up length to investigate effects of therapy on hearing preservation in short and long-term outcome.

RESULTS
786 eligible articles were identified. 644 were excluded in primary screening on relevance. 124 were ruled out due to low quality, duplicates or non-satisfactory in/exclusion criteria. Statistical analysis of 16 included studies showed long-term (5-10 years) hearing preservation rates for radiosurgery, microsurgery and observation to be 53.4%, 28.6% and 56.9% respectively. Short-term results (2-5 years) appeared to be 65.8%, 19.9% and 58.6%.

CONCLUSION
In patients with small and spontaneous vestibular schwannoma, radiosurgery offers the most durable preservation of hearing in long-term. Observation proves to be a valid alternative in selected patients.
INTRODUCTION
Glioblastoma, the most malignant primary brain tumor, requires appropriate models that represent the most important genetic and pathological features. We established a robust workflow to create culture models from adult and pediatric GBM patients.

METHODS
Tumor samples from consented GBM patients were prospectively (2017-2019) and retrospectively (2007-2017) collected at UZLeuven (n=59), Europe Hospitals Brussels (n=8), and AZNikolaas (n=3). Tumors were grown in various media/substrates and growth verified by >3 passages. Genomic verification was performed using NGS analysis and transcriptional profiling.

RESULTS
71 Gliolan-positive GBM samples from 2 distinct locations of the tumor (core and periphery) were evaluated for in vitro growth in >400 culturing attempts. The success rate of growing GBM tumors was robustly high, with a strong correlation to patient prognosis. Growth beyond P3 was achieved in ~70% of newly diagnosed GBM cases of which >80% were genetically verified while retaining genomic and/or transcriptional features. For recurrent and secondary (IDH1-mutant) GBM tumors, the success rate was lower (50 and 20%, respectively). Overall, our efforts resulted in the generation of >105 genetically and pathologically confirmed patient-derived GBM models, derived from various locations in the tumor (n=20 pairs of core/periphery-derived models), but also of primary and recurrent tumors derived from the same patient (3 pairs available). These models are available through the Leuven Living Tissue Bank (www.lpcm.be/leuven-living-tissue-bank/) and serve as important tools in drug discovery programs.

CONCLUSION
Patient-derived cell lines may be created at scale from GBM tumors to support pre-clinical cancer research, while representing the most important genetic and pathological hallmarks of GBM.
INTRODUCTION
Ollier-Maffucci’s (OM) disease is a rare disorder with an estimated prevalence of less than 1/100 000. It is characterized by multiple enchondromas mainly in the limbs with soft tissue haemangioma. It also increases the risk of skull base chondrosarcoma. We report such a case.

MATERIAL AND METHODS
We report the case of a 17-year-old boy with OM disease. Cerebral MRI showed a lesion of Sella turcica. Differential diagnosis was enchondroma or chondrosarcoma. A debulking surgery has been performed. Anatomopathological analysis could not confirm the diagnosis. At 3 months follow-up, the MRI showed a significant recurrence of the cartilaginous tumour of skull base with soft tissue extension. A new surgery of subtotal resection was performed.

RESULTS
Anatomopathological data couldn’t confirm the diagnosis of chondrosarcoma, but that diagnosis has been considered because of a major growth in a short time. Complete surgical resection was impossible without major neurological impairments, and the patient was sent for carbon ions radiotherapy.

CONCLUSION
Presumed rate of skull base lesions in OM is about 25%. The risk of malignant transformation is up to 10%. Treatment of choice for chondrosarcoma is complete resection of the lesion. However, when complete removal is impossible, proton beam or carbon ions therapies can be considered with a local control ranging from 90.5% to 100% at 4 years.
Nowadays, one time surgery for resection and cranioplasty of calvarial lesions is the gold standard. Our objective is to report our surgical procedure using “surgical guides” to create a patient specific cranial implant in bone cement (PMMA).

A 52-year-old woman presented with a frontal cosmetically disturbing lesion. Imaging showed a large hyperostotic parasagittal meningioma occluding the anterior third of superior sagittal sinus and in close relation with pneumatized frontal sinus.

Using 3D technologies, we defined the resection area based on a thin-slice CT. Then a first guide enabling to shape the resection area intraoperatively was created by 3D printing. We could so precisely avoid the opening of the frontal sinus. After the tumor resection, we produced the implant by placing bone cement on the second printed “surgical guide” that contained the computer designed curvature and adapted borders. Finally, without major further adjustments, the implant could be fixed with titanium screws to obtain a very satisfying cosmetic result.

This technique allows, in one surgical procedure, to perform the resection and the reconstruction very easily with an excellent level of patient satisfaction.
INTRODUCTION
Chordoma is a primary malignant bone tumor characterized by a slow progression, a locally aggressive behavior and a low metastatic potential.

CASE REPORT
A fifty-four-year-old man presents with sacral pain associated with a sensation of suprapubic heaviness for several months. CT scan and MRI show a large heterogenous presacral mass, eroding the lower part of the sacrum. Tumor resection is performed by a combined anterior (laparoscopic) and posterior approach. The anatomopathology of the tumor shows a dedifferentiated chordoma with a sarcomatous component. In spite of a gross total resection and additional treatments by radio- and chemotherapy, the patient dies of a fast tumor recurrence five months later.

DISCUSSION
In the sacrococcygeal region (the most common site), initial symptomatology of chordomas is banal: low back pain, increased when sitting, and, sometimes, digestive disorders. CT and MRI are crucial in the staging of the tumor. The main differential diagnoses are: chondrosarcoma, plasmacytoma, giant cell tumor and bone cyst. Dedifferentiated lesions are rarely seen de novo and more often observed in a context of recurrence or after irradiation. Sarcomatous lesions have a pejorative prognosis due to faster tumor progression and higher metastatic potential. The incidence of the dedifferentiated type ranges from 6 to 9%.

CONCLUSION
The multidisciplinary approach, involving a neurosurgeon, a general surgeon, a radiologist and an oncologist, is the key to deal with this invasive lesion. The surgical team advocates a combined approach to focus on haemostasis control, oncological resection and respect of nervous structures and adjacent organs.
INTRODUCTION
Intramedullar spinal cord tumors are rare pathologies. Ependymomas represent the most common intramedullary tumors in adults. Mostly these tumors have a typical onset of symptoms with neurologic deficit of the long tracts: hypesthesia, motor weakness, pain, sphincter disturbances. We present a case in which the onset of symptoms is atypical, due to syringomyelia as a result of a large, distended syrinx into the medulla oblongata and fourth ventricle.

MATERIAL AND METHODS
A 28 year old woman is admitted at the Emergency department with mainly complaints of dysphagia and in lesser degree of general weakness and short periods of diplopia. The day after admittance, she develops a rapid evolutive paraparesis of both lower limbs and the left arm. An intramedullary ependymoma is diagnosed at thoracic level Th 2 with a large syrinx cranial of the tumor extending into the medulla oblongata and fourth ventricle. A smaller syrinx is present caudal of the tumor. The patient undergoes surgery in emergency. A gross total resection can be performed and on both sides of the tumor, the syrinx can be evacuated.

RESULTS
Postoperatively, there is no new neurologic deficit. The dysphagia disappears and the quadriparesis recuperates slowly but progressively. Because of the gross total resection, radiotherapy is not initiated.

CONCLUSION
Intramedullary ependymoma and progressive dysfunction of the long tracts is a well known entity. In this case, a young patient presents with at first signs of central neurologic deficit, due to syringomyelia by a large syrinx cranial of the tumor, followed by quadriplegia.
Title: Full neurological recovery after medullar decompression for post-traumatic intramedullar cysts present for more than 2 years.

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Keywords: intramedullar cyst, traumatic injury, torture, outcome

TEXT:

INTRODUCTION
We report the clinical results of a surgical procedure performed on a patient who suffered since more than 2 years from tetraparesia due to medullar compression by post-traumatic intramedullar cysts.

MATERIAL AND METHODS
A 43-year old syrian patient was tortured in the spring of 2016; he was hanged by his feet upside down and beaten on the cervical and thoracic spine with a baton. During one of these torture sessions, the patient developed complete tetraplegia. He recovered partially in the following weeks, and moved from Syria to Europe. In the summer of 2017, he had a tetraparesia scored 3/5 at both arms and legs: the patient could not stand up or use cutlery to eat. The MRI showed 2 large cysts located at the center of the medulla, at levels C3 and C6-Th2.

RESULTS
The patient was operated on September 2018; microsurgical decompression of the medulla was performed at both levels and a drain was placed into each cyst. The patient improved neurologically in the following weeks. One month after surgery, the patient could walk with crutches (motor function 4/5). At 4 months post-surgery, the patient has full neurological recovery: motor function 5/5 on arms and legs: the patient walk and run without help and no sign of residual deficit. The control MRI shows disappearance of the cervico-thoracic cyst and major reduction of the size of the cervical cyst.

CONCLUSION
Despite a long period of more than 2 years after the trauma and neurological deficits, full neurological recovery can be observed after drainage of post-traumatic intramedullar cysts.
INTRODUCTION
Spontaneous Spinal Epidural Hematoma (SSEH) is a rare condition which often requires emergent surgical decompression.

MATERIAL AND METHODS
An unusual case of SSEH in a young male with acute but transient neurological symptoms is reported. There was a rapid normalisation on imaging, a negative angiography, but a recurrence after 1 year.

RESULTS
A man of 24 years presented on emergency dept. with acute onset of thoracic back pain, sensory loss below D12 and paraparesis. There were no trauma nor concomitant diseases. CT and MRI showed an epidural hematoma of 51x20x11 mm³ at D7-D9. An emergency surgical decompression was planned, but was annulated because the symptoms spontaneously cleared over 2 hours. MRangiography and conventional angiography showed no AV fistula. After 1 year he presented a similar episode of SSEH, with the same findings, clinical course and imaging. There was no further recurrence in a follow-up of 1,5 year.

CONCLUSION
SSEH can develop and clear fastly, even without surgery. Exact mechanism is not known, but recurrence is possible.
BACKGROUND
Metallosis, the lymphocytic reaction of soft tissue after a period of metal on metal articulation, is a common described complication in hip and knee arthroplasties. In lumbar total disk replacement (TDR) this metal corrosion reaction has only been described four times in the literature.

CASE PRESENTATION
A 65-year-old patient presented in 2017 with low back pain and right L5-radiculopathy after previous spine surgeries: L4-L5 TDR (Maverick) in 2004; left L4-L5 foraminotomy in 2010 for residual disc protrusion. Imaging revealed L3-L4 stenosis due to epidural mass, L4-L5 could not be visualized due to metal artefacts. Thirteen years after TDR, the patient underwent decompressive laminectomy L3-L4-L5 during which a gray-colored posterior epidural mass was identified. Pathology revealed inflammatory infiltrate including macrophages with black pigments suggesting metallosis. The patient experienced resolution of pre-operative symptoms. 18 months later recurrent L5-radiculopathy occurred while Cobalt and Chrome serum values increased slowly. Upon re-operation in January 2019 recurrent intraspinal metallosis was noted. Debridement was performed with posterior fusion using L4-L5 transpedicular screws in order to immobilize the disk prosthesis. The latter has not yet been described for treating metallosis.

CONCLUSION
Metallosis secondary to lumbar TDR is a rare complication difficult to diagnose by imaging. Different surgical treatment options have been described, including posterior decompressive surgery with debridement and device removal with fusion. Due to the complexity and risks of the TDR removal we decided to proceed first with a posterior fusion, in order to prevent repetitive metal-on-metal movements, without explantation of the artificial disc.
INTRODUCTION
Round cell sarcomas were recently classified as Ewing-like sarcomas because of their morphological similarities. Lately, the recent molecular progress lead to a new classification of these tumors. BCOR-CCNB3 fusion sarcoma is one of these new entities described. It usually occurs in soft tissue of children or bones (preferentially long bones -40%- pelvis-33%- and small bones -27%-). We report a first case of spinal cord compression by one of these sarcomas.

MATERIAL AND METHODS
A 3-year-old female child suffered of neck pain and fever with no neurological defect. With a cervical MRI, we diagnosed a spinal cord compression by an extra-axial lesion at the Th3 level. During the surgery, we noticed a firm tumor arising from the bone with protrusion into the paraspinal muscles but into the spinal canal too. Postoperative imaging showed a complete resection.

RESULTS
The immediate postoperative course was uneventful and the patient left our unit a few days after the surgery. The first anatopathological results suggested a congenital infantil fibrosarcoma but further analysis confirmed a BCOR-CCNB3 fusion sarcoma. MRI performed one month after the surgery showed a locoregional recurrence. After a new multidisciplinary discussion, chemotherapy was begun.

CONCLUSION
BCOR-CCNB3 fusion sarcomas are malignant tumors seen preferentially in childhood with a male predominance (9:1). It arises from soft tissue and bones (42-50 % of cases). Coming from the vertebras, it can produce a spinal cord compression leading to neurological deficit. Nowadays, these tumors have been treated with Ewing sarcoma protocols, with similar treatment responses.
CASE REPORT
A 52-year-old woman displayed cervical pain with loss of strength in the right hand along with paresthesia of both upper limbs and episodic electrical discharges in the legs since 2 months, without traumatic or oncological story. The neurological examination revealed 4/5 paresis of the right hand and pyramidal syndrome. The magnetic resonance imaging showed a 10x15 mm right-sided intramedullary spinal cord tumor at the level of C6 and C7 vertebral bodies. The tumor displayed hyposignal on T1-weighted sequences, hypersignal on T2-weighted sequences and was associated with a huge edema without cyst. The contrast enhancement was intense and slightly heterogenous after gadolinium injection. Radiological differential diagnosis was unclear. A surgery was organized under perioperative electrophysiological neuromonitoring. Surgery was stopped because peroperative extemporaneous histological exam was in favor of a metastasis, absence of a cleavage plan between the tumor and the spinal cord and temporary loss of evoked potential. The final pathological analysis confirmed the diagnosis of a metastasis from a lung adenocarcinoma. Further examinations diagnosed the primitive lung adenocarcinoma with a second cerebral metastasis.

DISCUSSION
Most intramedullary spinal cord tumors are ependymoma and astrocytoma. Intramedullary spinal cord metastases from visceral cancer are rare, in particular when it appears as the first clinical manifestation of the neoplastic disease.

CONCLUSION
Intramedullary spinal cord metastasis appearing as the first clinical event of the neoplastic disease is rare but this diagnosis should not be unrecognized. The current case report thus evidences the importance of the extemporaneous histological exam and the electrophysiological monitoring to assess a precise diagnosis.
INTRODUCTION
Spinal cord ischemia (SCI) is a rare complication following an endovascular aortic aneurysm repair (EVAR). We present a case of a patient with a tethered cord, who developed a cauda equina syndrome following an EVAR, due to isolated medullary cone ischemia.

CASE REPORT
We present the case of a 74-year old male, with an extended cardiovascular history who received an EVAR for an infrarenal aortic aneurysm. During surgery, an occlusion of the prosthesis occurred, which was treated with thrombolysis. Immediately after surgery, the patient noticed paresthesias on the backside of both legs and diminished force in the right leg. Clinical investigation showed normal strength, a slight dysesthesia on the left medial thigh, an absent anal reflex, as well as fecal soiling and urinary retention. An urgent MRI revealed a tethered cord and an ischemic zone on the left side at the end of the medullary cone. Treatment consisted of tension control and observation, he slowly regained bladder function and fecal continence over the following days.

DISCUSSION
In this case, the SCI was likely due to a prolonged procedure, combined an aberrant anatomy and global hypoperfusion of the medullary cone which is known in tethered cord syndrome. We present this case to warn surgeons operating on a patient with tethered cord, performing any type of lumbar surgery, as compromise of even small radicular blood vessels can cause ischemia in these precarious situations. A recent review revealed a poor prognosis, with only 25% of patients making full recovery after lumbar SCI in general.
INTRODUCTION
Conjoint nerve root syndrome is a benign development anomaly, usually occurring in the lumbosacral region. This anatomical variation is in most patients asymptomatic. Due to this syndrome multiple nerves are at risk for entrapment at the level of the anomaly. L5 and S1 roots are most frequently involved (50%), followed by S2 anomalies (30%). Several classifications have been describing different types of anomaly.

CASE
A 52-year-old female patient developed acute back pain with painful radiation in the left leg matching with both L5 and S1 roots. There was grade 3 loss of power on the Medical Research Council (MRC) grading scale in the extensor muscles of the left foot. MRI showed a foraminal disc herniation at L5-S1 disc level, compressing both L5 and S1. Needle electromyography (EMG) confirmed L5 and S1 radiculopathy. The patient preferred a conservative treatment. Non-surgical treatment with oral pain killers and a transforaminal epidural infiltration were insufficient on pain relief. Eleven days after onset, a lumbar microdiscectomy was done. Intraoperative microscopic view of the left lateral recess at L5-S1 disc level showed a triple conjoint root of L5, S1 and S2 nerves with duplication of S2. All symptoms fully recovered after surgery.

CONCLUSION
Knowledge of the existence of triple conjoint root development anomaly is of great importance for all spinal surgeons, as the anomalous root can be misinterpreted as a mass lesion, leading to an intervention at an incorrect level or accidentally causing nerve damage during surgery.
INTRODUCTION
Intracranial fat deposits are an uncommon finding, most often they attributable to rupture of a dermoid cyst.

CASE PRESENTATION
We present the case of an 83-year-old woman admitted after she fell down some steps at her house. She complained of headache and pain in the sacral region. Clinically, she demonstrated mild disorientation in time. A brain CT showed multiple low attenuation lesions in the left lateral ventricle, as well as the right insular and prepontine subarachnoid space. These lesions demonstrated a mean density of -105 Hounsfield units, compatible with fat. A CT of the lumbosacral spine was remarkable for a displaced multi fragment fracture of the sacrum involving the spinal canal at the level of S2. The patient had a DNR order put in place and subsequently succumbed to acute pulmonary oedema before further investigation could be undertaken.

DISCUSSION
We hypothesize that fatty material originating from the exposed bone marrow of the sacrum migrated through a meningeal breach. This material, clustered into lipid droplets, was able to drift up to the cranium. Intrathecal fatty dissemination has been previously reported in the setting of suspected rupture of an intracranial or spinal dermoid cyst. The presence of free fatty material in the subarachnoid space can cause aseptic chemical meningitis. Such follows mostly a benign course, however, some patients require supportive care and administration of corticosteroids.

CONCLUSION
The presence of intracranial fat in the context of trauma and absence of intracranial tumour should prompt a workup for spinal injury.
**Title**: Unilateral hearing loss as a main clinical presentation of Chiari I malformation.

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**Keywords**: Chiari, hearing loss

**TEXT:**

**INTRODUCTION**
Chiari I malformation is a radiological diagnosis with a wide and varying clinical presentation, but most frequently presents with occipitocervical headache. Sensorineural hearing loss is rarely the main symptom. Possible theories of hearing loss in Chiari malformations are compression or traction of the vestibulocochlear nerve or the cochlear nuclei. Other theories include ischemia of the cochlear nuclei by the posterior inferior cerebellar artery (PICA) or its branches. Traction of the nerve does not seem explanatory since there’s no brainstem herniation in Chiari I. The reversibility of the hearing loss makes ischemia less likely.

**MATERIAL AND METHODS**
We describe a 28-year-old patient presenting with rapid progressive unilateral hearing loss because of Chiari I malformation (Figure 1). Patient underwent suboccipital craniectomy with C1 laminectomy followed by tonsillar coagulation and fascia lata duraplasty.

Figure 1: Preoperative MRI (T2 FLAIR) showing tonsillar herniation >9mm with compression of medulla oblongata. There was no hydrocephalus or syringomyelia.

**RESULTS**
MRI scan showed adequate decompression without cerebrospinal fluid leakage (Figure 2). The unilateral hearing loss completely disappeared. This was confirmed with a pre- and postoperative audiogram (Figure 3).

Figure 2: Postoperative MRI (T2 FLAIR) showing adequate decompression without sign of cerebrospinal fluid leakage.

Figure 3: Pre- (dot) and postoperative (cross) audiogram showing normalization of the hearing loss, except for a subclinical remnant for the highest frequencies.

**CONCLUSION**
Chiari I malformation may present with sensorineural hearing loss as a main symptom. The hearing loss responded very well to fossa posterior decompression.
INTRODUCTION
Spontaneous acute spinal subdural hematoma (SSDH) is a rare cause of acute back pain, presenting within minutes to days along with radicular pain or myelopathy, most frequently involving the thoracolumbar and lumbar spine.

CASE REPORT
A 70-year-old woman presented to the emergency department due to back pain since 24 hours, new sudden gait instability and uncontrolled hypertension. There was no history of trauma or anticoagulation. Initial neurological examination revealed gait instability due to sensory ataxia, without motor weakness. Over the next four hours she developed a progressive paralysis in the proximal legs. Lumbar CT showed a discrete dense mass anterior in the spinal canal. Lumbar MRI showed an anterior extramedullar subdural mass from T9 to L3. The patient underwent an urgent decompressive laminectomy of T10-L1, showing a dark discoloration of the dura. Durotomy revealed an anterior subdural hematoma, which subsequently was removed in clots. No active bleeding point was identified. One week later, the motor weakness had improved to a MRC grade 4+ proximal in the left leg and grade 3 proximal in the right leg.

DISCUSSION
SSDH is a rare cause of spinal cord compression. Spontaneous idiopathic SSDH is not well understood, but could result from rupture of valveless radiculo-medullary veins or extra-arachnoidal vessels located on the inner dural surface, especially in the context of uncontrolled hypertension.

CONCLUSION
Spinal subdural hematoma is a rare entity requiring a fast decompressive surgery with evacuation of the hematoma to achieve satisfactory clinical results.
INTRODUCTION
Neurenteric cysts are rare congenital malformations of endodermal origin, believed to be included in the split notochord syndrome.

MATERIAL AND METHODS/CASE PRESENTATION
A 55 years-old man presented with a three years lasting low back pain, radiating to the right buttock and lateral aspect of the right thigh, progressive legs weakness and increasing gait instability, with several episodes of falls. Neurological examination showed a right sided weakness, hypoesthesia below a Th9 level, brisk reflexes and bilateral Babinski signs. Electromyogram and somatosensory evoked potentials were normal. Spinal cord MRI showed a intradural cystic lesion at the D7 - D8 level, anterior to the spinal cord, causing severe cord compression and syringomyelia, without contrast enhancement.

RESULTS/SURGICAL TECHNIQUE AND EVOLUTION
Thoracic laminectomy extended to the left rib and transverse process was performed, allowing sufficient exposure of the lateral aspect of the spinal cord. The cyst was incised and removed, allowing immediate decompression of the spinal cord. The postoperative course was uneventful and the signs of myelopathy improved immediately.

DISCUSSION/CONCLUSION
Neurenteric cyst should be considered in the presence of intradural or intramedullary isolated cystic mass. Although isolated in this case, it can be associated to congenital malformations such as Klippel Feil, tethered cord or filar lipoma. These cysts should be removed completely whenever possible, but partial excision is an acceptable option for intramedullary lesions with significant adhesion, although with a higher risk of recurrence.
INTRODUCTION
Epidermoid cysts are frequent lesions in cranial neurosurgery, but spinal locations are rare and represent <1% of all intraspinal tumors. Most spinal epidermoid cysts are intradural and extramedullary. The lumbar spine represents the most common location. The goal of surgical treatment of spinal epidermoid tumors is the safe resection of both cyst content and tumor membranes. We present the case of a 68-year-old woman with a T4-T5 epidermoid tumor.

MATERIAL AND METHODS
A 68-year-old woman presented with a 3-month history of progressive paraparesis (4/5) and a walking function limited to 500 meters. There was also a mild proprioceptive ataxia. Bilateral pyramidal syndrome was observed. Spinal MRI showed a hyper-T2 hypo-T1 lesion with pericystic Gadolinium enhancement.

RESULTS
Laminectomy was performed before dural opening. We observed a pearly and avascular lesion covered by the arachnoid membrane. We performed a resection of the entire cystic component and its membranes with preservation of the arachnoid sheet. A second microscopic cystic lesion less than 1cm below the main lesion was also removed before closing the dura mater. Postoperative course was uncomplicated, and the patient presented an improvement of the symptoms after few days. Pathological analysis revealed a layer of epidermoid-like cells with irregular nuclei.

CONCLUSION
Epidermoid cysts are rare spinal lesions, especially in the dorsal region. A complete removal of the capsule is recommended when possible to diminish the recurrence rate and the risk of transformation in squamous cell carcinoma, but a partial removal is usually realized to avoid postoperative neurological impairment.
Pseudarthrosis after previous lumbar interbody fusion surgery in lumbar degenerative disease, is a highly described topic in spine surgery.

The diagnosis of pseudarthrosis is often the etiological problem of new or worsening retractable low-back-pain, as well as radiculopathy. There is limited evidence-based literature concerning solutions in the therapeutic management of pseudarthrosis.

Recent studies describe the potential effects in using rhBMP-2 in stimulating bone formation in revision surgery.

We describe a case series, consisting out of 3 patients, whom have had underwent prior posterior lumbar interbody fusion surgery because of degenerative disease of the spine. The clinical presentation showed instability, radiculopathy, and intractable low back pain. Radiological imaging, was performed, showing an incomplete interbody fusion on the L5S1 spinal segment, resulting in the diagnosis of pseudarthrosis. Dosing of the rhBMP-2 was equally made in every case, using 1/3th of the total dose, being 4mg on each spinal segment. The procedure involved a posterior approach, with removal of the present cages, curettage of the disc space and reinsertion of cages with rhBMP-2. In addition the loosened pedicle screws were replaced.

CONCLUSION
All patients showed solid bony fusion in a 1-year follow-up. No side effects or complications secondary to the use of rhBMP-2 were noted in our population group. Thus, its use in spine surgery, more specific in posterior approaches, is safe. Nonetheless, a correct dosing of rhBMP-2 is primordial because of its potential in bone remodeling, resulting in potential local osteolytic effects or ectopic bone formation.
INTRODUCTION
Craniosynostosis has an incidence of 0.0004% and is an isolated non-syndromic malformation in 92%. The sagittal suture is most frequently affected (50%). Non-syndromic multiple suture craniosynostosis is very rare. The parallel growth of the skull to the fused sutures due to Virchow’s law may compensate and attenuate the clinical presentation. This may complicate the bedside interpretation.

MATERIAL AND METHODS
We describe a case with a rare combination of synostosis of the sagittal suture and the left coronal suture. The combined scaphocephaly and anterior plagiocephaly resulted in discrete but typical phenotyping, possibly due to partial compensation of the perpendicular fusions (Figure 1). X-ray confirmed the clinical interpretation (Figure 2).

RESULTS
Patient underwent a cranioplasty with sagittal suturectomy and creation of floating frontal and parietal boneflaps combined with a left fronto-orbital remodelation and advancement (Figure 3).

CONCLUSION
Combination of anterior plagiocephaly and scaphocephaly is an exceptional multiple suture craniosynostosis. It may lead to a misleading and very subtle clinical presentation requesting radiological diagnostic confirmation and careful surgical planning.
INTRODUCTION
Split notochord syndrome (SNS) is a rare condition belonging to the group of spinal dysraphisms and forming a wide spectrum of abnormalities. It associates a vertebral cleft and a communication between the cleft and the gastrointestinal tract. We report the case of a newborn who presented a dorsal enteric fistula and a partial sacral agenesis.

MATERIAL AND METHODS
A full-term newborn girl was vaginally delivered after an uncomplicated pregnancy. She was able to move the lower extremities and had a normal anal function. She presented an erythematous protrusion in the right lumbar area with a small amount of whitish gelatinous substance and a tumefaction on the midline. An ultrasound scan showed a vascular tubular structure protruding from the spinal canal and a lipoma. A surgery was performed some hours after the delivery to close the skin defect and prevent an infection.

RESULTS
We intraoperatively discovered a right displaced hemisacrum non-entirely ossified and a connection between the skin defect and the rectum through this tubular structure. We excised this latter and made a ligature on its basis of implantation. The anatomopathological analysis revealed a rectal fistula with goblet cells. Post-operative MRI documented a tethered spinal cord and the barium enema did not show any contrast agent leakage.

CONCLUSION
SNS is a rare congenital malformation resulting from a defect in the division of notochord and causing a persistent connection between the endoderm and ectoderm. Some patients have a form with dorsal herniation of abdominal organs and a severe prognosis.
INTRODUCTION
Tumours arising from peripheral nerve root extending in the spinal canal (mostly when they are bilateral) are known to cause neurological deficits or pain by compression of the spinal cord. We describe the case of a left C2 schwannoma presenting with neck pain, right shoulder paresis and right brachialgia. Conventional MRI showed no direct compression of the spinal cord. Only MRI with head rotation showed spinal cord compression.

MATERIAL AND METHODS
59-year-old woman was referred in our department for neck pain, right shoulder paresis and right brachialgia (C5) persistent after a 3 levels laminectomy (C3-C6) performed in another neurosurgical department. Neurological examination revealed a positive Lhermitte’s sign. The left C2 schwannoma was fortuitously diagnosed several years before with an MRI realized for walking disorders and remained stable.

RESULTS
Although there was adequate subarachnoid space around the spinal cord on MRI, a deformity of the cord facing the tumour was observed. An intermittent compression was therefore suspected and an MRI with rotation of the head to both sides was performed. It revealed a protrusion of the tumour into the canal with spinal cord compression during the left head rotation. We performed an uneventful total resection through a posterior approach. All preoperative symptoms resolved after surgery and histological analysis confirmed a schwannoma.

CONCLUSION
Even unilateral C2 nerve root tumors can compress the spinal cord only in rotated position of the head. MRI with head rotation is required in case of neurological symptoms without spinal cord compression in neutral head position.
Title : A rare cause of extradural hematoma for a 7-year-old boy.
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Keywords : Eosinophilic granuloma extradural hematoma

TEXT :

CASE REPORT
Langerhans cell histiocytosis is a rare group of disorders characterized by a proliferation of Langerhans-type histiocytes. The range of clinical presentations is very large. Its clinical manifestations range from a solitary lesion in a single organ to a more severe disseminated multisystem disease.

Eosinophilic granuloma (EG) is a subtype of LCH that usually present in the form of a single osteolytic lesion. EG is predominantly a pediatric condition. The skull is the most commonly involved bone in children; Most children with skull EG are presented with a tender enlarging skull mass that sometimes proceeded with a history of head trauma. The relation between the two conditions is unclear.

The presentation of EG of the skull with hemorrhagic sequelae is rare with only few cases describe in the litterature. We present a case of a 7-year-old boy with left occipital EG complicated by a spontaneous infra and supratentorial extradural hematoma.

The literature is reviewed and the possible pathophysiology is discussed.
INTRODUCTION
Diffuse villous hyperplasia of the choroid plexus (DVHCP) is a very rare condition causing shunt-resistant communicating hydrocephalus. Only few cases have been described and it is associated with trisomy 9 mosaicism. There is controversy about what the best treatment is.

MATERIAL AND METHODS
A 11-day-old boy, preterm born and diagnosed with mosaic trisomy 9, presented on outpatient clinic with hypothermia and poor feeding. Ultrasound identified enlarged ventricles and a clear hypertrophic choroid plexus of the lateral ventricles.

RESULTS
A ventriculoperitoneal shunt (VP-shunt) was successfully implanted via the frontal horn of the right lateral ventricle. He was admitted again two months later for increasing head circumference (> 97th percentile), signs of increased intracranial pressure (bulging fontanels and intermittent sunsetting sign) and swelling across the shunt path. Enlarged ventricles were identified and ascites was ruled out. We chose to postpone invasive treatment (resection of choroid plexus with craniotomy) and did a replacement of the VP-shunt.

CONCLUSION
This case of DVHCP shows not only the diagnostic difficulties of this rare form of communicating hydrocephalus, but also the controversy about the best treatment. Literature suggests that invasive brain surgery (excision of choroid plexus) is the best definitive treatment. Because of young age we avoided craniotomy until now and continued treatment of VP-shunt.
INTRODUCTION
A caput succedaneum is a benign, subcutaneous, epiperiostal soft tissue swelling resulting from increased pressure of the birth canal on the fetal head during labor. Treatment is usually not necessary. An infection of a caput succedaneum in the absence of an overt skin-penetrating trauma is very rare and to our knowledge has only been described once before. An active treatment is indispensable.

CASE
We present a case of a newborn with a persistent fever and caput succedaneum after an uncomplicated 40 weeks pregnancy and labor with the use of vacuum extraction. The presence of a normal appearing, though large and still growing, caput succedaneum 14 days after birth with a fever warranted further evaluation. A diagnostic biopsy of the caput succedaneum showed infection with a multisensitive strain of Esscherichia Coli. MRI evaluation confirms the presence of the epiperiostal abscess, without signs of osteomyelitis or intracranial infection. Initial intravenous antibiotic treatment yielded no significant improvement of the infection. Surgical incision and drainage of the abscess followed by a 10 days antibiotic course resulted in full recovery.
INTRODUCTION
The pediatric cerebral oncologic pathology requires a precise diagnosis. This can be difficult to achieve in cases of rare occurrences, such as desmoplastic astrocytomas.

CASE REPORT
During a period of three weeks, a 12-month old child has been presenting a motor regression (impossibility of standing straight and holding her head) associated with a torticollis. CT- & MRI-scans show huge supratentorial mass (10x10x8cm) involving the right frontal lobe and the lateral gyrus. This multilocular tumor is composed of a central cyst (no enhancement after iv contrast) and a peripheral solid portion, which seems to be attached to the underlying dura and is enhanced by Gadolinium injection. Gross total resection was not possible due to local extension to the lateral sulcus and gyrus. Microscopic examination demonstrates a heterogeneous mass, with high and low mitotic activity and without neuronal component. The ATRX gene is positive. Diagnosis of desmoplastic astrocytoma is made. A radio-clinical follow-up will take place every 6 months. As of today, there is no regrowth of the remaining lesion.

DISCUSSION
Desmoplastic astrocytoma is a benign tumor (WHO grade I). Clinical presentation is often related to raised intracranial pressure. Radiological findings show a solid peripheral portion invading and thickening the meninges associated with a central cyst. Surgery is the gold standard treatment.

CONCLUSION
Desmoplastic astrocytoma is a rare condition: the diagnosis can be challenging. It should be evoked when it is discovered in a child with a large supratentorial lesion made of a central cystic part and a peripheral solid component.
INTRODUCTION
We describe the case of a 13-year-old boy with a papillary glioneuronal tumor (PGNT).

CASE REPORT
A 13-year-old boy with no previous medical history experienced headaches and visual disturbances. Brain MRI revealed a left occipital solid-cystic lesion with intense but heterogenous enhancement (fig. 1). The patient underwent a left occipital craniotomy with macroscopically total resection of the tumor. The final histopathological exam reported the presence of prominent pseudopapillary structures and glioneuronal elements, consistent with the diagnosis of PGNT (fig. 2).

DISCUSSION
Papillary glioneuronal tumors are rare well circumscribed complex solid cystic supratentorial lesions. They were first recognised in the 2007 edition of the WHO classification of CNS tumors and are considered WHO grade I tumors. The majority of these tumors are in the cerebral hemispheres, with occasional intraventricular tumors described. The differential diagnosis is primarily of other parenchymal tumors with mixed solid and cystic components, such as ganglioma, pleomorphic xanthoastrocytoma and pilocytic astrocytoma. They are indolent and surgical resection is usually sufficient to effect a cure.

CONCLUSION
PGNT is a recently described central nervous system neoplasm that mostly occurs in the supratentorial system. It mimics other parenchymal tumors with mixed solid and cystic components. Therapy consists of total surgical resection.
**Title**: Aesthetic outcome of metopic craniosynostosis following fronto-orbital advancement and remodelling: a comparative study between methods  

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**Keywords**: metopic craniosynostosis; trigonocephaly; aesthetic; treatment outcome

**TEXT**:

**INTRODUCTION**  
Today fronto-orbital advancement and remodelling (FOAR) is considered as the gold standard procedure for metopic craniosynostosis. The primary goal of surgical repair is to improve the craniofacial deformity. The purpose of this study is to outline the different methods to evaluate the aesthetic outcome in children with metopic craniosynostosis following FOAR.  

**MATERIAL AND METHODS**  
Medline and the Cochrane Database of Systematic Reviews (CDSR) were screened for follow-up studies regarding the aesthetic outcome of FOAR in children with a single-suture, non-syndromic metopic craniosynostosis (n=798).  

**RESULTS**  
After definition of the inclusion criteria, 15 studies were considered for quality assessment and data analysis. There are different methods to evaluate the aesthetic outcome in children with metopic craniosynostosis following FOAR. They can be divided in two main groups. The anthropometric methods use 2D methods (caliper and CT) or 3D techniques to compare the pre-operative state with the post-operative outcome. Subjective methodologies use the Whitaker score or clinical photographs and a panel of professionals and laypersons to evaluate the post-operative outcomes.  

**CONCLUSION**  
Two groups of methods are used for the evaluation of aesthetic outcome of metopic craniosynostosis following FOAR, with both their merits and deficits. In order to obtain a more accurate evaluation, both methods should be used in combination. An anthropometric method using 3D skull morphology allows more regions of the skull to be evaluated. This in combination with a subjective method would give a better estimation of the aesthetic outcome.
INTRODUCTION
Carotid cavernous (CC) fistula is an abnormal communication between the internal or external carotid arteries and the cavernous sinus. We present an interesting and rare case of bilateral spontaneous carotid cavernous fistula treated as conjunctivitis for three months.

MATERIAL AND METHODS
In December 2018, a 60-year-old female patient with a history of Ehlers-Danlos disease was transferred to Clinic Saint Luc (UCL) for suspicion of CC fistula (exophthalmia, left periorbital edema, binocular diplopia, blurred vision, intermittent headaches and conjunctival injection). CT-scan did not show clear CC fistula. A paresis of the right cranial nerve VI was diagnosed with suspicion of a CC fistula that was confirmed at the MR angiography. Patient was referred for endovascular treatment. The CC fistula was more marked on the left side with drainage mainly directed towards the superior ophthalmic vein and the inferior petrosal sinus, while on the right-side drainage was unfortunately mostly directed toward cortical veins.

RESULTS
The left fistula was treated by endovenous approach through the inferior petrosal sinus and coiling of the cavernous sinus from the ophthalmic vein departure point to the inferior petrosal sinus origin. The ICA was totally preserved. The patient outcome was uneventful with significant improvement of her ocular symptomatology and marked reduction of the flow and pressure in the right sinus by stopping flow from left to right.

CONCLUSION
Spontaneous bilateral carotid cavernous fistula is a rare diagnosis. Our case is peculiar because of vision preservation and significant improvement of ocular mobility after treatment despite long duration of symptoms.
INTRODUCTION
The majority of cavernous angiomas are intra-axial lesions and over 80% are located supratentorial. An intradural extramedullar location is extremely rare and only a handful of case reports are available. Recurrent haemorrhages within these low-flow vascular lesions result in expansive growth causing progressive brain stem and cranial nerve compression and possible neurologic dysfunction.

MATERIAL AND METHODS
We report on a 45-year-old female with a progressively growing vascular mass located on the right lateral surface of the medulla oblongata was identified on MRI. Imaging was performed because of chronic occipital headaches and intermittent sudden right-sided migraine attacks. A suboccipital craniotomy combined with C1 laminectomy was performed. A highly vascularized, fragile and partially thrombosed encapsulated multicystic lesion could be identified. Complete microsurgical resection was obtained without neurologic impairment.

RESULTS
As preoperatively expected, the lesion was situated entirely extraparenchymal. Pathologic analysis confirmed the diagnosis of a cavernous hemangioma. After resection her migraine attacks were completely resolved.

CONCLUSION
Extradural foramen magnum cavernomas are extremely rare. Despite its precarious location, progressively growing and/or symptomatic lesions should be microsurgically resected.
INTRODUCTION
The dentato-rubro-olivary pathway (Guillain-Mollaret triangle) is formed by dentate nucleus, contralateral red nucleus and contralateral inferior olivary nucleus (ION). The ION provides important input to the cerebellum and plays a role in motor control. A lesion along this pathway is known to cause hypertrophic olivary degeneration (HOD).

MATERIAL AND METHODS
A 66-year old female patient presented with right-sided cerebellar symptoms (dysarthria, difficulties walking and ataxia in right hand and leg) for one year. MRI revealed a cavernous malformation in the tegmentum pontis on the left side, close to the superior cerebellar peduncle. Closer examination of the MRI revealed left HOD and atrophy of the right dentate nucleus.

RESULTS
It was initially difficult to explain how a left-sided brainstem cavernoma could cause right-sided cerebellar syndrome. Only by disentangling all components of the dentato-rubro-olivary pathway we can explain her symptoms. The cavernoma lies close to the left superior cerebellar peduncle, however if the SCP was damaged, it would lead to ipsilateral (left-sided) cerebellar symptoms. We hypothesize that the cavernoma damaged the left central tegmental tract, causing a left sided HOD and further degeneration of the right dentate nucleus.

CONCLUSION
This report supports the corticonuclear organization of the cerebellum, the important contribution of the ION and emphasizes the function of the dentate nucleus as the principal output nucleus. Only by unraveling the components of the dentato-rubro-olivary pathway we could explain her symptoms. This case stresses the importance of a good knowledge of complex anatomical relations, necessary to diagnose patients with neurological deficits.
INTRODUCTION:
Burr hole surgery for moyamoya disease and moyamoya syndrome is known to be an effective, versatile, and relatively simple revascularization technique. We will focus on the technical operative aspects of multiple burr hole surgery as we perform it in our center.

MATERIALS AND METHODS
Periosteal flaps are prepared and placed in a burr hole with beveled edge, after opening the dura and arachnoid membrane, in order to facilitate neovascularization into the ischemic cortex.

RESULTS
Follow-up of patients shows an adequate neovascularization.

CONCLUSIONS
Burr hole surgery is a versatile treatment modality for moyamoya and moyamoya-like disease. Success can be maximized by having a meticulous operative technique.
FUNCTIONAL

Title: Improving targeting accuracy leading to successful treatment of secondary dystonia with deep brain stimulation of globus pallidus internus

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Keywords: DBS secondary dystonia

TEXT:

INTRODUCTION
Cervical dystonia is a very disabling disease. Bilateral deep brain stimulation (DBS) of the globus pallidus internus (GPI) has been proven to be a successful treatment for dystonia. The results of DBS in secondary dystonia are unclear. A crucial part of the surgical procedure contains the anatomical accuracy of the implanted electrode comparing with the obtained target.

MATERIAL AND METHODS
A 57-year old male patient presented with a severely disabling cervical dystonia, due to longterm neuroleptic drug intake. Due to failure of best medical management, the patient was treated with bilateral DBS of the GPI under general anesthesia. Preoperative 3T MRI protondensity and T1 MPRAGE with gadolinium sequences images (Siemens Skyra 3T MRI) were made. Direct targeting through visualization of the GPI in protondensity images was done. After attachement of a CRW frame, CT guided stereotactic images were made and fused with the MRI images. Peroperative microrecordings and macrostimulation were used to verify the correct electrophysiological location and estimate the threshold for especially capsular motor side effects. There were no surgical or postoperative complications.

RESULTS
The patient developed 90% relieve of the symptoms during the next days after surgery without side effects.

CONCLUSION
The success of DBS correlates with the anatomical accuracy of the implanted electrode. The error between anatomical target and the final electrode trajectory can be decreased by improving the quality of the preoperative MRI images. Anatomical landmarks are more clearly shown with specialised MRI settings. General anesthesia avoids motion artifacts. More evidence had to be obtained for DBS in secondary dystonia.
INTRODUCTION
Intermediate nerve neuralgia (IN) represents a rare type of cranial neuralgia, characterized by paroxysmal episodes of pain in the auditory canal, in absence of clinically evident neurological deficits, with the posterior wall of the auditory canal as possible trigger zone. We report the case of patient suffering from typical IN, illustrating the diagnostic and therapeutic challenges in this pain syndrome.

MATERIAL AND METHODS
A 64-year-old male suffered from typical IN since three years. A 3D-CISS-MRI proved neurovascular impingement at the root entry zone of the acousticofacial bundle by an elongated vertebral artery. Due to unbearable otalgia despite pharmacological treatment, the patient eventually had to be sedated and intubated. As a last resort, the patient was referred for surgical treatment. Through a posterior fossa retrosigmoid keyhole approach, microvascular decompression was performed. The intermediate nerve was mobilized from the offending vertebral artery without sectioning and a Teflon paddy was placed in-between to prevent recurrence.

RESULTS
The postoperative course was uneventful. The patient noticed immediate pain relief, with normal facial, auditory, vestibular, gustatory and sensitive functions. The patient was discharged on the seventh postoperative day and remained pain free without medication.

CONCLUSION
IN poses a clinical, diagnostic and therapeutic challenge, with lack of large randomized controlled studies due to rareness of the disease. Various types of chronic pain in the ear canal are reported, therefore patients with paroxysmal intractable otalgia should undergo a high-resolution MRI to exclude other causes and identify a possible neurovascular conflict. In the latter case, surgery should be considered in an early stage.
INTRODUCTION
The selection of treatment goals (i.e. goal setting), adds patient engagement in order to achieve individual selected outcome parameters. Even though spinal cord stimulation (SCS) has been used extensively, patients’ individual goals that they want to achieve with SCS, remain to be explored. Therefore, the aim of this study was to explore goal setting in patients with FBSS.

MATERIAL AND METHODS
Fifteen patients suffering from FBSS and scheduled for SCS were in-depth interviewed. The ICF-framework was used to structure the responses of patients. All interviews were recorded and analyzed using in vivo coding.

RESULTS
In the domain of bodily functions, 11 patients wanted to regain a feeling of happiness, 5 patients wanted to focus on avoiding depression and 1 patient wanted to regain his previous sleep pattern, besides pain reduction. In the domain of activities, walking, sitting, driving a car, bending down and picking up were the highest ranked goals. Regaining a social life was the highest ranked goal for participation. Additionally, 8 patients indicated that they have concerns about SCS with subthemes a) fear of complications, b) fear of procedure success and c) fear of pain after procedure.

CONCLUSION
This study reveals the importance of an appropriate goalsetting, since the interviews revealed a broad spectrum of individual patients’ goals. Goalsetting could entail the first step towards individualized medicine in the SCS trajectory.
INTRODUCTION
Building on the recent finding that chronic pain patients with impaired functioning of the descending nociceptive inhibitory system (DNIS) present lower resting heart rate variability (HRV), this study aims to investigate the impact of spinal cord stimulation (SCS) on HRV in patients with Failed Back Surgery Syndrome (FBSS). More precisely, we hypothesize that SCS influences the DNIS, with increased parasympathetic tone as a consequence, as measurable by HRV analysis.

MATERIAL AND METHODS
Twenty-two patients diagnosed with FBSS and treated with SCS participated in this study. HRV was measured with a 2-lead ECG registration tool during on and off state of SCS. HRV analysis for time, frequency, time-frequency and nonlinear domain parameters was based on a 5-minute recording segment.

RESULTS
The mean heart rate and low frequency power were significantly lower when SCS was activated. HRV, absolute and normalized high frequency power significantly increased during SCS compared to without SCS. The ratio of low frequency/high frequency ratio’s, as parameter for global sympathetic-parasympathetic equilibrium, significantly decreased when SCS was activated.

CONCLUSION
When SCS is switched off, patients with FBSS present relatively stronger sympathetic tone and weaker parasympathetic activity. Activation of the SCS, possibly via stimulation of the DNIS, restores this disbalance of autonomic activity.
INTRODUCTION
The exquisite capacity of humans to detect and recognize faces is crucial for social interaction. Although disentangling the neural basis of human face recognition is a key goal in neuroscience, direct evidence at the single-neuron level is virtually nonexistent. We report the first face-selective neurons recorded in human visual cortex, in a region characterized by functional magnetic resonance imaging (fMRI).

MATERIAL AND METHODS
A micro-electrode array was implanted in the right occipito-temporal cortex of a 28-year old epilepsy patient during depth electrode placement which allowed us to study a face-selective region at high spatiotemporal resolution (single neuron level). To investigate the processing of facial features at the single-cell level in humans, we capitalized on the phenomenon of face pareidolia, the compelling illusion of facial features in inanimate objects. Stimuli of faces (n=32), face-like objects (n=32) and objects (n=32) were presented while recording neural activity. Three months after removal of the electrodes we performed fMRI using the same stimuli.

RESULTS
In total, we recorded the activity of 44 visually responsive single neurons. The majority of visually responsive neurons in this fMRI activation showed strong selectivity at short latencies for faces compared to objects. Face-like objects evoked intermediate responses – consistent with the fMRI activations.

CONCLUSION
Individual human neurons showed strong and early selectivity for faces, consistent with fMRI activations. Face-like objects induced intermediate neuronal responses. Thus, face-selective neurons at this level of the visual hierarchy are broadly tuned, responding even to illusory facial features.
INTRODUCTION
The descending pain modulatory system (DPMS) comprises a network of cortical and subcortical brain and brainstem regions that can inhibit nociceptive afferent brain input. Recently, researchers found that conventional and new paradigms of SCS (such as high frequency SCS at 10 kHz or Burst SCS) induces several influences on the modulation circuits in the cerebrum and brainstem. The authors investigated the effect of High-Dose SCS (HD-SCS) on the DPMS.

MATERIAL AND METHODS
were enrolled in this study. They underwent a rs-fMRI protocol at baseline (before implantation) and 3 months after HD-SCS. Functional changes from the DPMS were obtained and a correlation between clinical results and strengths in functional connectivity (FC) was made. Also, correlation with a potential conditioned pain modulation (CPM) effect was investigated.

RESULTS
Significant increases in connectivity strength (p<0.05) between several regions of interest (ROI’s) of the DPMS were found after 3 months of HD-SCS. No statistically significant correlation was found between the clinical results and FC changes from the DPMS. Furthermore, after 3 months of HD-SCS 4 patients out of 7 were able to demonstrate a CPM effect.

CONCLUSION
These results demonstrate for the first-time differences in FC after HD-SCS in patients with FBSS. The observations provide us more insight of the physiological processes underlying HD-SCS. An alteration of the DPMS could feed the hypothesis of the possible inhibitory supraspinal effect of HD-SCS.
INTRODUCTION
At a frequency of 40–60 Hz and relieves pain in FBSS patients. During the last decade, two major changes have emerged in the techniques of stimulating the spinal cord: paresthesia-free or subthreshold stimulation and administration of higher frequency or higher amounts of energy to the spinal cord. Despite the positive clinical results, the mechanism of action remains unclear. A functional MRI (fMRI) study was conducted to investigate the brain alterations during subthreshold and suprathreshold stimulation at different frequencies.

MATERIAL AND METHODS
Ten subjects with FBSS, treated with externalized SCS, received randomly four different stimulation frequencies (4 Hz, 60 Hz, 500 Hz, and 1 kHz) during four consecutive days. At every frequency, the patient underwent sub- and suprathreshold stimulation. Cerebral activity was monitored and assessed using fMRI.

RESULTS
Suprathreshold stimulation is generally accompanied with more activity than subthreshold SCS. Suprathreshold SCS resulted in increased bilateral activation of the frontal cortex, thalamus, pre- and postcentral gyri, basal ganglia, cingulate gyrus, insula, thalamus, and claustrum. We observed deactivation of the bilateral parahippocampus, amygdala, precuneus, posterior cingulate gyrus, postcentral gyrus, and unilateral superior temporal gyrus.

CONCLUSION
Suprathreshold stimulation resulted in greater activity (both activation and deactivation) of the frontal brain regions; the sensory, limbic, and motor cortices; and the diencephalon in comparison with subthreshold stimulation. Each type of frequency at suprathreshold stimulation was characterized by an individual activation pattern.
INTRODUCTION
Foix-Chavany-Marie syndrome (FCMS) is a corticosubcortial suprabulbar palsy with loss of voluntary control of palatal, glossal, pharyngeal and masticatory muscles. It is usually described in patients with bilateral opercular lesions. Most cases are caused by opercular strokes but we present a case where symptoms are caused by a sunken skin flap.

MATERIAL AND METHODS
A 52-year old male patient was referred because of dysarthria, dysphagia and sialorrhea since a couple days. Thirty years before he had received radiotherapy for pineal region tumor and 5 years ago he had been operated for a right temporal meningioma, possibly radiation-induced. He had 6 months before undergone resection of multiple left-sided meningiomas (using 2 small bone flaps), complicated with empyema and epilepsy. Bone flaps had to be removed and later patient had refused cranioplasty. Differential diagnosis was neuromuscular disorder, side effects of anti-epileptic drugs and sunken skin flap syndrome.

RESULTS
We assumed that compression of the opercular region by atmospheric pressure was causing his symptoms. Imaging showed postoperative changes in the right subcortical insular region and sunken skin flap with compression in the left operculum. After staying supine for 3 days, his bulbar paresis improved. Afterwards he was successfully treated with cranioplasty.

CONCLUSION
Based on clinical findings, we speculate that a newly arising unilateral sunken brain syndrome in the left operculum with a persistent old lesion in the contralateral insular cortex resulted in bilateral opercular dysfunction, causing FCMS. Diagnosis was confirmed when removing atmospheric pressure improved his symptoms.
INTRODUCTION
Image-guided neurosurgery based on neuronavigation is become an essential tool for intracranial neurosurgery. However, the accuracy of neuronavigation systems based on preoperative imaging data is limited due to intraoperative changes such as “brain shift.” Intraoperative Imaging modalities are necessary to address this limitation. Intraoperative MRI or CT require long image acquisition times, enormous economic investment. Advanced intraoperative ultrasonography (IOUS), truly produced in real time could present a promising alternative. The aim of this study was to review the clinical application of IOUS and analyze its benefit as an effective tool for neuronavigation.

MATERIAL AND METHODS
Since March 2017, 24 patients admitted for a brain surgical procedure underwent an IOUS neuronavigation procedure. The surgical indications were brain tumors, hydrocephalus drainage, vascular clipping procedure. Ultrasonography modality was co-registered with preoperative MRI in all cases.

RESULTS
This procedure takes less than 10 minutes and was considered as accurate (positioning error is within 2mm) in all cases. Interesting information as location or vascularization of the brain lesions, location of deep vascular structures, brain shift or adequate positioning of catheter were obtained. No related complication was reported.

CONCLUSION
Based on this preliminary experience, we consider the intraoperative ultrasonography (IOUS) neuronavigation procedure as feasible, accurate and helpful. A larger experience is still necessary to understand all the benefit possible offer by IOUS.
INTRODUCTION
Superior semicircular canal dehiscence (SSCD) or Minor’s syndrome is a rare disorder. Other otological pathology, in particular otosclerosis, can mimic this pathology. The five most characteristic symptoms are vertigo, nausea, nystagmus induced by sound (Tullio Phenomenon) or pressure (Hennebert’s Sign), pulsatile tinnitus, conductive hearing loss and autophony. These symptoms can be explained by the “third window” theory. Other common complaints such as vertigo by head movement, dizziness, instability, aural fullness and hearing loss are not specific for SSCD. Audiograms show typically low frequency conductive hearing loss.Computed tomography of the temporal bone is essential in diagnosing SSCD. Different non-surgical and surgical treatment options are previously described. Minimal symptoms or solitary hearing loss should be treated preferably non-surgically. Three major surgical techniques are described: round window reinforcement, transmastoid semicircular canal occlusion and subtemporal extradural resurfacing by craniotomy.

MATERIAL AND METHODS
Three patients with severe, disabling symptoms of unilateral SSCD were operated. A subtemporal extradural approach was performed in each patient with covering the SSCD by bone and a tensor fascia latae plasty.

RESULTS
Two patients had complete disappearance of all symptoms. The third patient had significant improvement and retained minimal vertigo after surgery. There were no postoperative complications. There were no reinterventions needed. Conductive hearing normalized in all patients in comparison with preoperative audiograms.

CONCLUSION
The subtemporal extradural approach with resurfacing of the dehiscence is safe and grateful technique to improve severe, disabling symptoms. It is in addition the only surgical technique to give possible improvement of the hearing loss.
Title: Bone flap resorption following cranioplasty
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Keywords: bone flap, resorption, complication, cranioplasty

TEXT:

INTRODUCTION
A series of 2 patients with bone flap resorption following cranioplasty were reported.

MATERIAL AND METHODS
Two patients had cranial surgery, one for decompressive craniectomy and the other for brain tumor, with associated cranioplasty. Both patients complained of a cosmetic problem due to change in the thickness of the bone flap, one patient at 2.5 years after cranioplasty and the other patient at 1.8 years post-surgery. A CT scan showed bone flap resorption with loss of >50% of the initial thickness of the bone flap, for both patients. Esthetical disfigurement and risk of brain injury after head trauma were the 2 indications for a second surgery for both patients.

RESULTS
Both patients were reoperated with removal of the residual bone flap and placement of a synthetic acrylic 3D prosthesis. No complication occurred.

CONCLUSION
Bone flap resorption is a very rare but already reported complication after surgery with cranioplasty, mainly after decompressive craniectomy. No variable has been found to date to be significantly associated with a higher risk of bone flap resorption, including the different methods of conservation of bone flaps. Pedicled bone flaps seems to avoid this risk.
INTRODUCTION
Ventriculoperitoneal shunt (VPS) is recommended among others in refractory cases of Idiopathic intracranial hypertension (IIH). Although it’s one of the most common neurosurgical procedure, complications are commons (51% requiring revision, 30 % multiple revisions). We describe here one rare complication which is ascites causing abdominal pain.

MATERIAL AND METHODS
43-year-old women with headache, nauseas, and visual deficit was diagnosed with IIH. She had no surgical history. Because of the failure of the medical treatment and after a multidisciplinary discussion, we proposed VPS placement under neuronavigation. The immediate postoperative course has been uneventful with immediate extinction of headache. One month later, she was referred for abdominal pain for 10 days without infection symptom. Computed tomography (CT) scan revealed ascites between the liver and the diaphragm. The shunt was externalized at the abdominal extremity. After being sure there was no infection, we placed a new catheter using the same abdominal incision. A few days later, she was referred for the same abdominal complaint and the imaging confirmed recurrence of ascites. We decided to perform a ventriculo-auricular shunt (VAS).

RESULTS
The abdominal pain decreased in the first days after surgery and the patient left our unit a few days later. The control scan showed a clear regression of the ascites.

CONCLUSION
CSF ascites is a different and rare complication of VPS from abdominal pseudocyst, even in patients who never underwent abdominal surgery before. It doesn’t cause shunt dysfunction but abdominal pain. The gold standard remains to drain the CSF to another site than the peritoneal cavity.
CASE REPORT
A male patient of 73 years old was referred to our outpatient clinic. In 2012 he presented with bacterial meningitis due to liquorrhea of the left ear. Further investigation showed a defect of the tegmen tympani on the left side. He underwent surgery, minimal low temporal approach, and a duraplasty with periosteal flap was successfully placed over the defect. After surgery the otorrhea resolved.

During the following years the patient presented with hearing loss on the right side. Otological examination showed effusion of the middle ear, whereafter a tube was placed through the tympanic membrane. After tube placement, he started suffering from otorrhea again, this time on the right side. Beta2transferrin testing confirmed the diagnosis of liquorrhea on the right side. Computer tomography showed thinning of the tegmen on the right side, whereafter he underwent the same procedure on the right side.

Spontaneous tegmental defects are rare; most defects are seen after mastoid surgery. Predetermining factors of spontaneous defects are chronic mastoid inflammation, arachnoid granulations, dural weakness and congenital thinning of the tegmen. There are very few cases described in the literature with bilateral otorrhea. In most of these cases the otorrhea presents consecutively; after successful surgery on one side, the contralateral side becomes symptomatic. We would like to underline the importance of evaluation of both sides of the middle ear in case of unilateral otorrhea.
INTRODUCTION
The abduction function of the shoulder is largely dependent on a good function of the deltoid muscle as the function of the compensating rotator cuff diminishes with advancing age. The function of the deltoid muscle can be impaired after a brachial plexus lesion or selectively impaired typically after an anterior luxation of the shoulder. The strategy of performing a nerve transfer to the deltoid muscle is an elegant technique as it is simple and has a quick recovery. We present the technique we applied in 2 cases.

MATERIAL AND METHODS
We present a 35-year-old patient with a total loss of axillary nerve function after a fracture dislocation of the humerus head and an 80-year old patient who suffered a brachial plexus lesion after a shoulder dislocation. We provide detailed description including images showing how to perform the radial nerve-to-axillary nerve transfer.

SURGICAL TECHNIQUE AND RESULTS
By dissecting the caudal border of the deltoid muscle we find the axillary nerve in the quadrilateral space. More distally under the long head of the triceps muscle we find the radial nerve in the triangular space. An end-to-end anastomosis was then accomplished under an operating microscope using 8-0 nylon sutures. We obtained a very nice recuperation of the function (MRC Grade ≥ 3/5).

CONCLUSION
The use of the radial nerve as a donor to the axillary nerve to restore deltoid function is a technique without complications. The literature describes 73% to 88% of the patients regaining useful deltoid strength after 12 months.
INTRODUCTION
A 22-year old male sustained a sword injury during a medieval re-enactment. The sword perforated the left orbit, frontal and parietal lobe until it hit the inner cortex of the skull. At the emergency department a right sided paralysis and motor aphasia was present. After two weeks he was discharged to the rehabilitation unit, with a slight recovery of the motor deficit. At 3 months he had made a spectacular motor recovery, with however residual motor aphasia, sensory loss and minor clumsiness of the right hand. At 6 months he made a near complete recovery, with a very subtle language and fine motor deficit.

MATERIAL AND METHODS
We performed functional magnetic resonance imaging (fMRI; task-based: motor, language; and resting state) and diffusion tensor imaging (DTI) at 3 months and 6 months to assess possible networks supporting recovery.

RESULTS
Language fMRI at 3m showed intact activations in the left hemisphere. DTI showed a marked decrease in volume and fractional anisotropy (FA) of the left superior longitudinal and arcuate fasciculus. Motor recovery of the right hand was clinically paralleled with mirror movements. During bilateral lip movements no fMRI activation was present in the damaged hemisphere, suggesting that the intact hemisphere compensated for this loss.

CONCLUSION
Recovery after an extensive penetrating head injury is possible and is paralleled by cortical and subcortical reorganization mechanisms, which can be illustrated using advanced MR imaging.
INTRODUCTION
Cerebral and spinal hydatid cysts are extremely rare and, despite advances in imaging and therapy, it remains difficult to manage. The purpose of this presentation is to show the role of imaging in the management of this disease.

MATERIAL AND METHODS
We report five cases of hydatid cysts in nervous system that were explored by MRI and then treated by surgery.

RESULTS
MRI revealed a hydatidosis in intracranial in two cases and in the medullary canal in three cases. Hydatid serology was positive in all cases. No recurrence in the two cases of intracranial hydatidosis and in one case of intramedullary hydatidosis, whereas the postoperative follow-up of two other cases was marked by recurrence.

CONCLUSION
Advances in imaging make MRI the gold standard for detecting the hydatid cyst of the nervous system.
Title : Tissue engineered methods of peripheral nerve repair
Authors : Tybault Hollanders
Affiliations : UZ Ghent
Keywords : Tissue engineering, peripheral nerve, conduits

TEXT :

INTRODUCTION
Peripheral nerve injury is a clinical entity which can cause severe functional deficits. Traditional treatment options include end-to-end anastomosis, split nerve neurography or autologous nerve grafting. Functional results however are often dissatisfactory. Advancements in tissue engineering provide new promising treatment options in the form of Nerve Guidance Conduits (NGCs).

MATERIAL AND METHODS
A Pubmed database search was performed for fundamental science studies reporting tissue engineered methods of peripheral nerve repair.

RESULTS
NGCs are biocompatible scaffolds interpositioned between proximal and distal ends of a transected peripheral nerve. Although biological NGCs (arteries, veins, allogeneic nervegrafts) are known therapeutic entities, increased effort is put in the development of artificial NGCs made from biological (collagen, hyaluronic acid,...) or synthetic (PLLA, PCL, PLGA,...) polymers. Artificial NGCs are able to induce, promote and accelerate axon regeneration by providing a growth stimulating environment. This environment is engineered by seeding cells (e.g. Schwann cell precursors), including growth factors (neurotrophins) and modifying macro-, micro- and nanoscale properties of the polymer scaffolds. Application of these advanced constructs shows promising results, but is mostly limited to small scale in-vitro and lab animal studies. Clinical application and evaluation of the few available FDA approved constructs in humans are sparse and hard to compare due to lack of controlled studies.

CONCLUSION
Artificial NGCs have been proposed and created in a large variety of forms and sizes promising improved axonal regeneration over tradition repair of peripheral nerve lesions. Results from basic research studies are promising and encourage further evaluation in human in-vivo studies.
INTRODUCTION
Lesions extending beyond sagittal plane can be difficult to reach in endonasal skull base surgery. No depth perception and narrow working space are common limitations. On the other hand, having instruments coming in a lateral direction during endoscopic surgery allows traction and counter-traction and enhances the perception of depth.

MATERIAL AND METHODS
Multiportal endoscopic endonasal skull base approach carried out in 11 cadavers combining a transmaxillary “Sinus Lift” approach with a bi-nostril endonasal approach and assessment of gained working angle.

RESULTS
In addition to standard endonasal ports, we have systematically added one or two maxillary ports via a gingivo-buccal U-shaped incision lateral to the canine eminence and a 1cm² opening of the anterior wall of the maxillary sinus that is frequently used in dental surgery (Sinus Lift). This technique is feasible, it allows reaching areas that extend lateral to the median skull base, it reduces overcrowding in the surgical area and permits to work with instruments coming in a lateral direction with additional working angles (mean 18.3°; range 16.8° - 20.3°).

CONCLUSION
Combined endonasal and transmaxillary skull base surgery enhances the working angles and the perception of depth. We believe this approach is less disruptive of the nasal corridor compared to other maxillary approaches, it has less risk regarding infra-orbital nerve, it allows easier access to deep lesions and facilitates the approach to difficult to reach areas with a suitable angle. Finally, this technique enables to work with more than three instruments within the surgical field, what can be advantageous in case of unexpected event during surgery.
Title: Belgian Neurosurgical Trainees
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Affiliations: UZ Leuven
Keywords: Education, Training, networking, Belgian

TEXT:

INTRODUCTION
Belgian Neurosurgical Trainees (BNT) is a new section under BSN that should represent all Belgian neurosurgeons in training. It has recently been established by and for all Belgian trainees.

ORGANISATION
This section is organised around a central board, with functions of president, vice-president, social activities, education, secretary/PR, treasurer and international relations. This board is elected yearly. Every education centre/university has its own representative, who serves as a way to keep contact with all.

MISSIONS
The main goal is to increase connections between different hospitals and resident-centres and to have more networking opportunities. Today the landscape is widespread and even though we are a small country we know too little about each other. This section should also increase the affinity of neurosurgeons on a younger age with the national organ that represents us, the BSN.

Different sites we want to explore:

- Political: to be a contact person and representative, to unite and voice the opinions of Belgian trainees.

- Education: to give input and improve our education and training as future neurosurgeons, to facilitate exchange between centres and to organise educational events and meetings for trainees.

- Communication: to streamline communication between and for trainees, working with a newsletter and direct contact through the representatives.

- Social: To organise social events for the trainees. By getting to know each other better we hope that we can easier learn from each other. Also this can improve our motivation to continue hard working as social interaction is important in the work pleasure.
BACKGROUND
Post-traumatic vasospasm (PTV) occurs in 35-65% of traumatic brain injury (TBI). However, this complication is mostly seen in severe TBI and less than 20% of cases are symptomatic. We describe here a case of severe vasospasm after mild TBI.

CASE REPORT
A 29-year old male patient was admitted in our hospital for mild TBI (GCS 15 with right hemiparesis). The computed tomography showed a left extradural hematoma (EDH) and slight cisternal traumatic subarachnoid haemorrhage (tSAH). Evacuation of EDH was immediately performed with complete recovery of preoperative symptoms. On post-injury day 11, the patient developed a sudden aphasia and right hemiparesis. Angiography showed a severe and bilateral vasospasm with no response to conventional treatments, leading to delayed ischemia in the right MCA territory. Continuous intra-arterial Nimodipine was administrated for 7 days with slow resolution of PTV and good clinical recovery.

DISCUSSION
Vasospasm is rarely described in the literature as a complication of EDH. Nevertheless, this case illustrates that severe PTV can occur more than 10 days after mild TBI especially in cases associated with tSAH. When suspected, angiography should be performed. Continuous intra-arterial Nimodipine is an effective last tier therapy for refractory vasospasm after aneurismal SAH. In some reports of severe PTV, this treatment seems to improve Transcranial Doppler (TCD) velocities and clinical outcomes.

CONCLUSION
Incidence of PTV is probably underestimated in the literature and severe refractory vasospasm can occur even after mild TBI. We suggest to consider preventive Nimodipine treatment and routine monitoring by TCD if tSAH is associated.
INTRODUCTION
Bridging veins (BVs) drain the blood from the cerebral cortex into the superior sagittal sinus. Relative movement between the brain and the skull can lead to BV rupture and cause Acute Subdural Hematoma, a pathology with a mortality rate from 30% to 90% [1]. This study aims at quantifying the number and the diameter of BVs in humans in order to better understand the inter-subject morphological variability of BVs.

MATERIAL AND METHODS
CT angiograms from 67 patients were collected from UZ Leuven database. The cortex region of each subject was split in ten segments and the number of BVs per segment was noted along with their diameter size. The software MIMICS (Materialise™) was used. Afterwards a statistical analysis was performed using Excel and SAS software.

RESULTS
The mean number of BVs per hemisphere is 11.59. Statistically significant differences were found for the number and the mean diameter between the frontal, parietal and occipital lobe. The highest number of BVs and bigger diameters were found in the parietal lobe, while the lowest number of BVs and smaller diameters were found in the occipital lobe. No statistically significant differences were found between hemispheres.

CONCLUSION
The number and mean diameter of bridging veins have statistically significant differences in the frontal, parietal and occipital lobe, but not in the hemispheres.

REFERENCES