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Abstract 1 [Poster]
Xanthogranuloma in the suprasellar region: a case report
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Objective: Xanthogranuloma, also known as cholesterol granuloma, is extremely rare. It represents approximately 1.9% of tumours in the sellar and parasellar region with 83 cases recognised in the literature. The preoperative diagnosis is difficult due to the lack of clinical and radiological specificities. Through this work, we report the third case of xanthogranuloma in the sellar region described in Tunisia.
Method: We report the case of 29-year-old girl who was followed up since 2012 for delayed puberty. The patient presented with a 1-year history of decreased visual acuity on the right side. On ophthalmological examination her visual acuity was rated 1/10 with right optic atrophy. Biochemical studies revealed ante-pituitary insufficiency. The MRI demonstrated a sellar and suprasellar lesion with solid and cystic components associated with calcification evoking in the first instance a craniopharyngioma. She underwent a total resection of the tumour by a pterional approach.
Result: The anatomopathological examination concluded the lesion to be an intrasellar Xanthogranuloma.
Conclusion: Sellar xanthogranuloma is a rare entity that is difficult to diagnose preoperatively due to its similarities with other cystic lesions of the sellar region, especially craniopharyngioma. The treatment is -essentially surgical. A few rare cases of recurrence after complete excision have been described. Xanthogranulomas of the sellar region are reported to be predominantly located in the sella turcica, but should be included in the differential diagnosis even in cases of suprasellar mass lesions.
Key words: xanthogranuloma, suprasellar region, craniopharyngioma, cholesterol granuloma

Abstract 2 [Oral]
Surgical Treatment of Brainstem Cavernous Angiomas
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Objective: Brainstem cavernomas (BC) are low flow vascular malformations detected incidentally or after bleeding and subsequent neurological deficit. Surgical resection continues to be the treatment of choice. However, cavernoma proximity to vital adjacent structures makes this surgery truly challenging. Recently, a variety of safe entry zones (SEZ) minimising risk of neurological damage during brainstem access have been described. We present a series of 21 patients with BC treated using these approaches
Method: Retrospective study of a series of adult patients (over 18 years of age) who after experiencing an episode of bleeding due to a BC, were operated on at our institution.
Result: Medical records from 21 patients who underwent surgery for BC between 2001 and 2019 were analysed retrospectively. Average patient age was 40 years and follow-up duration was 41 months. The most frequent symptom was sudden headache associated with CNS haemorrhage (66%), and the most frequent neurological sign was hemiparesis (53%). Most BCs were located in the pons (47%) Both telovelo-tonsillar and retrosigmoid approaches were used, most often through SEZs in the suprafacial triangle of the floor of the fourth ventricle, and in the peri-trigeminal area. Thirty-eight percent of

patients were operated after the first episode of bleeding and 57% after the second. Gross total resection was achieved in 95% of cases. Finally, long-term follow-up showed neurological improvement in 71.4% of patients, stable outcome in 23.8% and worsening of symptoms in 4.7%.
Conclusion: At present, treatment of choice for BC continues to be surgical resection in well selected patients. Lesions causing minimal symptoms or without signs of pial-ependymal involvement may be followed conservatively with clinical and imaging surveillance. Detailed anatomical knowledge of the brainstem together with intraoperative neurological monitoring help to decrease postoperative deficits.
Key words: brainstem cavernomas, surgery, safe entry zone.

Abstract 3 [Oral]
Blood blister like aneurysm: general considerations and management
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Objective: Twenty-one cases of blood-blister like aneurysms (BBLA) are presented, 2% of 1,071 ruptured aneurysms treated in the last 23 years at Carlos Van Buren Hospital, Chile. Their aetiopathogenesis, topography, clinic and treatments are described.
Method: Aetiopathogenesis: 1-Acquired injury of the arterial wall as systemic hypertension with lipohyalinosis. and atherosclerosis with atheromatous ulcer. 2 - Hemodynamic stress of cerebral blood flow on areas with structural collagen dysfunction. Frequency 1- 2% of intracranial aneurysms. Location: 1-upper wall of the internal carotid, 2-segment M1 of middle cerebral a., 3-segment A1 of the anterior cerebral a., 4-segment V4 of the vertebral a.. Clinical picture: Posterior circulation: SAH of the posterior fossa. Anterior circulation: SAH related to dorsal ICA, parasellar HSA, frontal intracerebral haemorrhage. Treatment: Surgery and endovascular treatments. Surgery is limited to the expansion of a subadventicial arterial dissection with SAH. The surgical techniques used are: Aneurysm clipping, "Trapping" (with or without high-flow bypass) , Wrapping with muscle tissue or silk material and Arteriorraphy .**Result:** Fourteen aneurysms of anterior circulation and 7 of posterior circulation were treated; in clinical WFNS II scale: 4 cases, in WFNS III :11 cases, in WFNS IV: 6 cases; Endovascular treatment was used in 9 cases, direct clipping in 8 cases, Trapping in 3 cases, Wrapping in 1 case. Good results were obtained (mRankin scale 1 and 2) in 11 cases. Bad results (mRankin scale 3 to 6) in 10 cases. (47.6%).
Conclusion: The treatment of BBLA is associated with a high rate of morbidity and mortality, due to a very high risk of intraoperative rupture of the aneurysm due to the fragility of the wall of the aneurysm and main artery, and high probability of losing the permeability of the main artery, inadvertently or as a consequence of the planned treatment.
Key words: blood blister like aneurysm, subarachnoid haemorrhage, intracranial arterial dissection

Abstract 4 [Flash]
Intracranial pressure monitoring (ICP) monitoring in traumatic brain injury adult and paediatric patients – Clinical significance
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Objective: Every year we operated around 200 patients out of admitted 700 head injury patients. It is always difficult to decide in a group of patients whether to manage conservatively or, to operate. ICP monitoring is a very useful tool in this subset of patients. We want to report our experience of 25 patients during the period of 1 year.
Method: Twenty-five cases of ICP monitoring was done over a period of 18 months. The admission GCS was 3-7, 8-12,13-15. These patients have the CT scan findings contusions, 1. frontal, 2. temporal and 3. Parietal, cerebral oedema. Usually these patients are decided to monitor ICP in the interval of 0-6 hours after the admission. Most of the patients are inserted Codman ICP catheter in the operating theatre (OT); now we are inserting the catheter in the Neuro ICU through right frontal craniostomy under local anaesthesia. The follow-up CT are done on 48 -72 hours after the catheter placement. The ICP monitor is attached to the sensor after calibration and every hour we recorded the ICP measurement in the case sheet. We didn't experience any procedure related complications in the operation theatre or neuro icu.
Result: Out of the 25 cases, 3 cases were taken up for the definitive craniotomy after ICP reading more than 20 mmhg. One case was expired due to sudden rise of ICP to 40 mmhg over a duration of 1 hour. All other patients are managed conservatively with minor procedure related morbidity . All these patients the ICP monitor is very useful tool to manage conservatively. We want to stress two patients of

clinical significance.
Conclusion: ICP monitoring is very useful in the management of TBI. Now there is wide application of ICP monitoring in the neurosurgical field, TBI is the important and proved ICP monitor is very useful in managing the patients. There are various kinds of ICP monitoring; we use intra-parencymal pressure monitoring. From our data we want to conclude that in the clinical background of TBI, ICP monitoring is useful tool for the management of the patient.
Key words: paediatric trauma, ICP, clinical significance

Abstract 5 [Flash]
Haemorrhagic parasagittal meningioma
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Objective: Meningiomas are one of the most commonly found intracranial tumours. Meningiomas are tumours that are often found and counted for 20-30% of primary intracranial tumours. The most frequent localisation of meningiomas is in parasagittal, lateral convexity, sphenoid wing, anterior fossa close to the olfactory nerve, sella region, and posterior fossa around the foramen magnum. Meningiomas with intra-tumoural bleeding are very rare and the pathophysiology is still not well known. The incidence of bleeding in meningiomas ranges between 0.5-2.4% with 28-50% mortality in the last third decade.
Method: A 38-year-old female suffered with a gradual decrease in consciousness since 2 days ago, headache (+) since 1 year ago and getting worse, weakness in left half of limbs since 1 year ago, decreased vision since January 2019. There's no abnormalities for defecation and urination.
Result: The signs of increasing intracranial pressure are progressive. Headache complaints are also obtained. CT scan with contrast results showed a contrast enhancing lesion on parieto-occipital dextra impressing extra axial tumours with base in medial one third of superior sagittal sinus with peripheral oedema surrounding and accompanied by intratumoural haemorrhage.
Conclusion: In this case tumour resection craniotomy and osteoplasty were chosen to eliminate the symptoms of neurological deficit from the brain tumour itself.
Key words: meningioma parasagittal, intra-tumoural bleeding, craniotomy tumour resection, cranioplasty

Abstract 6 [Oral]
Lesioning for Tremor in the DBS era
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Objective: Surgical management of tremor has evolved over the years with Deep Brain Stimulation (DBS) gradually supplanting lesioning as the mainstay in treatment. In this article, the largest of its kind from our country, we present our experience in the use of lesioning in the management of patients with multi-etiological tremors. These include not only common indications like Parkinson disease and essential tremor but also rare causes such as Pantothenate kinase-associated neurodegeneration (PKAN), multiple sclerosis (MS) and Wilson disease.
Method: Patients with medically refractory tremor who underwent surgery were included in the analysis. A comprehensive clinical and radiological evaluation was performed which was repeated 3 months post-operatively and at successive visits. Video documentation of was obtained at all visits.
Result: A total of 46 patients with an average age 37.7 years (range 21–65 years) underwent stereotactic thalamotomy/subthalamotomy at our institute between 2008 and 2019, for the treatment of medically refractory tremor of varying aetiologies. The mean preoperative duration of symptoms was 11 years (range 10 months to 34 years). The median time to onset of improvement was 2 months (range 1 week to 8 months). Analysing the improvement on the modified FTM scale, in part 1 the scores improved from 21.7 to 3.5, the part II subset improved from an average of 9.2 to 4.2 while the part III subset improved from an average of 14.1 to 4.6 post-operatively. This implied an excellent response in tremor while the other 2 components had a very good response.
Conclusion: In this study we have for the first time objectively analysed the tremor improvement with a modified FTM scale and have produced excellent results. We have also shown that tremor of various aetiologies respond extremely well to lesioning surgery. While DBS continues to remain the treatment of choice in various types of bilateral tremor, lesioning is very successful in a carefully selected cohort of patients. We are of the opinion that in predominantly unilateral tremor or when the patient cannot afford DBS especially in a country like ours, lesioning surgery is an important tool in the armamentarium of the functional neurosurgeon.

Key words: lesioning, Tremor, DBS, thalamotomy

Abstract 7 [Flash]
Association of May-Thurner syndrome in spine clinic
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Objective: May-Thurner is characterised by thrombosis of iliofemoral venous system, due to overlying Iliac artery compressing the Iliac vein. This is usually due to local vascular anatomical problem which predisposes to deep venous thrombosis (DVT) , termed as Classical MTS which was published in 1957 by May and Thurner. This remained a vascular phenomena for quite a few years until invention of CT and MRI. Of late there have been reports stating compression of vein due to degeneration of Lumbar spine mainly located to L5-S1 area. There can be plethora of aetiology from a simple osteophyte to complex sponylolisthesis. We at our institute report 2 examples each pertaining to vascular and lumbar spine aetiology and review of literature.
Method: We present case report, which include 2 patients with MTS. By various investigation we could differentiate the MTS into vascular and Lumbar degeneration related MTS. We also investigated them in detail to exclude routine DVT risk factors.
Result: Case 1 demonstrated a vascular phenomena, but was reviewed in the spinal out-patients clinic in view of the history of long standing low back pain for which she was put on traction. Case 2 demonstrated ventral osteophyte of L5 compressing the left iliac spine; he too presented to spine clinic with long standing back for which MRI scan was obtained. He later had left limb swelling and typical vascular claudication.
Conclusion: May-Thurner though caused by venous thrombosis of iliofemoral system can be caused by compression of Iliac artery as well as lumbar spine degeneration, It can commonly present to spine clinic with back pain which usually due to degeneration or as a sequelae to prolonged traction which might provoke deep vein thrombosis in already anatomically distorted vein
Key words: May-Thurner syndrome(MTS), deep vein thrombosis (DVT)

Abstract 8 [Oral]
Systematic review of Robotic Assisted Spinal Surgery: A hope to perform safe spinal surgery During COVID-19 and any other infective outbreaks
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Objective: To evaluate the role of robotic assisted spinal surgery during infective pandemics such as COVID-19
Method: Following the PRISMA guidelines a review of 18 articles on robotics in spine surgery was performed a thorough search was conducted on PubMed, Cureus and Researchgate and relevant data considering the learning curve, the duration of robotic assisted procedures, efficacy in terms of precision and accuracy according to the specified spinal procedures, the caveats and nuances of procedures, radiation exposure, feasibility of remote supervision, risk of infection transmission, cost effectiveness and reasons for robotic failure were sought for
Result: Out of the 18 studies, 11 evaluated precision and accuracy of spinal procedures and declared them lengthy yet precise. Five studies considered failures and complications and concluded again lengthy but with less failure and complications. Ten studies studied the radiation exposure hazard in terms of usage of fluoroscopy, the overall times range and indicated better risk profile. Ten studies examined the learning curve and concluded that it is same as that for MIS and is directly proportion to the experience of the surgeon. A surgeon who has previous experience of MIS will learn the robotic assisted surgeries in a shorter period of times. All studied the duration of procedures and 12 were convinced that it is longer or at the most equal, 2 said not much difference and 2 said that it shortens the procedure. 5 evaluated the cost effectiveness, since the equipment is still under developmental phases so despite our future expectations and goals of having the procedure as a cost effective one, we are by far lacking adequate experience to deem it one. 5 studies evaluated the risk of infection transmission and 1 was for specifically COVID-19 and they were all convinced that the risk of transmission of infection both airborne and blood borne is much lower, mainly due a reduced exposure between patient and health personnel which can both be adequately protected against infection.

Conclusion: Robotic assisted spine surgery can be a safe way to perform surgery during COVID-19 and any other infective outbreak condition
Key words: COVID-19, pandemic, robotic spine surgery, spine surgery, infections, safe surgery

Abstract 9 [Oral]
Open vs endoscopic assisted surgery for craniosynostosis in terms of blood loss, Infection risk and hospital stay: a study from a low-to-middle-income country (LMIC)
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Objective: To compare open vs endoscopic assisted surgery fro craniosynostosis in terms of blood loss, infection risk and hospital stay
Method: We studied 14 patients with age range 4-months to 11-months, both gender, non-syndromic craniosynostosis. Seven underwent classical open surgery while the other 7 endoscopic assisted surgery.
Result: For endoscopic assisted surgeries compared with open surgeries operating time was shorter (2 hrs 50 minutes vs 6 hours 15 minutes, P = 0.001), estimated blood loss was lower (87 mL vs 305 mL, P = 0.001), lower blood transfusion (90.6 mL vs 226.9 mL), shorter hospital stays (4 days vs 8 days, P = 0.001) however infection risk was 3% in both groups.
Conclusion: We conclude that endoscopic assisted approach for craniosynostosis is better than conventional open surgery in terms of blood loss, need of transfusion, operative duration and post-op hospital stay. However, in LMIC, endoscopic assisted surgical option is not widespread and it is being done sparsely
Key words: craniosynostosis, endoscopic, open surgery

Abstract 10 [Oral]
Body weight as factor for post-operative COVID-19 Infection Risk in pediatric patients
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Objective: To evaluate the link between body weight of paediatric patients between 1-year to 8-years of age and incidence of acquiring COVID-19 infection post-operatively
Method: The study was conducted from 15 March 2020 until 15 September 2020. A total number of 78 patients of both genders were enrolled. The age range was between 1-year to 8-years. Most of them were operated for paediatric intracranial tumours. Patients were stratified according to weight into below average, average and above average according to their age group standard weights.
Result: The mean pre-operative admission time was 4 days and, the mean post-operative time was 6 days. Mostly the patients were admitted for intracranial brain tumours: 57% cerebellar tumours, 18% craniopharyngiomas , 21% ventriculo-peritoneal (VP) shunt and 4% had surgery for tethered cord. All children were free of any other co-morbidity and no family member had history of COVID-19 infection. A total 16% children were above average and 24% were below average weight. Patients were kept for the shortest possible pre-operative and post-operative period and complete precautions against COVID-19 were taken. Patients were asked to follow-up initially for stitch removal and then after 2 weeks later. Other followup schedules differed according to diagnosis and state. All patients were told about the likely symptoms for COVID-19 infection and were asked to report in case they come positive. Only 9 patients (11%) patients were turned positive for COVID-19 with one turning positive pre-operatively. The surgery was postponed for 1-week only and, he was successfully operated after a week. The other 9 were tested positive for COVID-19 after being operated. Two patients had become positive on 2nd and 3rd postoperative day (POD)respectively. Three patient turned positive on 4th POD while 1 turned positive on 7th POD. Out of these n=9, 55.5% (n=5) belonged to below average weight while 22.2% (n=) were over weight. However , there was not much difference in the recovery time from COVID-19 and all of them recovered without any surgery related complications as well.

Conclusion: From this study we strongly suspect that preoperative body weight does pose risk to post-operative incidence of COVID-19 infection. We suggest further studies on this topic as well however we did not find any difference in recovery and complications
Key words: COVID-19

Abstract 11 [Oral]
Comparison of surgical versus Intradiscal Ozone treatment of sciatica due to lumbar disc herniation: Can It be an ideal option to Consider during COVID-19 pandemic?
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Objective: To compare the outcome of surgical versus ozone treatment of sciatica due to lumbar disc herniation in patients without severe myelopathy and cauda equina syndrome as well as to evaluate this management option as a safe option during COVID-19 pandemic
Method: The study was conducted over 1 year from January 2017 to January 2018. A total number of 72 patients were enrolled and divided equally into two groups based on those who underwent surgical treatment and those who were treated with ozone nucleolysis. Outcome was assessed using VAS (Visual Analogue Scale) and a VAS <2 was considered satisfactory. Cases with severe myelopathy, cauda equina syndrome and calcified disc were excluded. During the COVID-19 pandemic we recovered data regarding any transmission risk between patients and the health personnel.
Result: n=36 (50%) patients treated with ozone nucleolysis method and n=36 (50%) treated with surgical method (hemi-laminectomy and discectomy). The mean age, height, weight, duration of disease, VAS score before and after treatment of the ozone nucleolysis group was 42.13±2.85 years,176.77±2.0 cm, 70.50±3.15 kg, 8.88±3.09 weeks, 41.11±2.20 mm and 14.16±6.77 mm respectively. Satisfactory outcome was observed as n=24 (66.7%) and n=13 (36.1%) for ozone nucleolysis and surgical group respectively. This difference was statistically significant (p=0.009).
Conclusion: Ozone nucleolysis treatment of sciatica due to lumbar disc herniation is a better option as compared with surgical treatment in cases of disc herniation without myelopathic signs and symptoms especially in early course of disease. This therapy is especially useful for patients who are at high risk for surgery.
Key words: COVID-19, Ozone nucleolysis

Abstract 12 [Flash]
Comparison of surgical clipping vs endovascular coiling for posterior projecting anterior communicating artery aneurysms
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Objective: To compare surgical clipping with endovascular coiling for posterior projecting anterior communicating artery aneurysm in terms of per-operative technical feasibility and possible complications such as rupture, peri-operative complications and postoperative mortality and morbidity
Method: The study was conducted at Punjab Institute of Neurosciences. Total 6 cases were studied, 3 of them
(n=3, 50%) were operated by surgical clipping and 3 (n=3.50%) underwent endovascular
coiling. Average age was 52 years; 90% had hypertension; 80% were smokers. All presented through emergency with subarachnoid haemorrhage. Two of the patients in each surgical and endovascular group presented at ER with Hunt and Hess grade 3 (n=2,33.3%) the others were at Hunt and Hess grade 2 (n=4,66.6%). The average time from haemorrhage to surgery and coiling was 25 days. Outcome assessed using modified Rankin score and a score of 2 was considered satisfactory.
Result: In the surgically treated-arm, 2 patients had mRS of 2 while the third patient had 4. In the endovascular coiling group 1 had mRS of 1, one patient had mRS2 and third patient had mRS of 3. Despite the very small sample size the outcome in terms of mRS indicated slightly better results for patients undergoing coiling
Conclusion: Endovascular coiling is better in the treatment of posteriorly projecting anterior communicating artery aneurysm.
Key words: aneurysm, endovascular surgery

Abstract 13 [Oral]
The era of web-based education during pandemic: do we need to listen to the call of the void to take the leap of faith?
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Objective: To evaluate the efficacy of web based neurosurgery education during pandemic and to consider integration of this teaching methodology as a part of postgraduate integration even after pandemic
Method: We conducted an online survey with the neurosurgery trainees and junior consultants regarding their views on how the new online educational activities have been successful in teaching. A total 237 responses from 57% trainees and 43% junior consultant neurosurgeons were received from 80 different countries.
Result: All respondents (100%) agreed that learning from daily ward experience alone, book alone and web based learning alone is not sufficient. Sixty-five point-five percent (65.5%) reported satisfaction with web-based and all (100%) agreement that ward based learning should be combined with textbook reading and web-based learning program. Eighty-four point-six percent (84.6%) of the respondents

agreed that web based learning should be continued as a part of neurosurgical training even after the pandemic is over. Seventy-six-point-nine percent (76.9%) agreed that web-based learning should be integrated as a part of future neurosurgical training. Fifty-three-point-eight (53.8%) agreed that they do not have stress during web-based training program as compared to their traditional learning program. Thirty-eight-point-five percent (38.5%) agreed that they remain more attentive during web based training as compared to ward rounds and class. On a scale of 1-5, 38.5% gave grade 5 to web-based learning, 30.6% gave 4. Sixty-nine-point-two percent (69.2%) agreed that web-based learning cause them to learn more per duration spent during web-based learning program as compared to the number of hours spent with the conventional learning method
Conclusion: Web-based teaching is an effective method of teaching and should be integrated in the residency curriculum
Key words: web-based learning, web-based teaching, pandemic

Abstract 14 [Oral]
The effects of COVID-19 on Hypothalamus: is it another Face of SARS-CoV-2 that may potentially control the level of COVID-19 severity?
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Objective: To evaluate the infliction of hypothalamus in COVID-19 Infection
Method: Twenty-seven (27) patients of COVID-19 were interviewed regarding symptoms referring to hypothalamus .Their charts were also studied
Result: In a short study, we detected at least 27 patients who suffered from "unquenchable thirst" and "ravenous appetite". 7 of them were diabetic including 2 who were insulin dependent. Most of them did not develop severe COVID-19 . Polydipsia and polyphagia raise suspicion of hypothalamic infliction, since hypothalamus has centres of thirst, hunger and satiety. The interplay between stimulation and inhibition leads to the normal hunger and thirst sensations. We further noted that 21 of them had other signs and symptoms related with peripheral nerves. They all suffered from dysosmia and dysgeusia as well. If we put all of these symptoms together and correlate it with the viral entry through the nose, it is quite simple to explain that SAS-CoV-2 affects the olfactory nerve and from there finds its way to the hypothalamus. **Conclusion:** We strongly suspect SARS-CoV-2 affects the hypothalamus
Key words: COVID-19, hypothalamus

Abstract 15 [Poster]
Paediatric epidural hematoma spontaneous resolution: a case report and literature review
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Objective: Report a case of epidural hematoma (EH) with spontaneous resolution in a child, with good results.
Method: Paediatric male, 11 months-old, victim of a fall from a height of two metres. At hospital care, irritability, constant crying, swelling in the left parietal region, with a score of 13, on the Glasgow Coma Scale modified for children. He underwent cranial computed tomography (CT) that revealed a left parietal fracture, subgaleal haematoma, left parietal EH and left parietal intraparenchymal haematoma. After 14 hours, he showed improvement in his neurological status. The new skull CT scan did not show epidural hematoma. He was discharged in good general condition, with no evident neurological deficit for his age.
Result: Epidural haematoma (EH) after its formation, it is uncommon to have a conservative resolution in less than 24 hours. Being considered as spontaneous resolution when it occurs less than 72 hours after the traumatic event. The extracranial space does not present any resistance in relation to the existing intracranial physiological pressures, therefore, from the diastatic fracture line, unilateral conduction of blood volume will occur, reducing the intracranial amount of the lesion and increasing the subgaleal haematoma. EH with a clinical course of spontaneous resolution, will present the same symptoms associated with all types of epidural collections. The clinical presentation can be through loss of consciousness and vomiting. The diagnosis can be made using a simple skull radiograph, in which diastatic fracture will be seen in 81% of cases. Since this entity presents spontaneous resolution, the treatment is strictly conservative, often due to the delay in performing the surgical treatment.
Conclusion: EH can be subjected to conservative treatment in selected patients and accompanied by intense neurological surveillance associated with neuroimaging, due to the increase in the volume of blood collection and worsening of the patient's neurological status. Spontaneous resolution is possible, especially in young children who have a diastatic

fracture associated with haematoma. In our case, due to technical problems, the surgery was delayed and haematoma resorption occurred. The size of the haematoma and the neurological status of the patient are important characteristics during the treatment decision.
Key words: Conservative treatment, haematoma epidural neuroimaging.

Abstract 16 [Flash]
A single centre review of endoscopic third ventriculostomy (ETV) success rate
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Objective: -To evaluate various etiologies, surgical indications and patient outcome in relation to ETV. To review ETV failure and shunt dependency.
- End point:

To determine if the ETV success score can help determine the best candidates for this procedure in our local cohort as the original ETV success score only had predictive value of less than 60%.
Method: Location: Patients admitted & treated with features of hydrocephalus requiring cerebrospinal fluid diversion at the Department of Neurosurgery of the Sabah Women & Children Hospital in Sabah, Malaysia. Period : 1st April, 2017 – 31st March, 2020. Patient grouping and analysis: i. Types of underlying pathology; ii. Age (new born up to age 12 years old; iii. ETV for CSF diversion; iv. associated post surgical ventriculo-peritoneal shunt (VPS) dependency at 1 year.
Result: -Out of the total 43 patients, 15 showed failure requiring VPS by 1 year.
- ETV success score (ETVSS) of 70-90 showed high favourability among our patients. Reliability of ETVSS is proven.
- Overall success rate of ETV in our cohort is 65.1% which is better and comparable to published data on predictive value of ETVSS of 53-59%.
- Outcome of the procedure is highly dependent on the aetiology and age.
- Favourable outcome are seen in those of: Congenital cases especially in aqueduct stenosis (75.6%), tumours causing obstruction (65.1%)
- Poor outcome are seen in those of: infection (22.2% failure), children lower than the age of 1 (63.2% failure)

Conclusion: ETV done with the correct indication & technique becomes a valuable asset in reducing the requirement of VPS. ETVSS proves to be crucial in aiding decision making
Key words: endoscopic third ventriculostomy(ETV), ETV success score, ventriculo-peritoneal shunt dependency, hydrocephalus, CSF diversion

Abstract 17 [Poster]
Intra-operative monitoring for spinal tumour surgeries

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Objective: • Intra-operative monitoring (IOM) is used as an adjunct to reduce post-operative morbidity secondary to spinal cord or nerve injury.
• It is important to determine the requirement of IOM in various types of spinal tumours namely Extradural extramedullary (EDEM), Intradural extramedullary (IDEM) and Intradural intramedullary (IDIM).
• The post surgical morbidity among patients operated with or without IOM needs to be analysed.
• Final aim: If IOM can be proven not essential for all types of surgeries; its usage can be minimised to reduce patient's financial burden as IOM is expensive.
Method: All patients treated with spinal tumours from April 2015 - March 2019 at the Department of Neurosurgery, Sabah Brain & Spine Centre, Hospital Queen Elizabeth 2, Sabah, Malaysia were included. Patients were grouped and analysed according to the: i. location; ii. usage of IOM; iii. associated post-surgical morbidity. Due to our department's financial constraint IOM is only used for IDIM tumours if the patient is able to self-fund the rental or purchase of IOM.
Result: Fiofty-six (56) patients were included with 33 primary spinal tumours, 17 metastatic tumours and 6 post infective tuberculous lesions.
- 36 patients presented with IDEM tumours, 12 with EDEM tumours and 8 with IDIM tumours.
- Out of the 8 patients with IDIM tumours, only 6 patients used IOM due to financial constraint.
- All patients with IOM usage had better Glasgow Outcome Score (GOS) compared to patients operated without IOM for IDIM lesions.
- IOM usage also showed improvement ASIA score at 6 months' post-surgery.
- As for the IDEM and ED group of patients, all

had good GOS without the usage of IOM.
Conclusion: An excellent knowledge of surgical anatomy and expert surgical skills are adequate for good outcome among EDEM and IDEM tumour patients.
- IOM is not essential for all types of spinal tumour surgeries and should be highly selective for IDIM tumours if financial burden is an issue.
Key words: Intra-operative monitoring, spinal tumours, ASIA score, intramedullary tumours, surgical morbidity

Abstract 18 [Oral]
Hippocampal RNA expression gene sets and biological pathways with prognostic value for seizure outcome following anterior temporal lobectomy with amygdalohippocampectomy
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Objective: Approximately 1% of the U. S. population suffers from epilepsy. Among these patients, 30% are defined as medically intractable and thus potential candidates for epilepsy surgery, most commonly amygdalohippocampectomy (AH) with or without anterior temporal lobectomy (ATL) in temporal lobe epilepsy (TLE). Approximately 65% of patients treated with AH will be seizure-free. Therefore, there is need to improve prognostic value of selection criteria for AH surgical candidates. Thus, we pursue an approach known as neurosurgical genomics, where the identification of RNA-Seg biomarkers will establish gene expression profiles in patients with different seizure outcomes.
Method: Whole transcriptome analyses were performed to test the hypothesis that hippocampal tissue RNA expression differs between patients rendered seizure-free (SF) and non-seizure-free (NSF) to establish predictive prognostic biomarkers. A total of 14 patients (mean age: 33.1 years, range 16-56 years; 10 males, 4 females) with intractable TLE have undergone AH/ATL with 1-year minimum follow-up dichotomized into SF and NSF. Logistic regression analysis of Next Generation Sequencing reveals sufficient statistical power for hippocampal RNA expression data.
Result: Comprehensive analysis of hippocampal RNA expression revealed an upregulation in biological pathways consisting of glucuronidation, reproduction, and activation of matrix metalloproteinases prognostic for SF group. Likewise, an upregulation in biological pathways encompassing the innate and adaptive immune system prognostic for NSF group.
Conclusion: Hippocampal tissue RNA expression is expected to enhance selection of TLE surgery candidates by establishing predictive prognostic biomarkers for successful outcome from operative AH/ATL. This research seeks to improve our understanding of pathophysiological TLE over-activation of the innate and adaptive immune system. This increases the transcription of pro- inflammatory genes perpetuating hippocampal neuroinflammation by damaging endothelial cell tight junctions breaching the blood-brain barrier to transcellular leukocyte diapedesis influencing epileptogenicity and seizure onset.
Key words: medically intractable epilepsy, precision medicine, neuroinflammation, blood brain barrier permeability, neurogenetics, neurosurgery

Abstract 19 [Oral]
Impact of intra-operative ultrasound on outcomes in patients undergoing seizure surgery for focal cortical dysplasia
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Objective: Approximately 50-60% of patients with focal cortical dysplasia (FCD) attain seizure freedom after epilepsy surgery. The main prognostic hallmark of a seizure-freedom outcome is attaining gross total resection (GTr) of the offending lesion of which in this case, FCD. Archiving GTr is often challenging due to the fact that normal and dysplastic brain tissue in frequent scenarios are indistinguishable. Additionally, during course of surgery, brain-lesion shifting might occur which in turn render technical challenges for the neurosurgeon. Intra-operative ultrasound (iUS) is a real-time, cost and user friendly tool that can be used to circumvent the earlier described challenges. Here we describe our single centre experience use of iUS postoperative outcomes in 24 patients. Additionally we explore and showcase literature in which iUS was successfully used and subsequently postoperative seizure freedom .
Method: Literature was extrapolated by utilising eLibrary, PubMed, and ClinicalKey. Parameters of

individual patient data on demographics, baseline clinical (including seizure) characteristics, procedure-related factors, and outcomes, including new or persistent neurological deficits and final Engel score were documented and analysed. We also conducted a prospective & retrospective analysis of patients who were surgically treated for FCD in our institution.
Result: In total, 46 patients (inclusive of our patients) were included in this study (25 male; 21 female; mean age 18.0 years), among whom 32 (69.6%) had a seizure outcome of Engel I.This rate was superior to the 59.7% reported from a previously published meta-analysis of 15 studies encompassing 469 patients. Of the 27(58.7%) patients with pre-operative neurological deficits, 4 had their deficits completely resolved, while 3 showed marked improvement. No deficits developed among the 19 patients (41.3%) with no pre-operative deficits. Statistically-significant predictors of Engel class I were FCD (p = <0.05) and clear intra-operative visualization of FCD with iUS (p = <0.05).
Conclusion: Based on our experience and data supplemented in literature, intra-operative ultrasound appears to be a safe, inexpensive and effective tool to achieve intra-operative FCD imaging during epilepsy surgery, a necessity for attaining GTr of epileptogenic tissue. Employing iUS during FCD resection surgery leads to achieving better post-operative seizer free outcomes in more than 3/4 of patients.
Key words: epilepsy,ultrasound, Engel

Abstract 20 [Oral]
The Incidence of spina bifida in Pakistan: The need to consider food fortification strategy
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Objective: To know the incidence of spina bifida in Pakistan in order to assess the gravity of situation and propose food fortification in order to decrease risk
Method: Based on institution based registered data from the leading hospitals with neurosurgical facilities and literature review. 230 registered cases of affected infants were studied, 80 adults were studied occult defects, and 10 studies were reviewed.
Result: Incidence of NTDs was found to be 7-8/1000 live births and 35% of them are spina bifida. The incidence of spina bifida occulta has been found to be 25%. 97% were lumbosacral. Female : male ratio was 1.2:1.0.44.5% had overt hydrocephalus on presentation. 85% survived 1-year and 71% survived 2 years. Not much data on long term survival was found. A post operative wound infection rate of 14.2% was found. 24.1% suffered from CSF leak. 2.1% had history of an affected sibling. 23.7% parents with an affected child and 45.3% of those with an already affected pregnancy were cousins so it was because of consanguineous marriage
Conclusion: The incidence of spina bifida is high in Pakistan which is a country amongst those who do not fortify food. It is time to raise awareness and highlight the need to fortify food, arranging awareness campaigns, providing antenatal and prenatal care and proper counselling for future pregnancies. There is a need to address the culture of consanguineous marriages as well
Key words: NTDs, Spina Bifida, folate

Abstract 21 [Oral]
Metabolism related genes profile as a prognostic biomarker source in primary Glioblastoma
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Objective: Glioblastoma multiforme is the most common primary malignant brain tumour and the most devastating CNS tumour. Notwithstanding currently treatment strategies mean survival rate is estimated in 15 months after diagnosis. Due to the ineffectiveness of current treatments, it is necessary to find new tools that allow a better approach of this tumour types. In this sense, mutations on the Isocitrate dehydrogenase (IDH) gene, a key enzyme for the metabolism, have been demonstrated to be able to discriminate tumours based on their prognosis. However, there are still many unknown aspects of this mutation/tumour-prognostic relationship. Thus, the aim of this study is to determine the prognostic value of metabolism-related gene fingerprint for primary Glioblastoma depending on the presence of the IDH mutation type.
Method: In this retrospective study, 28 patients di-

agnosed with primary glioblastoma between 2016 and 2019 were selected. Intra-operative samples were obtained to isolate DNA and mRNA. Consecutively, IDH1 mutation were measured using a High-fidelity Taq-poymerase and 39 metabolism-related genes were studied by qPCR microfluidic array. Finally, univariant Kaplan-Meier study (according to Long-Rank and Breslow) and Cox regression were performed.
Result: Clinical data showed 19,6 months mean survival rate with a median follow-up of 19±2.14 months after diagnosis. The median age at diagnosis was 59±9 years, incidence was higher in females (56%) than males (46%) being 86% of lobar lesions. Moreover, total or subtotal surgical resection was carried out successfully in 94% of patients. Regarding molecular analysis, IDH1 mutation was found only in one sample, which had the longer survival rate (32 months). Furthermore, levels of ETNK1/GCK/GLS/GLUL/IGF1/PC and SHMT1 genes demonstrated a statistically significant ($p<0.05$) survival impact.
Conclusion: Taken together, our results demonstrate that genes involved in the metabolism of glucose, glutamine, GABA, adaptation mechanisms, cell proliferation and treatment resistance showed a significant relation with mean survival having a prognostic relevance in these patients.
Key words: metabolism, IDH, glioblastoma, gene

Abstract 22 [Flash]
Hallermann-Streiff Syndrome, congenital myth.
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Objective: Hallermann-Streiff syndrome (HSS) is an absolutely rare condition that has a constellation of dysmorphic features which generally include abnormal development of the skull, face, hairs, skin, teeth, bones and eyes. These are genetic abnormalities that may be inherited in an autosomal dominant or recessive manner
Method: This is a case of a still born baby delivered in a secondary health care facility. The pregnancy history was significantly eventful events with Intra-uterine fetal death coupled with maternal complications. Physical examination of the baby revealed: fresh still born, frontal bossing of the skull, brachycephaly, beaked shape nose from lateral view, micrognathia, natal teeth, short webbed neck, dysmorphic chest, asymmetric nipple and abnormal thoracoabdominal orientation.
Result: In Hallermann-Streiff syndrome (oculo-mandibulo-facial syndrome), the exact cause is not known, there have been studies at the molecular level which revealed gene mutations. More so, defect of elastin and abnormal glycoprotein metabolism has been reported. Majority of the features seen in the index case are in keeping with another publication revealing that HSS is characterized by seven main signs; dyscephaly with bird-face and hypoplasia of the mandible, proportioned dwarfism, dental anomalies (absent, malformed or irregularly set teeth), hypotrichosis (particularly the scalp, the eyelashes and eyebrows), cutaneous atrophy (usually affecting the skin scalp, face and nose), bilateral micro-ophthalmia, and spontaneous resorption of the congenital cataract. Low resources in this case was a significant factor in assessing structural congenital intracranial comorbidities. There have been reports about HSS with agenesis of corpus callosum, the presence of non-decussating fibre bundles of Probst medial to the bodies of lateral ventricles and classical appearance of lateral ventricle.
Conclusion: This report is the first of its kind in our locality and aims to emphasise the pan-systemic (especially cerebro-facial)
complications of congenital anomaly stemming from late ante-natal care.
Key words: Hallermann-Streiff syndrome

Abstract 23 [Oral]
Assessment of the prognostic value of Helsinki computer tomography score in severe traumatic brain injury patients at Kenyatta National Hospital (KNH)
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Objective: The broad objective was to investigate the prognostic value of the Helsinki Computer tomography (CT) score on the outcome of severe traumatic brain injury (TBI) patients at KNH at 6 weeks post-admission. Our specific objectives were to establish the baseline GCS, physiological parameters, demographic characteristics and presenting extra cranial injuries among patients admitted at the KNH after sustaining severe TBI, to evaluate the predictive value of the Helsinki CT score and the correlation between the admission Helsinki CT score and the clinical parameters on the outcome of severe TBI patients at 6 weeks post-admission.
Method: This was a prospective observational study conducted on severe TBI patients admitted at the Critical care Unit/ Intensive Care Unit after initial

assessment and resuscitation at the Accident and Emergency department at KNH. This study included all patients with age above 18 years, severe traumatic brain injury patients with GCS <8 and who had informed consent availed from relatives/ guardians. This study excluded all patients without a CT scan done, non resuscitated patients and those with mortality before 24 hours of admission. Sample size – The minimum study sample population using the Fishers' formula was calculated at n=36 patients.

Data Collection tools and Methods – Consecutive sampling was used for recruitment of study population. At the point of presentation, the investigator interviewed the guardian to obtain the history of clinical presentation, physically examined the patient and recorded both the clinical parameters and radiological imaging findings using the study proforma. At follow up the investigator recorded the Glasgow outcome scale score at two weeks and six weeks. SPSS 23.0 was used to process the available information.

Study variables – The independent variable included demographic, clinical parameters and the Helsinki CT score. Patient characteristics were summarised using the clinical parameters of age, GCS, pupillary reactivity, blood pressure, blood glucose level and extra cranial injuries, and presented as means or proportioned for continuous and categorical variables respectively. The Glasgow outcome score (GOS) was dichotomised as unfavourable (grade I – III) and favourable (IV and V). Association of GOS with extra cranial injuries, blood pressure, blood glucose level, pupillary reactivity, GCS and the initial Helsinki score were done. Logistic regression analysis was used to determine the independent predictors of outcome. Receiver-operator characteristic (ROC) curve was drawn for sensitivity and specificity and AUC values were calculated. Confidence interval was calculated at 95% for sensitivity and specificity to determine the level of precision. All statistical tests were conducted at a 5% level of significance.

Result: Results - There was a higher male preponderance at 90% (n=38). Mean age for patients with severe TBI was 33 years old with an overall mortality of 64.3%. RTA was the commonest mode of injury at 64% followed by assault at 26% and falls at 10%. Patients with non reactive pupil had mortality of 67% while slow reacting pupil had 63%. Patients with systolic BP > 90 mmHg comprised 95% of the study population with a resultant mortality at 67.5%. The most common random blood glucose level was < 10 mmol/l at 80% with a mortality of 58.8%. Patients with GCS of 3-4 had the highest mortality of 100% while GCS of 7-8 lowest mortality of 60.9%. GCS of 3-4 had no favourable outcome at 6 weeks while GCS 7-8 had favourable outcome in 30.4%. The Helsinki CT score of 4 had mortality of 33.3% while Helsinki score of 11 had mortality of 100%. Patients with contusions and intracerebral haematomas had mortality of 80% while in acute subdural haematoma and extradural haematoma the mortality were 53.8% and 44.4% respectively. In correlation analysis the Helsinki CT score was significantly associated with GOS at 6 weeks(p=0.004) and death (p=0.009). Age was significantly correlated with 6 weeks GOS (p=0.03) and mortality(p=0.02). Systolic BP was only associated with mortality at p value of 0.043. The other clinical parameters did not show any statistical significance with both 6 weeks GOS and mortality. The specificity, sensitivity and accuracy for Helsinki CT score for mortality were 88.9%, 53.3% and 71% respectively; and for an unfavourable outcome, these values were 81.8%, 55.6% and 69% respectively. After performing logistic regression analysis for the predictors of outcome, the odds ratio for the Helsinki CT score to predict mortality was 9.1(95% CI 1.9-44) and unfavourable outcome at 5.6(95% CI 1.2-27.4).

Conclusion: Severe traumatic brain injury is a frequent source of mortality and acquired persistent disability among young individuals. It affects more than just the injured person and robs the person of his income per year to sustain a family. The patients often require neuro-intensive care which is expensive in developing countries and burdens the health care resources. A significant proportion of patients (35.7%) were still dependent for care at 6 weeks post-injury.

The age of patient, the systolic blood pressure on admission and the initial Helsinki CT score are significant predictors of outcome($p < 0.05$). The Helsinki CT score correlates well with the clinical parameters at predicting outcome. Hence, a change to new computer tomography scoring system may be warranted and the Helsinki CT score can be used as a predictor of outcome in the African subcontinent.

Key words: Helsinki computer tomography score, traumatic brain injury, prognostic value, neurotrauma, Glasgow Coma Score

Abstract 24 [Flash]
Anterior spinal cord fissuring: a predictor of spontaneous resolution of syrinx?
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Objective: Syringomyelic affliction of spinal cord is usually seen in association with variety of cranio-vertebral junction anomalies i.e. Chiari malformations, basilar invagination/impression, atlanto-axial instability etc. The natural history is not very clearly understood and a majority of patient present with slowly progressive neurological deficit followed by sudden rapid deterioration. At present, there is a general consensus to offer surgical decompression in all patients diagnosed with Chiari I malformation with Syrinx irrespective of their symptoms in order to prevent delayed neurological worsening. Few authors have reported spontaneous resolution of syrinx with persistent tonsillar herniation without operative treatment. We report one such patient and propose anterior spinal cord fissuring as a plausible cause of spontaneous drainage of syrinx. We also propose an idea to keep such patients with anterior spinal cord fissure seen in index scans to be followed up conservatively closely instead of upfront Chiari decompression
Method: Case report : A 21-year-old female with history of birth asphyxia had an episode of generalised tonic clonic seizure during sleep at the age of 12 years. She was evaluated with non-contrast computed tomography (NCCT) scan of brain in 2010 which showed area of hypodensities in left temporal lobe which were suggestive of ischaemic damage and patient was managed conservatively with anti-epileptics. In 2011 Patient had similar episode of seizures for which she underwent Magnetic resonance imaging (MRI) brain which showed gliosis in left temporal lobe and bilateral occipital poles along with an incidental finding of tonsillar herniation with no evidence of syrinx and a diagnosis of seizure disorder with Chiari I malformation was made (Figure 1). Patient had similar episodes infrequently for three consecutive years and had multiple changes of anti-epileptic medication regime by a neurologist followed which she was one-year seizure free.

In 2017, she again had an episode of GTCS and she was referred to neurosurgery OPD. MRI showed similar cranial findings as was seen in 2011 scan with cervical cord syrinx at C2, C3 level (Figure 2). Till date patient showed no high cervical cord or posterior fossa symptoms. Considering Chiari I malformation with a large syrinx, patient was advised Posterior Fossa Decompression with duraplasty but Patient was not willing and was lost to follow up.

She returned to our OPD after one year with willingness to undergo surgery in 2018. Till now, patient was asymptomatic for syrinx/Chiari malformation since her index visit. An MRI cervical spine was ordered as a routine preoperative imaging protocol. To our surprise MRI showed persistent Tonsillar herniation as seen in 2017 but no syrinx in cervical cord. (Figure 3). We retrospectively reviewed all the radiological investigations and found a fissure in substance of spinal cord anterior to syrinx which was connecting it to subarachnoid space in 2017 MRI study (Figure 4). During the course of her treatment she remained asymptomatic for cervical disease.
Result: Spontaneous resolution of syrinx with persistent tonsillar herniation in patients with Chiari malformation is very rare. Less than 10 such cases have been reported in literature till date. Role of abnormal CSF flow is very well established in development of syrinx but due to variable natural history of the disease, the correct pathogenesis and predictive factor for spontaneous resolution of syrinx is not clearly established. This uncertainty challenges the present recommended surgical treatment of syrinx in all the patients.
Conclusion: With our report, we propose spinal cord fissure as a predictive factor for spontaneous resolution of syrinx and recommend to keep such patients who are asymptomatic under follow up and not to consider surgery irrespective of the size of syrinx. Further studies including documentation of flow across such fissure with CSF flow study (CINE-MRI) is needed to support this evidence. Also, reduction of syrinx can result in increased space at craniospinal junction which can promote progression of tonsillar herniation and thus, we recommend to keep such patients in close regular clinicoradiological follow up to detect early worsening signs of tonsillar herniation even after complete resolution of syrinx.

Key words: spontaneous resolution of syrinx, syringomyelia, Chiari malformation, conservative management of Chiari with syrinx, anterior spinal cord fissuring

Abstract 25 [Oral]
Utility and pitfalls of high field 3 Tesla intraoperative MRI in neurosurgery: A single centre experience of 100 cases
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Objective: In India, several centres are using iMRI system. Ours' is the first centre to acquire high field 3 Tesla iMRI system. The aim of this paper is to share our one year experience with the implementation of 3T iMRI in neurosurgical procedures and to evaluate its use to improve our surgical outcomes in neuro oncological conditions.
Method: Prospective observational study conducted from August 2017 to July 2018 at Yashoda Hospital, Secunderabad. All patient undergoing 3T iMRI guided resection of ICSOLs were included in the study.

All iMRI were conducted using a 3 Tesla machine (MAGNETOM SKYRA, Siemens medical system, Erlangen, Germany). At our centre, the magnet is located in the room adjacent to neurosurgery operating room (OR) i.e. "NEAR BY OT TYPE". Before the start of procedure, the patient is positioned on MRI compatible head pins (DORO LUECENT®) attached to sliding patient board on operating table (MAQUET MAGNUS OR TABLE SYSTEM™). All skin to skin contact surfaces is covered with cotton rolls. Navigation system is placed and virtual position of patient inside gantry is anticipated using Bore gauze which mimics MRI gantry size ([Figure 1A1a).]. MRI staff is informed 30 minutes prior to expected arrival for intraoperative imaging. Routine imaging is withheld, and floor of MRI suite and corridor along with MRI surface is sterilized using Disinfectant (BACILLOCID®, Ramen & Weil). When the need for Intra-operative imaging is felt, the surgery is suspended and all the ferromagnetic instruments are removed from patient's body and surgical site is packed with antibiotic incise drape (IOBAN-TM) after filling the surgical cavity with saline. Patient is wrapped in a sterile plastic drape and checked with a metal detector for any accidentally left metal instruments on patient's body. The MRI machine has a detachable trolley which is wheeled in and docked to operating table. An iMRI checklist is filled by team of neuroanesthetists before transfer of patient to ensure patient, personnel and equipment safety. After checklist patient is transferred to iMRI trolley and shifted to MRI room through a dedicated sterile corridor. Once in the imaging suite, patient is connected to MRI compatible ventilator and monitors using compatible ECG electrodes and oximeters ([Figure 1B1b).]. A team of dedicated neuroanesthetists and neurosurgeons observe the patient throughout and strict asepsis is maintained. The acquired images are analysed by experienced neuroradiologists and neurosurgeons for any residual tumour and complications like bleeding, infarcts etc. ([Figures 2, and 3)].

Following The following variables were recorded:; preoperative imaging diagnosis, presence or absence of residue in Intra-operative imaging, whether or not iMRI modified our surgical decision, complications and mishaps attributed to iMRI, time required to shift and time required for image acquisition.

The resection status based on iMRI was divided into three 3 categories. Patient with no residue in iMRI were classified as "primary gross total resection (GTR)", patients with residues seen in iMRI and surgery was continued with GTR confirmed in post-operative post-operative scan were classified as "Secondary GTR", patients with residue seen but decision of aborting the surgery or partial resection of residue was taken were classified as "Subtotal resection (STR)", and the total number of primary and secondary GTR was termed as "Total GTR"

The data was recorded using a spreadsheet software (EXCEL, Microsoft, Redmond, USA) and was analysed statistically.

Result: A total of 100 patients with various intracranial SOLs were included in the study. Primary GTR was achieved in 44% (44/100) and residue was detected in 56% (56/100), secondary GTR was achieved in 37% (37/100) and decision of discontinuing surgery was taken in 19% (19/100), due to presence of tumour remnant in eloquent cortex or adjacent to major vascular structures. ([Graph 1)].

Out of 100 cases, the most common surgical indications were intra-axial SOLs (42%) and pituitary macroadenomas (30%) followed by other extra-axial lesions. iMRI was able to detect residues in 59.52% (25/42) intra-axial SOL, 60.00% (18/30) pituitary adenomas, 45.45% (5/11) meningioma,71.42% (5/7) CPA mass lesions, 50% (1/2) craniopharyngioma and 33.33% (2/6) intraventricular SOLs. ([Tables 1

& and 2)].

iMRI also helped us to improve our extent of resection (to achieve secondary GTR) in 76% (19/25) detected residues in patients with intra-axial SOLs, 55.55% (10/18) pituitary adenoma residues, 60% (3/5) meningioma residues, 60% (3/5) CPA residues, 100% (2/2) residues of intraventricular SOL. ([Table 3)].

We also noted and analysed the mishaps occurred during imaging and complications in the early post-operative period. Coil induced and contact Radiofrequency burns were seen in 3 cases (3%)(1) , circuit disconnection and transient rise in ETCO2 occurred in 1 patient (1%) and minor easily resolvable technical issues like problems in docking the MRI trolley and sliding the patient on MRI trolley was recorded in total 18 patients (18%). Post-operative infections were seen in 2% which was comparable to our infection rate in non-iMRI guided surgeries.

The mean time required for shifting and image acquisition in first 20 cases was 85.6 minutes which was reduced to 37.4 minutes in next 80 cases due to multiple repetitions and adoption to the shifting process and reduction in number of MRI sequences to identify residual tumour.

Conclusion: Setting up and effective utilisation of any new surgical adjunct has its own challenges. iMRI success depends on multi-departmental efforts, good communication between group persons involved and sincere team work. The team of neuroanesthetists and technical staff plays a pivotal role for successful and safe image acquisition. Our experience shows that it takes multiple iteration of the shifting process, along- with initial training session and mock drill, proper education of neurosurgical technicians and nursing staff, meticulous data collection and auditing to analyse and smoothen the work flow. Institution protocols and checklists should be prepared to reduce any untoward events.

Limitations of our work include not describing the efficacy of iMRI in various grades of gliomas separately and not comparing it with the control conventional resection group along with no analysis of long term surgical outcome, overall survival and progression free survival rates of the patient which needs further attention.

So, to conclude, 3TiMRI is a valid and state of the art technology which can help us achieve better extent of safe resections, and in turn can improve prognosis in patients with intracranial SOLs.

Key words: intra-operative MRI, adjuncts in neuro-oncology, maximising resections of glioma

Abstract 26 [Poster]
Cervical medullary compression by brown tumour
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Objective: The brown tumour or fibrocystic osteitis is a benign bone lesion resulting in an abnormality of bone metabolism integrating in the context of hyperparathyroidism. The spine is an exceptional location and can be complicated by spinal compression.
Method: We report a case of cervical brown tumour revealed by a medullary compression table
Result: This is a patient aged 65 years, followed for chronic inflammatory rheumatism seronegative, who consults for heaviness of the four members evolving since a year of progressive worsening. The examination objectified an asymmetric tetraparesis. Medullary MRI showed a lesional process of C4-C5-C6 vertebrae with intracanalar extension and spinal cord compression. Biologically, hypercalcaemia at 120mg/l with hyperparathyroidism. The patient underwent decompression surgery with a double anterior and posterior approach associated with a parathyroidectomy. The postoperative course was marked by the recovery of the neurological deficit and the normalisation of the calcaemia.
Conclusion: Spinal brown tumours with spinal cord compression are extremely rare, requiring decompression surgery and spinal stabilisation.
Key words: brown tumour, hyperparathyroidism, cervical medullary compression, decompression surgery.

Abstract 27 [Poster]
Intradural spinal tumours : about six cases
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Objective: Intradural spinal tumours are rare tumours whose evolution is slow and the clinical symptomatology varied and not very specific. Intradural tumours account for less than 10% of spinal tumours. There is a distinction between extramedullary and intramedullary tumours. MRI is the test of choice for diagnosis. The treatment is based on surgical excision
Method: We report a series of six cases collected over a two-year period in the neurosurgery department at Oujda University Hospital.
Result: The average age of our patients was 44 (27 years - 67 years). There is a female predominance: four women and two men. The symptomatology was dominated by discrete and progressive neurological deficits with genito-sphincteric disorders. All our patients benefited from a spinal MRI. The lesions were intradural extramedullary in five cases, intradural intramedullary in one case. The level of lesions was predominant at the thoracolumbar hinge. All our patients have undergone surgical treatment. The excision was total in 5 cases, subtotal in the case of the intramedullary tumour. The anatomopathological study was in favour of a neuroma in 3 cases, a meningioma in one case, an ependymal cyst in 1 case and an intramedullary oligodendroglioma in 1 case. In the case of medullary oligodendroglioma, a complement by radiotherapy has been indicated.
Conclusion: Intradural spinal tumours are rare with an annual incidence of 0.74 per 100,000 population. Extramedullary tumours represent 90%, intramedullary tumours 10%. These tumours are most often revealed by spinal pain, which may be associated with motor and / or sensory deficit of progressive or subacute onset and with vesicosphincteric disorders. Magnetic resonance imaging is the key examination in the assessment of these lesions. Meningiomas and neuromas are the most common extramedullary intradural tumours, they are usually benign and their treatment is mainly surgical with often complete excision. Medullary tumours, very rare, are mainly represented by astrocytomas and ependymomas whose excision is more difficult but remains the only possible treatment.
Key words: intradural spinal tumours, MRI, surgical excision

Abstract 28 [Poster]

Endoscopic treatment of pituitary macroadenoma in CHU Oujda

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Objective: The endoscopic endonasal surgery of the pituitary gland represents the gold stand in the management of pituitary adenomas. It is characterised by its minimally invasive character and benefits from the contribution of endoscopy
Method: The objective of our work is to report our experience in the management of pituitary macroadenomas and to highlight our results. Through a retrospective study of a series of thirty (30) cases operated at the neurosurgery department at Oujda by endoscopic endonasal transsphenoidal over a period of three years
Result: In our series, there is a female predominance: sixty seven (67) % of women. The average age of our patients was forty two (42) years old. Clinical symptomatology was dominated by neurological signs and visual disturbances. A hormonal biological assessment was performed in all patients including all anterior pituitary hormones

Pituitary adenoma was no-secreting in fifty three (53) % of cases. All of our patients benefited from the pituitary MRI and nasosinus CT. We obtained in our series the following result: twenty (20) % of microadenomas and eighty (80) % of macroadenomas. All of our patients were operated on by endoscopic endonasal transsphenoidal. The excision was considered: - total in 76.1% of cases - subtotal in 14.3% of cases - partial in 9.6% of cases related to the fibrous or haemorrhagic nature of the tumour. The postoperative complications in our series were marked by the occurrence of cerebrospinal rhinorrhoea in 9.52% of cases, meningitis in 4.76% of cases and diabetes insipidus in 9.52% of cases.
Conclusion: Pituitary endoscopy has grown considerably over the past twenty years.
It has made great progress in the management of pituitary macroadenomas
Key words: pituitary adenomas, no-secreting adenoma, endoscopic endonasal surgery

Abstract 29 [Flash]

Rachischisis: a case report

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Objective: Rachischisis consists of a failure in the closure of the posterior part of the neural tube, leaving the spinal cord exposed. It can be diagnosed during early pregnancy. Few cases can be seen at birth
Method: We report the case of a baby boy who was admitted in the department of Neurosurgery at the Habib Bourguiba University Hospital for rachischisis complicated with meningitis.
Result: A term baby boy was delivered by vaginal birth. The pregnancy was not monitored. Parents were not consanguineous. The baby had a spontaneous cry at birth. On inspection, there was a 16 X 6 cm red mass, located in the back of the boy, covered by a thin layer of skin. The baby was paraplegic. In the second day of life, liquid was flowing out of the lesion and the baby had fever. Meningitis was suspected and antibiotics were started. The lesion was covered with sterile dressing that was changed daily. MRI was performed showing that it was rachischisis. The baby died at day 15 of life
Conclusion: Rachischisis is a very complex birth defect. Babies have often other congenital defects associated. MRI contributes to the diagnosis. Mortality is very high.
Key words: rachischisis, meningitis, pregnancy

Abstract 30 [Poster]
Hydatic cyst of the posterior fossa: a case report

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Objective: Cerebral hydatic cysts are unusual. Infratentorial localisation is very rare.
Method: We report the case of a young boy who was operated in the Department of Neurosurgery at the Habib Bourguiba University Hospital for a hydatic cyst located in the posterior fossa.
Result: A 3-year-old boy was admitted for headache and walking disturbance. Neurological exam revealed a bilateral convergent strabismus associated with a static and kinetic cerebellar syndrome. CT scan showed a large cyst situated in the vermis associated with tri-ventricular hydrocephalus. The lesion was not enhanced with contrast agent. The boy underwent
surgery and the cyst was completely removed. The patient was symptom-free after surgery and treatment by albendazole was started. Pathology confirmed that the lesion was a hydatic cyst.
Conclusion: Cerebral localisation of hydatic cysts is rare. It usually affects children and is often revealed by increased intracranial pressure syndrome. Imaging is very helpful and pathology can confirm the diagnosis. Surgery is the treatment for this infectious disease.
Key words: hydatic cyst, cerebellum, CT scan, surgery

Abstract 31 [Poster]
Occipital meningoencephalocoele: two case reports

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Objective: Occipital meningoencephalocoele is a rare defect that is less and less seen nowadays
Method: We report the cases of two female babies who were treated at the department of Neurosurgery at the Habib Bourguiba University Hospital for occipital meningoencephalocoele.
Result: Both babies were delivered by caesarean section. In the two cases pregnancy was poorly monitored. They both had a spontaneous cry at birth. On examination, a large mass (12 X10 cm and 8 X 5 cm in size) protruding from the occipital area was found. On palpation, soft tissue was felt within the mass. One of the babies had a club foot and flexion deformity of the hip, the other one had no congenital defect. MRI revealed in both cases a large defect in the occipital bone with extra-axial fluid, meninges, brain matter and ventricles entering the defect. A Reparative surgery was performed (one at the age of 18 days and the other at the age of 53 days). Postoperatively, both patients had uneventful recovery.
Conclusion: Occipital meningoencephalocoele is a very rare type of neural tube defect. Preoperative MRI provides useful information to assess prognosis and plan the surgical management. Morbidity and mortality rates are very high.
Key words: occipital, meningoencephalocoele, MRI

Abstract 32 [Poster]

Place of decompressive craniectomy in traumatic brain injury

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Objective: To study the epidemiological, clinical, radiological, biological, treatment and outcome of patients who underwent a decompressive craniectomy after severe traumatic brain injury.
To identify the variations in surgical technique of decompressive craniectomy and its clinical, radiological and manometric indications. To assess the vital and functional prognosis after decompressive craniectomy and highlight the statistical correlation with the various parameters studied

Method: Retrospective study which lasted 8 and half years (January 2006 to 30 June 2014) and including 100 severe traumatic brain injury patients (mean age 38.72, sex -ratio 5.66). Accident public roads occupy a large part in the causation. We proposed to study the epidemiological, clinical, radiological, biological, treatment and outcome of patients who undergone a decompressive craniectomy after severe traumatic brain injury and the various indications and techniques decompressive craniectomy and finally highlight the factors correlated with the prognosis in double univariate and multivariate analysis.
Result: The final outcome was marked by 44% mortality. The 56 survivors were classified according to the Glasgow Coma Score (GOS): (GOS 5; 37, 71%), (GOS 4; 32.14%), (GOS 3; 19.64%) and (GOS 2; 12.5%). The prognostic study was made based on the survival and quality of life. Independent factors related to mortality were: age> 60, GCS <6, bilateral dilated and fixed pupils, the shift on the median line ≥10 mm and not opening the dura mater. Independent factors correlated with poor functional outcome (GOS 2.3) were: GCS <6, hypoxaemia (Sa O2 <90%), the shift on the median line ≥10 mm, not taking the mannitol 20% preoperatively, not opening the dura mater. Independent factors correlated with a good prognosis (survival) were: age between 21 and 40 and opening the dura mater with plasty. Independent factors correlated with a good functional outcome (GOS 4.5) were: taking the mannitol 20% preoperatively and the time of surgery ≤ 6 fortunes.
Conclusion: In cases of severe traumatic brain injury, one must not consider the refractory intracranial hypertension as an entity without any therapeutic option, for when medical treatment is exceeded. A decompressive craniectomy can bring interesting results if the indication is put on time for well-selected patients.

Key words: decompressive craniectomy, traumatic brain injury, Intracranial hypertension, acute subdural haematoma

Abstract 33 [Poster]

Melanocytoma mimicking a pituitary adenoma

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Objective: Melanocytoma is a rare tumour. It is one of the melanocytic tumours of the central nervous system developed from leptomeningeal melanocytes derived from the neural crest.
Method: We report a case of pituitary localisation melanocytoma in a patient treated in the neurosurgery department in the Habib Bourguiba Hospital
Result: A 41-year-old patient was admitted in the Department of Neurosurgery in Habib Bourguiba university hospital for a progressive visual acuity decline over the past year associated with headache and vomiting over the past 10 days. The examination finds a decrease in visual acuity with a slight papillary pallor at the fundus examination. Cerebral MRI shows a voluminous expansive sellar and supra-sellar process, with a double cystic and fleshy component, a macro-adenoma was suspected. The diagnosis of craniopharyngioma was unlikely in the absence of calcification. The biological check-up shows low cortisol, hypothyroidism and slight hyperprolactinemia. The patient underwent surgery through a transsphenoidal approach. The peri-operative aspect of the tumour was blackish.
Histological examination concluded that it was a melanocytoma.
Conclusion: Melanocytomas represent 0.1% of brain tumours. The location in the sella turcica is rare. The MRI shows a dense or hyper-intense iso signal in T1 and intense hypo in T2, and a homogeneous contrast recording. These tumours have specific histological and immunohistochemical characteristics. The clinical course of melanocytomas is sometimes marked by local recurrences. The malignant transformation of melanocytomas is exceptional. The treatment of melanocytomas of the central nervous system is based on complete surgical excision. Radiation therapy is reserved for recurrences and for intermediate grade melanocytoma.

Key words: melanocytoma, pituitary adenoma

Abstract 34 [Flash]
Intracerebral hematoma: an unusual mode of revelation of acute lymphoblastic leukaemia: a case report and review of the literature
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Objective: Intracerebral haematoma accounts for 20% of the mortality of acute lymphoblastic leukemia (ALL). It is unusual for intracerebral haematoma to be the first manifestation of ALL.
Method: We report an unusual way of presenting an ALL in a patient treated in the Department of Neurosurgery in the Habib Bourguiba Hospital.
Result: A female infant, aged 1 year, with no particular medical history, was admitted for macro crania evolving for 2 months without history of fever or trauma. The examination objected a tense anterior fontanel, with facial dysmorphia. Biology showed hyperleukocytosis at 14400Elts/mm3, thrombocytopenia at 97000 and haemoglobin at 9.7 g/dl. Cerebral CT showed a collection under the right hemispheric dura that was enhanced with the contrast agent associated with a spontaneously hyperdense right temporal mass with osteolysis of the right temporal bone. Brain MRI concluded that there was a right hemispherical empyema with a right temporal intraparenchymal haematoma. During the operation, dura mater and the subdural space contained a thick fibrous tissue and in continuity with an intraparenchymal haematoma. Post-operatively, bi-cytopaenia with leukopenia at 1900 Elts/mm3 and severe anaemia at 5.3g/dl was observed. The patient died in the early postoperative period. Pathological examination was in favor of an acute T lymphoblastic leukaemia.
Conclusion: Acute Leukaemia should be suspected in case of hyperleukocytosis with intracerebral haematoma. A quick and accurate diagnosis will help to make the right therapeutic choice and improve prognosis.
Key words: acute lymphoblastic leukemia, Intracerebral haematoma

Abstract 35 [Flash]
Intramedullary tuberculoma: A case report and literature review
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Objective: Intramedullary tuberculoma is a rare condition for which diagnostic and therapeutic management may be difficult. Clinical manifestation is that of slow spinal cord compression. If medical treatment is still indicated, surgical treatment is still being discussed.
Method: We report the case of a patient treated for an intramedullary tumour in our department in the Habib Bourguiba Hospital.
Result: A 21-year-old patient with a history of treated pulmonary tuberculosis, was admitted for progressive walking disturbances with sphincter disorders. Neurological examination found para paresis. There was no fever and no meningeal syndrome. Achilles reflexes were weak while patellar ones were abolished with a bilateral Babinski sign. There was a T8 sensory level with decreased tactile and painful sensitivity of the lower limbs, proprioceptive ataxia, a bladder globe with overflow urination and anal hypotonia. Biological exploration was normal. Medullary MRI showed an intradural nodular process with meningeal attachment the spinal cord developed at the T7 vertebrae. The process was in hypo signal in T2 weighted sequences, with an intense and homogeneous enhancement with contrast agent injection. Urgent T6 to T8 laminectomy was done. However, the spinal cord was not stretched intraoperatively and the dura mater appeared to be infiltrated by the tumour. Total excision was impossible due to the extremely important pseudo inflammatory reaction and the degree of adhesion of the process. The postoperative period was marked by clinical improvement. The diagnosis of intramedullary tuberculoma was confirmed by the pathological examination.
Conclusion: Intramedullary tuberculoma is a rare condition. Treatment is essentially medical. Surgery should be reserved in case of rapid neurological deterioration or diagnostic doubt.
Key words: tuberculosis, paraparesis, MRI

Abstract 36 [Poster]
Transdural approach for upper lumbar disc herniation
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Objective: Upper lumbar disk herniation is not frequent. It represents 1 to 2% of all disc herniations. Surgical approaches are different from usual low

lumbar disc herniations due to the difficulty in mobilising the nerve root.
Method: We report the case of a patient treated with a transdural approach for a lumbar disk herniation in our depatrment.
Result: We report a case of a 27-year-old man was admitted in the department of neurosurgery in the Habib Bourguiba teaching hospital for back pain and bilateral L3 radicular pain following a fall. The pain was not relived by analgesics. There was no motor nor sensitive deficit. MRI revealed a giant L1-L2 disk herniation. The patient underwent surgery. The herniated disc was extracted through a transdural approach. The patient developed a discrete motor deficit in the L5 trajectory (4/5). He was discharged one week after surgery. The motor deficit disappeared few weeks later thanks to physical rehabilitation.
Conclusion: Surgery of upper lumbar disc herniation represents a challenge to surgeons and requires a long learning curve to master.
Key words: lumbar disk herniation, transdural approach

Abstract 37 [Flash]
Association between breast cancer and glioblastoma, is it a coincidence?
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Objective: Breast cancer is the most common cancer in women. In many cases, it can be associated with another tumour. However, the association between breast cancer and glioblastoma is rare and has been reported only in few
cases in the literature.
Method: We report the case of a woman with a history of breast cancer who was treated in our department for a glioblastoma.
Result: We report the case of a 37-year-old woman with a history of breast cancer. She had a TisN0M0 breast cancer in the right breast at the age of 22. Only surgery was performed and the patient was followed up in the oncology department. She was admitted to the department of neurosurgery in the Habib Bourguiba university hospital in Sfax, Tunisia, for an increased intracranial pressure syndrome. Physical examination did not reveal any neurological deficit. CT scan showed a left parietal lesion. MRI and a full body CT scan were performed. Surgery was performed. The patient was symptom-free after surgery and had no deficit.
Pathology revealed that the lesion was a glioblastoma. The patient was treated with radiation and chemotherapy.
Conclusion: Association between breast cancer and glioblastoma has been reported in few cases in the literature. Genetic mutations and hormones are the most implicated factors. Prognosis is not better than other patients with
glioblastoma.
Key words: breast cancer, glioblastoma, genetic mutations, radiation therapy

Abstract 38 [Poster]
Primary epidermoid cyst of the cauda equina
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Objective: Intraspinal epidermoid cyst is very rare. It represents 0.5 to 1% of all spinal tumours. The cauda equina is an uncommon location in such cases.
Method: We report the case of a patient who was treated in the department of neurosurgery in the Habib Bourguiba hospital for a primary epidermoid cyst located in the cauda equina.
Result: We report the case of a 44-year-old female. The patient has been suffering from chronic lumbar pain for two years. During the last two months, she reported a weakness of both lower limbs with a retention type sphincter malfunction. Neurological examination showed paraparesis with abolished deep tendon reflexes. Lumbar spine MRI showed a posterior intradural and extramedullary oval tumoural formation extending from L1 to L5. Surgery was performed and complete removal was not possible due tight adherences to the cauda equina nerve roots. Histological examination was in favour of an epidermoid cyst. The patient had a good recovery. She was symptom-free few weeks after surgery.
Conclusion: Epidermoid cyst of the cauda equina is a rare finding. Despite its location and surgery difficulties, the post-operative results are promoting.
Key words: cauda equina, epidermoid cyst

Abstract 39 [Poster]

Primary neuroectodermal tumour of the spine
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Objective: Primary neuroectodermal tumour is a malignant neural crest tumour. It usually develops in the brain in children and young adults. Secondary localisation in the spine is possible through the cerebrospinal fluid. However, a primary localisation is rare.
Method: We report the case of a young patient who was treated for a primary neuroectodermal tumour located in the lumbar spine, in the department of neurosurgery in the Habib Bourguiba Hospital in Sfax, Tunisia.
Result: The patient is a 33-year-old man. He had no previous medical history. He was complaining of lower back pain for 6 months. He was admitted to our department for sudden exacerbation of the pain with walking disturbances. There were no sphincter disfunction associated. Physical examination noted a flask paraplegia, with abolition of deep tendon reflexes and a L1 sensitive level. Spinal MRI revealed a single well-limited right posterior lesion at the level of L1-L2. The patient underwent urgent surgery and the lesion was completely removed. The patient improved after surgery and was symptom-free after physical therapy. Pathological exam was in favor of a Primary neuroectodermal tumour.
Conclusion: Primary neuroectodermal tumour is a malignant tumour that rarely develops in the spine. Prognosis remains poor despite progress in medical treatment.
Key words: neuroectodermal tumour, spine

Abstract 40 [Poster]
Sacral hydatidosis
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Objective: Hydatidosis is a parasitosis caused by the larva of the taenia *Ecchinococcus Ganulosis*. The bony localization of hydatidosis remains rare and is characterized by its clinical latency which delays diagnosis and favours the extension of the affection.
Method: We report the case of a patient who was treated for a sacral hydatid cyst in the department of neurosurgery in the Habib Bourguiba hospital, in Sfax, Tunisia.
Result: The patient is a 44-year-old man with no medical history. He was living in a rural area and was a shepherd. The patient was admitted for progressive back pain. He noted that he had sexual impotency for few weeks and no sphincter dysfunction. Clinical examination objected an isolated distal paraparesis. Lumbar MRI revealed multilocular cystic lesions in the sacrum with osteolysis. The patient underwent surgery. The removal of the cysts was challenging and could not be complete. The patient developed a distal motor deficit after surgery. Pathology was in favour of hydatidosis. Albendazole was admitted to the patient. With physical therapy the patient had partial mobility; however, sexual impotency did not improve.
Conclusion: Vertebral hydatidosis is a rare entity. It is characterised with its latency. Symptoms are not specific and spinal MRI is the key to diagnosis. Treatment depends on maximal cyst removal and on medical treatment. Prognosis is generally poor. Prevention is the best means of protection.
Key words: hydatidosis, vertebral, sacral

Abstract 41 [Oral]
Extrusion of distal shunt catheter: a report of three cases
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Objective: To describe three unusual shunt complications seen in a tertiary referral hospital in Kenya
Method: Three cases of distal catheter shunt complications are described here. This patients were seen in the neurosurgical unit in within a period of one year. Possible hypothesis of shunt extrusion are also explored. Ideal management of a patient with distal shunt catheter extrusion is discussed.
Result: Individual management outcomes for each patient are discussed in the article
Conclusion: Shunt extrusion is a rare distal catheter complications that if managed well has good outcomes
Key words: hydrocephalus, ventriculo-peritoneal shunt, distal catheter extrusion

Abstract 42 [Flash]
Maternal care of a quadriplegic patient
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Objective: We want to share our experience with a quadriplegic patient who gave birth to a healthy baby at 37-weeks gestation spontaneously and without

any immediate and delayed complications.
Method: Here we are sharing a case report and the literature review on the topic of spontaneous vaginal delivery in quadriplegic patients.
Result: It is case report from our hospital of a 28-year-old primigravida who acquired spinal cord injury at 36-week of pregnancy as fracture of C3 vertebra. She acquired the injury while she was waiting for her husband who was in a shop while sitting on the front seat of her car when a truck hit her parked car from behind. She was immediately rushed to the ER. Her motor power was 0/5 in all four limbs. She was admitted and the family was counselled. She had SLIC score of 6. The gynaecology and obstetric department was involved and evaluation of foetal well being was done. The patient was admitted and was kept under observation. After 1 week, patient's attending mother noticed and felt contractions and the duty doctors was notified. Patient was fully dilated and the baby was delivered safely even without forceps assistance. The patient did not suffer from any postnatal complication as well. also performed literature review regarding the management of pregnant quadriplegic patients and any increased risk of pregnancy and birth related complications.
Conclusion: Normal delivery is possible in quadriplegic patients. In some studies, an increased risk of urological sepsis has been suggested. Some studies suggested use of forceps assistance but in our case, our patient had an uneventful normal delivery without forceps assistance and our patient did well during her postpartum period.
Key words: SVD, quadriplegia

Abstract 43 [Flash]
Anterior mini-temporal approach for tumours of the temporal lobe
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Objective: Minimally invasive procedures have demonstrated benefits compared to common techniques by diminishing comorbidities and showing better aesthetical results. Thus, the aim of this study is to analyse our results with temporal lobe resections through anterior mini-temporal approach.
Method: We carried out a retrospective observational analysis of anterior mini-temporal approach for temporal lobe resections performed in our hospital. Based on this criteria, seven cases were included. Grade of resection, size of craniotomy, survival time, complications, and hospitalisation rates were examined.
Result: Complete supramarginal resections were successfully performed in 100% of patients, verified by immediate post-operative magnetic resonance. Average size of craniotomies was 3cm, verified with post-operative CT-scan. After microscope resection, the endoscope was used in order to obtain a greater view of the resection cavity and surgical field, and evaluate the grade of resection. All patients had favourable outcomes, there were no complications after surgery or during hospitalisation. Any post-operative bleeding, infections or damage of the frontal branch of the facial nerve were reported. All patients had an early recovery, and average hospitalisation rate was three days.
Conclusion: This study demonstrated that anterior mini-temporal approach for temporal lobe resections is a safe technique. The comparison with common craniotomy revealed that this minimally invasive procedure had similar survival time, with the benefits of reduced operative time and stay time in the operation room, less risk of infections, lesser hospitalisation rates, diminished soft tissue manipulation, better aesthetical outcomes, less temporal muscle atrophy and less chewing pain.
Key words: mini-craniotomy, mini-temporal, endoscope, temporal and tumours

Abstract 44 [Oral]
Microvascular decompression for hemifacial spasm. Our experience and literatur review
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Objective: In this study, we examined the hemifacial spasm patients operated in our clinic with the literature.
Method: Hemifacial spasm is a disease that causes involuntary contraction of the facial muscles. It also causes social withdrawal because the disease is caused by unintentional contraction of muscles. Hemifacial spasm is a curative disease if treated properly. We presented 60 patients with follow-up from 78 patients who were operated between 2016-2020. The ages of the patients are between 23-71

(mean 45.89) and F/M 32/28. Hemifacial spasm was detected on the left side in 26 patients and on the right side in 34 patients. In 18 of these patients, aica, 18 in pica, 4 in vertebral + pica, 2 in basils, 2 in venous base, 2 in basilar torticollis, 2 in vertebral artery + aica, 4 in vertebral + pica. + aica, pica + aica in 4, and vertebral arterial pressure was detected in 4. Patients were operated in the lateral decubitus position. Permanent retractor had not been used in any patient. Vascular contact was sought in medulla region, 2-3 mm above the cranial nerves, where the facial nerve is jutted, 9,10,11. Intraoperative monitoring was not used in patients.
Result: Patients being postoperative were not reoperated. Facial paralysis has not occurred in any patient. Loss of partial hearing occurred in 3 patients. Wound monitored due to cos flow in 3 patients. Surgical cured were provided to all patients. None of these patients had mortality or morbidity.
Conclusion: Hemifacial spasm is a disease that can be treated with surgery
Key words: hemifacial, spasm, decompression

Abstract 45 [Poster]
Spindle cell oncocytomas of the pituitary gland
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Objective: Spindle cell oncocytoma is a rare tumour of the pituitary gland with a dual diagnostic and therapeutic problem. Given the non-specific nature of the presentation, the diagnosis is based solely on anatomopathology. It is likely that the quality of the surgical gesture will condition the prognosis, but this gesture is not without risks and no prognostic factor has been identified to date. The number of cases described is currently insufficient to conclude to a standardised management.
Method: Our case is about a years old man who present a headache and a rapidly new occurring diplopia. He presented with bitemporal hemianopsia
Result: The patient underwent trans-sphenoidal surgery with a good operative follow-up. A complete excision was made Anatomopathology concluded that it was a spindle cell oncocytoma of the adenohypophysis.
Conclusion: The evolution of these benign tumours, little described in the literature, is characterised by a tumour progression that can threaten the visual prognosis and require early surgery. In addition, they are hypervascularized tumours that cause preoperative difficulties and have a much higher risk of haemorrhage than adenomas, which limits the possibility of complete removal.
Key words: pituitary gland, oncocytoma

Abstract 46 [Poster]
Primary dural lymphoma: case report and review of the literature
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Objective: MALT lymphomas of the dura, are an uncommon form of CNS lymphoma, accounting for an even smaller proportion of dural masses. They are, however, the most common form of primary dural lymphoma. On imaging, they are difficult to diagnose pre-operatively as primary dural lymphomas share many similarities with meningiomas which are vastly more frequent.
Method: we report the case of a 51-years-old who present a chronic headache evolving since 2 years. The clinical exam show an exophthalmos grade II. The MRI shows a pachymeninges with fibrous appearance located at the level of the pericerebellar region and in the cavernous sinus extended to the orbital apex. The patient was operated. An excision of fibrous thickening has been carried out.
Result: Histological analysis led to the diagnosis of MALT type B lymphoma, localised to the dura mater.
Conclusion: Primary lymphoma arising in dura is exceedingly rare. Literature describe only 14 reports of similar entity. Primary lymphomas arising in dura appear to have a more favourable clinical course compared to PCNSL and may require a less aggressive treatment.
Key words: lymphoma, MRI

Abstract 47 [Oral]
Issues in craniovertebral and spinal instability
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Objective: The author will present his philosophy on the manipulation of articular facet joint in the management of a number of complex anomalies of craniovertebral junction and rest of spine. An alternative strategy of treatment of degenerative spine will be presented.
Method: The experience is with over 30 year experience with C1-2 fixation and about 10 years experi-

ence with cervical and lumbar spine where facetal distraction and fixation of the spinal segment was done. Wide removal of the articular cartilage, stuffing of bone graft with or without a metal spacer provides a wide ground for bone fusion and for stabilisation. Facetal distraction was done using specially designed 'Goel' facet spacers.
Result: Attempts at fixation of the joint, manipulation and distraction of the facets can result in restoration of the alignment of the craniovertebral junction and clinical recovery. Facetal distraction of the subaxial spine (cervical, thoracic, lumbar) provide remarkable stability to the spinal segment, restores the intervertebral and spinal canal dimensions and results in immediate clinical recovery. The procedure ultimately results in arthrodesis of the spinal segment. No manipulation or resection of any part of the disc, ligament or bone is required.
Conclusion: Reduction of the joint cavity space, listhesis of the facets, arthritis of the cartilage, and destruction of the facets are the primary causes of a wide range of pathological entities that involve the craniovertebral junction and the spine. Facet treatment is effective and relevant.
Key words: craniovertebral instability, spinal instability, atlantoaxial fixation, spinal fixation

Abstract 48 [Oral]
Limbic System – Anatomical and Surgical Correlates

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Objective: A fibre dissection technique was used to study the limbic system and Papez circuit in particular. The relationship of the various components of the limbic system to normal anatomical structures and their relevance to surgery was studied.
Method: Six previously frozen and formalin-fixed cadaveric human brains were used. The fibre dissection techniques described by Klingler were adopted. The primary dissection tools used were handmade, thin and wooden and curved metallic spatulas with tips of various sizes.
Result: All the connections of the limbic system have been anatomically demonstrated. The course, length and anatomical relations of the structures that make up Papez circuit is delineated. Papez circuit begins in the hippocampus, continues into the fornix to reach the mamillary body. From there the mamillothalamic tract continues to the anterior nucleus of the thalamus, which in turn connects to the cingulum by means of the anterior thalamic radiations. The cingulum courses around the corpus callosum to end in the entorrhinal cortex which then projects to the hippocampus. The whole circuit has been anatomically dissected in the hemisphere first and then reconstructed outside after removing its various components meticulously.
Conclusion: Dissection of the brain delineates the anatomical details of the circuit clearly and assists in providing a three dimensional perspective of the limbic system. Intricate knowledge of the anatomy of this part of the brain aids the neurosurgeon while performing epilepsy surgeries, pyschosurgery and while approaching various lateral ventricular and third ventricular tumours.
Key words: limbic system, paper circuit, surgery, limbic tumours, paralimbic tumours

Abstract 49 [Poster]
Amoebic cerebral abscess: a report of four cases with literature review

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Objective: Cerebral amoebic abscess is a rare infection but fatal. Since its identification in 1965, few cases have been observed world-wide.
Method: The objectives of this study were to characterise the clinical, radiological, histological, prognostic and therapeutic aspects of this pathology with a review of the literature. We report four cases of cerebral amoebic abscess that were admitted to our department between 2010 and 2020
Result: Four men and one woman, aged 33, 43 ,44 and 56 respectively, were operated on. The diagnosis was confirmed by histological and serological examinations. No mortality was observed.
Conclusion: It is sporadic but it present a public health problem and usually has a poor prognosis.
Key words: amoebic abscess, cerebral abscess, MRI

Abstract 50 [Oral]
Vasopressin performance in chronic pain: study through systematic review
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Objective: To present a systematic review analysing the relationship between the role of vasopressin in chronic pain (CP).
Method: The systematic review was performed according to the guidelines contained in the Preferred Reporting Items for systematic reviews and meta-analyses (PRISMA). The data were extracted directly from the included papers full text. The search terms: "'chronic pain' AND (vasopressin * OR ADH OR V1 Receiver OR v2 receptor)" were used in the PubMed / MEDLINE, Scielo, Cochrane, Lilacs and TripDataBase databases on October 14, 2020, totaling 231 identified articles (PubMed / MEDLINE: 60; Scielo: 29; Cochrane: 4; Lilacs: 60; TripDataBase: 78). After removing duplicate studies, 195 articles were selected. The inclusion criteria were: studies in humans or animals with CP diagnosed by any criteria, in any age group, observational studies and case reports, originals published in any language. Studies published only as a summary, articles that prevented their full access, prior to 1990, publications only of protocol, as well as systematic or non-systematic reviews, were excluded. Three reviewers conducted the screening and removed studies that were not suitable based on the title and abstracts, making a total of 12 eligible. One study was excluded because it is not possible to have full access. Subsequently, four reviewers read the entire content of these articles and reached the consensus of 4 included studies. Studies that did not meet the eligibility criteria (inclusion and exclusion) were removed. Discrepancies at any stage were discussed between the authors until a consensus was reached.
Result: The frequencies of single nucleotide polymorphisms (SNPs) of the arginine vasopressin 1A receptor gene (AVPR1A) and one of its SNPs, rs10877969, is associated with pain. CP was not significantly associated with SNP rs10877969, however this polymorphism of the gene was associated with acute pain. The difference for this association may be due to differences between samples and their heterogeneity. The catastrophic pain and depressive symptoms are associated with rs10877969, suggesting a possible relationship between AVP and chronic pain through the limbic system. Hypersensitivity to vasoconstrictors is present in CP. A study carried out the application of intradermal doses of adrenergic agonists in rats with post-ischaemic CP (PICP), verifying that the models presented pain when submitted to these vasoconstrictors for several seconds, due to the abnormal and hypersensitised response to these substances. Nociceptive behaviours increased with the use of non-adrenergic vasoconstrictors, such as AVP, and suggests that hypersensitivity to sympathetic vasoconstriction and ischaemia are important mechanisms for pain and can be used for the development of future treatments.
Conclusion: The correlation between AVP and CP is not well understood by the studies. As limitations, difficulties were found in finding studies in the databases that evaluated this hormone in patients diagnosed with CP. However, it was possible to observe that there is a change in the serum concentration of AVP in the presence of CP that causes justifiable symptoms to its abnormal values, but it has not been clarified yet whether it is a consequent or causal link of CP. This change in AVP should be better studied to clarify its pathophysiological pathways that may be related to CP, enabling studies that improve existing treatments for CP patients.
Key words: chronic pain, V1 receptor, V2 receptor, vasopressin

Abstract 51 [Oral]
Role of neuroendoscopy (rigid and flexible) in management of hydrocephalus in children: our experience in last 2 years.
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Objective: Hydrocephalus is significant burden in paediatric age group. Endoscopic third ventriculostomy (ETV) has become standard of care in management of hydrocephalus. Aim of this study is to analyse outcome in children and identify factors related to failure or success of endoscopic third ventriculostomy.
Method: This is a retrospective study done in patients who underwent endoscopic third ventriculostomy during 2017 to 2019 at Kamineni hospital, Rainbow children hospital Hyderabad, Telangana. During the study period around 52 Endoscopic third ventriculostomy were done. ETV was success full in 33 children (64%). Out of 52 patients 30 were male and 22 were female child. ETV was performed in various aetiologies. 18 patients were due to Aqueductal stenosis with obstructive hydrocephalus, 3 patients were in obstructive hydrocephalus due to space occupying lesions in and around 3rd and 4th ventricle, 18 patients in communicating hydrocephalus, 7 patients in dandy walker variant with hydroceph-

alus, 5 patients in preterm IVH and 1 patient in multi-septate hydrocephalus. Having flexible neuroendoscope in armamentarium helps is performing trans lamina terminalis third ventriculostomy (ETV-LT) in cases where floor is not suitable for standard third ventriculostomy. ETV LT was done in 2 cases. Aqueductoplasty was done in 5 cases adjuvant to standard third ventriculostomy. Subdural hygromas were seen in 4 cases. 1 child improved with conservative management with successful third ventriculostomy, 2 children required burr hole evacuation of sub dural hygroma, 1 children who was managed conservatively had arrested hydrocephalus.
Result: ETV was success full in 33 children (64%). Non requirement of another CSF diversionary procedure like ventriculo-peritoneal shunt is considered to be success of surgical procedure. Relationship between success of ETV and various factors like aetiology of hydrocephalus, ante-natal diagnosed, post-natal complications, age at ETV, head circumference, previous shunt were assessed.
Conclusion: Endoscopic third ventriculostomy was performed in 52 children. Success of Endoscopic third ventriculostomy was seen in 33 children (64%). Postnatal complications and infection are poor prognostic factors for success of third ventriculostomy. Success of ETV is comparable with adults. Endoscopic third ventriculostomy should be offered as first line of management for shunt free survival in children.
Key words: hydrocephalus, rigid and flexible neuroendoscope, endoscopic third ventriculostomy, endoscopic third ventriculostomy- lamina terminalis

Abstract 52 [Flash]
Bobble head doll syndrome in multiloculated hydrocephalus
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Objective: Multi-loculated hydrocephalus is defined as multiple, separate, isolated CSF compartment or compartments within the ventricular system that may progressively enlarge. Multi loculated hydrocephalus is most difficult form of hydrocephalus to treat. Most commonly multi-loculated hydrocephalus presented with raised intra cranial pressure symptoms, increasing head circumference in infants, headache in elder children. Other common presentations are seizures, difficulty in walking, weakness of limbs: monoparesis or hemiparesis. Bobble head doll syndrome (BHDS) is uncommon syndrome characterised by head bobbing, usually seen in children with third ventricular or supra-sellar arachnoid cyst.
Method: We present a case of 20 months old child K/C/O obstructive hydrocephalus, post ventriculo-peritoneal shunt, presented with increasing head circumference, raised intra cranial pressure and abnormal head movement i.e., bobble head doll syndrome. Our literature search didn't reveal any association of multi loculated hydrocephalus with bobble head doll syndrome. Child underwent Navigation guided Neuro-endoscopic guided fenestration of multiple locules into single locule and was drained by ventriculo-peritoneal shunt.
Result: Post operatively abnormal head movement disappeared.
Conclusion: Our literature search didn't reveal any association of multi loculated hydrocephalus with bobble head doll syndrome. Aim of multi-loculated hydrocephalus was to communicate all locules into single cavity
Key words: multi-loculated hydrocephalus, neuroendoscopy

Abstract 53 [Oral]
Minimally invasive surgical options for the treatment of medium to large vestibular schwannomas: technical nuances
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Objective: Treatment of vestibular schwannomas presents many controversial aspects, from the indication to the selection of the best treatment option. In the era of stereotactic radiotherapy, microsurgery has to be competitive in terms of providing the best chances of functional preservation and complete tumour removal. The two most commonly used surgical approaches are the retrosigmoid suboccipital and the presigmoid translabyrinthine. We describe our experience regarding the endoscopy-assisted presigmoid retrolabyrinthine approach (EAPRA) and the use of the exoscope in the translabyrinthine approach.
Method: From May 2009 to June 2020, 25 patients

affected from large sporadic vestibular schwannomas were surgically treated in Our department. The EAPRA was used in 23 patients. Exoscope-assisted trans-labyrinthine approach was used in the remaining two patients.
Result: In the EAPRA group a complete tumour removal was obtained in 20 out of 23 patients. Postoperative transient facial nerve function impairment or worsening was observed in 3 cases, and hearing deterioration in 2 patients. No threatening complications occurred after surgery, and the length of hospitalization was usually less than 10 days. In the two patients treated by using the exoscope a complete resection of the schwannoma was obtained, without any complications.
Conclusion: The EAPRA can provide direct access to the cerebello-pontine angle along with labyrinthine complex preservation, conserving hearing function and allowing minimal cerebellar retraction. Endoscopic assistance is a crucial adjunct in the presigmoid retrolabyrinthine approach in order to overcome the limits imposed by labyrinthine complex preservation. It ensures complete visualization of the intracanalicular portion of the schwannoma, thus improving the rate of a radical tumour resection. The EAPRA could represent a valid surgical option in vestibular schwannoma surgery. In our preliminary experience, also the use of the exoscope can help a good visualization of the surgical field, allowing a safe and complete resection.
Key words: otoneurosurgery, skull base surgery, minimally invasive techniques, technical nuances

Abstract 54 [Flash]
Management of Intraventricular haemorrhage in Haemophilia. Case Report and Review of literature
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Objective: To highlight the challenges faced during the management intraventricular haemorrhage in Haemophiliacs and share forms of intervention that would be useful in resource poor settings.
Method: We report the case of a 10-year-old Haemophilia A patient who presented to our emergency department in an altered state of consciousness (GCS 12/15). This was occasioned by a fall 5 days prior While being attended to, he went into Status epilepticus necessitating sedation, intubation and mechanical ventilation in the Paediatric ICU. Head CT scan showed massive intraventricular haemorrhage with attendant acute hydrocephalus. A multidisciplinary team of Paediatric Neurointensivists, Haematologists and Neurosurgeons was established. Initial management by the haematology team was by fresh blood transfusions and factor VIII replacement. The patient then underwent EVD placement 3 days after admission. The EVD was placed on the side where there was no evidence of intraventricular clot. Daily monitoring of EVD drainage and serial head CT scan follow-up was done while the patient was in the Paediatric ICU.
Result: The patient was able to make a full recovery and was discharged home 3 weeks later.
Conclusion: Intracranial haemorrhage should always be a consideration in haemophiliac patients presenting with neurologic symptoms. A multidisciplinary approach is the best way to ensure appropriate management of these patients with good outcomes
Key words: Haemophilia A, intracranial haemorrhage, Intraventricular haemorrhage

Abstract 55 [Oral]
Selective vestibular neurotomy for intractable Ménière's disease in the era of endoscopy and intraoperative advanced neuromonitoring: recent experience and technical notes
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Objective: Vestibular neurectomy is considered a quite effective salvage-procedure to control intractable vertigo associated with Meniere's disease while preserving hearing and facial nerve function. However, it is still a potentially very dangerous procedure in terms of mortality and morbidity for, at the end, a benign disease. The present gold standard for the treatment of severe vertigo associated to Meniere's disease is transtympanic gentamicin injection and, regarding the surgical treatment, the extradural endolymphatic sac decompression surgery. With the present preliminary experience we explored the possibility, thanks to the higher magnification of-

fered by the endoscopic technique and the advanced intraoperative neuromonitoring, to maximise the selective section of the vestibular nerve fibers minimizing, at the same time, surgical complications.
Method: 22 patients with disabling, intractable vertigo associated to Ménière's disease treated by a combined micro-endoscopic selective vestibular neurotomy between May 2017 and May 2019 were evaluated. All patients come from a failure of a previous extradural surgical decompression of the endolymphatic sac. Demographics, clinical signs and symptoms, quality of life, thresholds of hearing, and adverse events were documented at baseline, 1 week, 1, 3, 6, 9, 12 18 and 24 months after surgery.
Result: At the maximum present follow-up of 2 years, vertigo disappeared in all but 2 of patients. In all cases, intraoperative neurophysiological monitoring and direct stimulation of nervous fibres allowed the selective identification of the facial and cohlear nerve. Furthermore, thanks to the better and higher magnification and visualisation provided by endoscopic technique, we were able, after the careful inspection of the cranial nerve VIII, to appreciate a slight difference in colour between the superior half (the vestibular nerve being relatively grayer) and the inferior half (the cochlear nerve being relatively whiter), which sometimes helped in demarcating the small sulcus between the two components. Moreover, after the initial partial section of the vestibular nerve by irrigating the field with saline solution, this difference become much more demarcated hence better guiding the definitive nerve section. In almost all cases, a fine vessel (arteriole) coursing along the demarcation line between the vestibular and cochlear components was identified by endoscopy while was hardly visible even at the highest magnification microscopic view. No major complications occurred, one case presented skin infection.
Conclusion: In our preliminary experience, the modern endoscopic technique and the intraoperative advanced neuromonitoring seem to be able to allow a precise, complete and very selective vestibular neurotomy, preserving at the same time, the cochlear and facial nerve functions. We believe that the surprisingly quite high success rate is due to the completeness of the vestibular nerve deafferentation of almost all its fibres. The main concern is the duration over the time being the follow-up still quite short.
Key words: selective vestibular neurectomy, skull base surgery, vertigo, minimally invasive technique, surgical technique, endoscopy

Abstract 56 [Poster]

Cavernous sinus topographic relations survey - a contribution to carotid cavernous vascular injuries endovascular treatment

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Objective: Report the limits of the cavernous sinus and its relationships topographic data to contribute to the neurosurgical management of vascular lesions in the parasellar region.
Method: The research consists of two stages. In the first, an integrative literature review study was performed. For the selection of articles the databases of Latin American and Caribbean Literature in Health Sciences (LILACS) and Scientific Electronic Library Online (SCIELO) were used. The time frame was determined between 2008 and 2018. The inclusion criteria were articles with anatomical description of the cavernous sinus contents and its neurosurgical relationship. In the second stage, an anatomical study in 20 cadavers heads.
Result: In the analysis of the cavernous sinus anatomical pattern, it was found that the upper limit is continuous with the sella turcica diaphragma that lines the lower margin of the anterior clinoid process and the oculomotor triangle, located between the anterior and posterior clinoid processes and the apex of the petrous part of the temporal bone. The lateral limit is formed by the junction of the sheaths of the oculomotor, trochlear and ophthalmic branch of the trigeminal nerve. The pattern of the medial limit is traced by the presence of the abducens nerve that passes medially to the ophthalmic branch. Generally, the lateral and medial walls join inferiorly to the level of the maxillary branch upper margin of the trigeminal nerve. The lower margin limits the petroclival fissure, at the junction of the temporal and sphenoid bones. And the standard posterior limit is the petroclinoid fold, which connects the posterior clinoid process to the petrous apex. The abducens nerve enters the cavernous sinus, inferiorly, to the petrosphenoidal ligament through its posterior wall.
Conclusion: The results obtained allowed us to conclude that, in general, the cavernous sinus presents, as an upper limit, a roof (related to the sella turcica diaphragm and the cisterns of the base) and three walls: lateral (with the temporal lobe), medial (with the sella turcica and the hypophysis) and posterior (with the posterior cranial fossa).
Key words: cadaver, cavernous sinus, neuroanatomy
Abstract 57 [Flash]

Trigeminal neuralgia secondary to giant osteoma: a case report

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Objective: The aim of this work is to present a case of a 37-year-old woman with a history of a right-sided giant osteoma located in the skull base causing a secondary trigeminal neuralgia.
Method: A 37-year-old female presented with severe paroxysmal pain of 3 years of evolution on the right side of the face, radiating the territory of the V2-V3 branches of the trigeminal nerve that extended to the occipital region. The pain progressively worsened until it became incapacitating. Medical observation and laboratory tests did not show other significant alterations.

Magnetic resonance imaging showed a hypointense mass located on the inner side of the petrous apex of the right temporal bone with an irregular multilobed shape, measuring 20 mm x 36 mm x 40.5 mm extending to the right cerebellopontine angle displacing the cistern portions of the trigeminal, facial and vestibulo-cochlear nerves

For minimally invasive microvascular decompression surgery, the patient was collocated in a lateral decubitus position where a trichotomy and antisepsis were performed at the right retroauricular region followed by a retrosigmoid craniectomy of 20 mm. The cerebellopontine cistern was accessed where an abnormal osseous structure was identified originating from petrous apex and extended to the cistern of the ipsilateral cerebellopontine angle. The bone lesion was interfering with the clear identification of the cranial nerves. A biopsy of the drilled osseous tissue was taken for histopathological examination.

Osteoma was progressively drilled, avoiding to damage to the adjacent vascular and brain structures. The trigeminal nerve was identified anatomically intact in its cisternal path where an exploration was performed in order to verify that there was no hidden vascular conflict.

During the microsurgical exploration, the facial/vestibulo-cochlear nerve complex was not displaced by the bony tumour. Due to the risk of causing neurovascular damage, it was decided not to remove all the neoplasia remnant. Hemostasis of the drilled cancellous bone was performed, and microsurgical decompression to the trigeminal nerve was concluded achieving the purpose of the operation.

Result: In the immediate postoperative period, patient was neuropathic pain-free, neurologically intact, haemodynamically stable, with no signs of wound fistula. No alterations in hearing and facial functions were informed, only transient right-sided diplopia and facial paraesthesia were reported. At 3 and 6 months of follow-up, computerized tomography revealed no growth of the osteoma margins. At 18 months of follow-up, the patient remained asymptomatic for trigeminal neuralgia.

Only 9 cases of trigeminal neuralgia secondary to osteoma has been previously described in the literature. We report our first case after nearly 700 MVD surgeries.

We recommend not to remove the entire tumour by drilling due to the high risk of damaging important structures. Periodical imaging tests, audiometric evaluation and clinical observation of patients are necessary in order to exclude recurrence.

Conclusion: Despite its low incidence, osteoma of petrous bone should be considered as a cause of secondary trigeminal neuralgia. To ensure pain relief, the osteoma must be drilled carefully without damaging adjacent structures, in addition to verifying that there is no other neurovascular conflict. Trigeminal neuralgia secondary to osteoma must be diagnosed after a correct clinical, radiological and pathological evaluation.

Key words: tumour, osteoma, temporal bone, cerebellopontine angle, trigeminal neuralgia, microvascular decompression

Abstract 58 [Oral]
Application of a Novel Scanner-Assisted Carbon Dioxide Laser System (SmartXide2) for Minimally Invasive Neurosurgery

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Objective: Despite potential advantages, a broad diffusion of the CO2 laser for neurosurgical procedures has been historically precluded by operative limitations, such as its cumbersome design, the bulky set-up and lower optical quality of the micromanipulators. Nonetheless, in the last decades, significant technologic improvements of CO2 lasers, together with a better ergonomics and quality of accessories, have made CO2 laser surgery easier and reproducible. The introduction of surgical microscanners, in particular, has allowed to perform a safer, more precise and faster laser microsurgery, while having a perfect view of the operating field (being a non-contact technique). Hereby, we report our preliminary surgical experience with the laser SmartXide2 CO2 scanning aided laser system, developed by DEKA (Florence, Italy).
Method: We treated 6 patients suffering from various lesions (1 vestibular schwannoma, 2 brain metastases, 1 glioma, 1 cerebral meningioma, 1 spinal neurinoma) with the aid of the SmartXide2 CO2 laser system, in order to evaluate its potential and benefits in different neurosurgical scenarios.

The laser system was a DEKA Smartxide2 60W, equipped with the high precision micromanipulator (Easyspot Hybrid version), coupled with a surgical scanner (HiScan Surgical) and connected to a Leica M720 OH5 (Leica Microsystems GmbH, Wetzlar, Germany) neurosurgical microscope through a dedicated adapter.

The focal length of the microscope was set on 300mm EFL and the CO2 laser was focused by means of the micromanipulator's zoom on the plane of view, in order to produce the best effect on tissue. At this focal length the micromanipulator produces a spot of 190Am, thus being highly precise and effective in ablation and cut.

Result: The CO2 laser was used, together with the traditional neurosurgical instruments, in every step of the procedures, from the initial pial incision for intra-axial tumours, as well as from the early extra-axial lesions debulking, to the progressive ablation and removal of the lesions, and, at the end of the operations, for the haemostasis of the surgical cavity. No injury to the surrounding neurovascular structures was observed. In particular, in the vestibular schwannoma case, the CO2 laser allowed a safe removal of the tumour around the VII-VIII complex and the lower cranial nerves. Immediate post-operative neuroimaging always confirmed the complete tumour removal, and showed a marked reduction of the pre-operative surrounding oedema with no evidence of cerebral/medullary contusions.
Conclusion: In our experience, the SmartXide2 CO2 laser, coupled with Easyspot Hybrid and Hiscan Surgical, turned out to be a suitable system for the resection of different cerebral and spinal lesions. It is an effective and precise tool to perform different neurosurgical steps and procedures. Moreover, having no consumable accessories is also cost effective. Therefore, the SmartXide2 CO2 laser may represent, in selected cases, a helpful and safe surgical instrument. It addresses some of the ergonomic limitations of the laser systems, and is able to cut/ablate and coagulate the tissue at the same time, with minimal lateral thermal spread, thus preserving the surrounding neurovascular structures.
Key words: laser, neuro-oncology, surgical techniques, minimally invasive neurosurgery

Abstract 59 [Oral]
Surgical approaches to the Cranio-Vertebral Junction Disorders: a spectrum for tailored approaches
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Objective: The cranio-vertebral junction (CVJ) is an anatomically complex region, affected by a wide range of tumour, vascular and traumatic diseases. In recent years surgical approaches to CVJ underwent technical improvements that increased both surgical manoeuvring space and working angle, with minimal manipulation of vascular-nervous structures. However, in some cases, the extent of bone demolition raise the issue of post-operative instability and the need of appropriate reconstruction techniques. We report our experience in a case series of CVJ diseases, discussing for each of them the type of surgical approach.
Method: All clinical records regarding patients undergone surgery for CVJ disorders from January

2011 to January 2019 were collected. Pre and post-operatively all patients were stratified by clinical features and eventual post-surgical instability was assessed by CT scan and/or MRI evaluation. Mean follow-up was at 6 and 12 months from surgery.

Result: We report a series of 35 patients affected by CVJ disorders: 2 of them, affected by PICA aneurysm, and one with foramen magnum meningioma, underwent far-lateral approach; 2 with giant clival chordomas were treated with a combined endoscopic endonasal approach (EEA) and open transmandibular-transcervical approach; 1 patient with an anterior CVJ chordoma underwent an antero-lateral approach sec. Bernard George; 13 patients were treated with a combined anterior transcervical and endoscopic endonasal C1-C2 screw fixation approach for either odontoid fractures or pannus retro-dontoideum; 14 patients with irreducible bulbo-medullary junction compression due to a migrated odontoid process and/or retro-odontoid inflammatory process and 2 patients with spheno-petro-clival meningiomas were subjected to an extended EEA. In the first two cases, condilum demolition was necessary to widen the exposure and clip the aneurysm. When performing the odontoidectomy, the anterior C1 arch was spared, if possible, in order to preserve spine stability. Four patients presented a CSF leakage and for 2 of them a revision surgery was needed. Post-operatively, one patient suffered from a mucosal dehiscence, with secondary healing confirmed at endoscopic endonasal outpatient follow-up. A complete tumour removal was achieved in 4 out of 6 patients.
Conclusion: CVJ approaches should be chosen and designed on a case-by-case basis, with the goal of achieving an appropriate surgical exposure, with the best working angle and minimising manipulation of vascular-nervous structures. Bone demolition is essential and, for selected cases, even more invasive approaches should be considered to have a shorter route to the surgical target. At the same time, whenever a bone demolition approach is chosen, the issue of post-operative instability must be addressed, in order to plan specific reconstruction techniques.
Key words: cranio-vertebral junction, skull base surgery, spine surgery, endoscopy

Abstract 60 [Flash]

Chronic Subdural Hematoma, a cause of persistent post-dural headache in the postpartum period
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Objective: Describe an association between spinal anaesthesia and chronic subdural hematoma in postpartum women with prolonged post dural puncture headaches.
Method: Two case reports in young mothers with no identifiable risk factors other than spinal anaesthesia for Caesarean section.
Result: A 24 year old primiparous woman presenting 4 weeks postpartum with persistent headaches refractory to over the counter medication. On examination had no focal deficits. CT scan showed bilateral chronic subdural hematoma.
A 29 yr old presenting with a 6 week history of persistent headaches. Developed diplopia 2-weeks prior to presenting in hospital. On examination had a right sided chronic subdural hematoma. Both young mothers had successful evacuation of the haematomas and uneventful recoveries.
Conclusion: Since the only identifiable risk factor these patients presented with was spinal anaesthesia where the CSF dynamics were potentially altered, we propose that this is the cause of the chronic subdural haematoma in these two patients. With the large number of caesarean sections under spinal anaesthesia being done in Kenya, the contributions of chronic subdural haematoma to the maternal indices is unknown.
We therefore propose a cohort study where patients with post-dural headaches longer than 2 weeks will be followed up with imaging to determine the prevalence of chronic subdural haematoma in patients undergoing spinal anaesthesia.
Key words: chronic subdural haematoma, spinal anaesthesia

Abstract 61 [Flash]
Cingulotomy to non-oncological pain: literature review
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Objective: To present a systematic review analysing

the relationship between the role of cingulotomy and non-oncological pain
Method: Literature review according to Preferred Reporting Items for Systematic reviews and Meta-analyses (Prisma). The inclusion criteria were studies and case reports with a period between 1987 to 2019, with individuals of any determined age group, diagnosed with non-cancer pain, treated with cingulotomy, observational studies and case reports, originals published in English. Studies not developed in humans, published in databases with no abstract, systematic reviews and letters to the editor, were excluded. The literature review was carried out on July 25, 2020, on the following bases: PubMed, ScienceDirect, SciELO, Lilacs and TripDataBase, using the terms: "Cingulotomy" AND "Pain". Duplicate studies were removed, resulting in a total of 7 articles that met the inclusion criteria taking into account their citations and their respective impacts.
Result: In quantitative somatic sensory tests and functional image of responses to painful stimuli before and after cingulotomy for obsessive-compulsive treatment, it was shown that cingulate lesions inhibit the ipsilateral Parasylvian cortex, indicating the functional connectivity between these cortical areas, a strict characteristic of network modulation of pain. In a study with 42 patients undergoing bilateral cingulotomy for the treatment of pain, depression and mood disorder, of these, eight in the postoperative period were without the initial symptoms, not needing medication or psychiatric support. But, in all cases the region where the cingulotomy was performed, showed in computerised tomography cystic areas of bilateral encephalomalacia, mostly symmetrical, well defined in the cingulate gyrus, measuring approximately 5x7mm^2. Cingulotomy does not present surgical mortality or permanent neurological morbidity. May be related to transient confusion, subtle cognitive impairment, such as attention deficits, and mild gastrointestinal bleeding.
Conclusion: Cingulotomy can be proposed as a treatment for non-cancer pain, however, in the area where the neurosurgical procedure is performed, areas of encephalomalacia can be found during the postoperative follow-up neuroimages, being considered a procedure with no surgical mortality and permanent morbidity.
Key words: cingulotomy, neurosurgery, pain

Abstract 62 [Oral]

Determinants of early postoperative mortality in patients with high grade glioma in Nairobi, Kenya
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Objective: Determine factors influencing early postoperative mortality (within 3 months) in patients with high grade glioma.
Method:
Study design: a case series, with a retrospective and prospective arm carried out between January 2018 and June 2019.
Subject selection: patients with a diagnosis of high grade glioma attending the neurosurgery clinic at Kenyatta National hospital
Study procedures
Recruitment and enrolment: for the retrospective 6-month arm, patients had their records traced in the surgical operations book and files in the records department. They were then contacted and on the next visit recruited into the study. For the prospective arm, we recruited patients sequentially as they presented in the clinic until the end of the study period. All patients received routine standard of care.
Result: The study recruited 17 patients with high grade gliomas with 15 prospective patients. The average age of patients was 45.29 yrs. There were 12 males (70.6%) compared to 5 females (29.4%). All 17 patients had primary complaints with headache, 12 patients (70.6%), being the commonest complaint. This was followed by 3 patients (17.6%) with memory loss and 2 patients (11.8%) with seizures. Twelve patients (70.6%) had secondary complaints in addition to their primary complaints. This were seizures, hemiparesis, memory loss, stiff neck, syncope and visual acuity loss. Only 4 patients had 3 symptoms at presentation. The tertiary symptoms being hemiparesis, incontinence and superstitious behaviour.

On the duration of symptoms, 2 patients (11.8%) presented to hospital less than 2 weeks after symptoms started, 6 patients (35.3%) presented between 2 weeks and 3 months, while another 6 patients (35.3%) presented more than 3 months after symptoms began.

Three patients (17.6%) gave reasons for delay symptoms not being serious enough followed by two patients (11.8%) each for whom primary physician was the cause of the delay and also lack of finances. Other reasons given by one patient (5.9%) each were

they thought it was another ailment, sought alternative care and there was lack of family support.

Clinically, 10 patients (58.8%) had a Glasgow Coma Scale of 15, with 2(11.8%) having a GCS of 14 and 1(5.9%) each having a GCS of 13 and 9. The Mean Karnofsky Score was 78.7% (range 30%-100%).

On imaging, 5 patients (29.4%) were found in the parietal lobe, 4 patients (23.5%) had tumours in the frontal lobe, 3 patients(17.6%) had tumours in the temporal lobe and 2 patients(11.8%) had tumours in the occipital lobe. All tumours were supratentorial. Nine patients (52.9%) had tumours were in the left hemisphere with 5 patients (29.4%) had tumours in the right hemisphere. The mean tumour size was 118.6 cm3 +/- 94.2cm3 (range 18cm3 to 300cm3) . Ten patients(58.8%) had well defined margins compared with 4 patients(23.5%) who had ill-defined margins. Surrounding oedema was present in 17 patients(76.5%) compared to only 1 patient(5.9%) with no oedema. At three months, 7 patients (41.2%) were alive and 8 patients (47.1%) confirmed dead. Two patients (11.8%) were lost to followup.
Conclusion: On Chi-square test, the independent factors predicting survival at 3 months included IDH-1 mutated status, duration of symptoms greater than 3 months at presentation, tumour in all other lobes except parietal lobe left sided tumours and presence of oedema on imaging.

Key words: high grade glioma, early post-operative mortality

Abstract 63 [Oral]
Development of guidelines for early diagnosis of childhood brain Tumours at Kenyatta National Hospital.
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Objective: To develop clinical guidelines for early diagnosis of childhood brain tumours(CBT) at a National Referral and Teaching Hospital in Nairobi, Kenya, Kenyatta National Hospital(KNH)
Method: The study involved two phases; the first phase being a cross-sectional study on childhood brain tumours at KNH to review the pattern of presentation, Pre-Diagnostic Interval (PSI), and to establish reasons for late diagnosis. The sample included all patients between 0-12 years who met the inclusion criteria presenting with childhood brain tumours in KNH during the study period of seven months. An informed consent was taken from the caregiver.

The second phase of the study involved a Delphi Survey, in which the results of the cross- sectional study (first phase) were used to formulate statements for the Delphi Questionnaire. The questionnaire was presented to Neurosurgeons and Paediatricians from the University of Nairobi (UoN) and KNH. The respondents of the survey ranked their agreement to each statement using the Likert scale. The feedback was analysed and the rankings for each statement was collated. The statements that reached the level of consensus (equal to or more than 80% of the respondents' score of 7-9) were accepted. The statements that reached consensus were outlined into the final guideline document. The statements that didn't achieve consensus were eliminated.

Result: Sixty-one children with brain tumour between the ages of 0-12 years who met the inclusion criteria for the cross-sectional phase of the study were analysed. A total of 25 signs and symptoms were recorded. The most common signs and symptoms were headache (75.4%), nausea/vomiting (70.5%), lethargy and school difficulties (39.3%) and focal motor weakness (32.8%). The Pre-diagnostic Symptomatic Interval (PSI) ranged from one week to 3 years with a median PSI of 3 months and a mean of 7.7+/_9.6 months. Eleven (18%) of the patients had a PSI of less than a month while 50 (82%) had a PSI longer than a month. The predominant reason for delayed diagnosis was lack of health worker expertise (59%) followed by lack of awareness by the parent/guardian (8.2%).
Delphi Survey results: 18 (72%) of the statements achieved consensus while 7 (28%) did not meet the consensus threshold and were eliminated. The 18 statements formed the final guideline. The guideline outlined the varied presentation of brain tumours in children, assessment details and imaging recommendations.

Conclusion: The findings have outlined the varied presentation of CBT with headache as the most common presentation at KNH (75.4%).
The study also concluded that delayed diagnosis of brain tumours in children at KNH had a median PSI of 3 months and a mean of 7.7 +/_ 9.6 months.

The main reason for the delayed diagnosis (prolonged PSI) was lack of expertise by the health

worker (59%)
Therefore, the guideline will assist the health worker primarily by providing the varied presentation pattern of CBT as well as imaging recommendations for children with brain tumours.

Key words: childhood brain tumour (CBT)

Abstract 64 [Oral]
The pattern of brain tumours in Kenya. A review
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Conflict of interests: none

Objective: Previous studies have reported a lower brain tumour incidence in Africans compared to Caucasians. This may be due to under-diagnosis and underreporting due to lack of Brain Tumour Registries in most African countries. The reported annual global age-standardised incidence of primary malignant brain tumours is about 6 and 4 per 100,000 for males and females respectively in developed countries and 3 and 2 per 100,000 for males and females in developing countries. While under diagnosis may account for lower incidence of brain tumour in developing countries, ethnic differences in susceptibility to development of brain tumours may also play a role. There are differences in the epidemiology of brain tumours in children compared to adults. Medulloblastoma and low grade glioma are the most common type of tumours in children compared to adults where high grade glioma and meningioma are the most common type of brain tumours. The aim of this study was to review the pattern of the common brain tumours seen at the Kenyatta National Hospital during the pre-CT scan era and the pattern observed during the post-CT scan/MRI era and whether the advances in neuroimaging had led to earlier diagnosis and improvement in management of brain tumours in our institution.
Method: In this paper the authors review the varying patterns of brain tumours in Kenya by analyzing data obtained from previous studies by the author and his colleagues at the Kenyatta National Hospital over a 50 year period (1971 and 2019). Published data from over 500 patients with brain tumours who underwent surgery is reviewed and compared with data from similar studies done elsewhere in Africa and the developed world.
Result: Earlier studies done at the Kenyatta National Hospital in the seventies when operative management of brain tumours was first established found that gliomas made up 45% of all brain tumours. This was in the pre-CT scan era. A follow up study in the same institution reviewed data on brain tumours seen between 1984 and 1993 and found out that gliomas made up 45.8% of all the brain tumours and meningiomas 34.4%. Gliomas were found to affect a young age group with a peak at the first decade of life and were commoner in males (M:F, 1.4:1). In another study done in the same institution around the same period that evaluated the diagnostic accuracy of imprint cytology in 71 patients who underwent surgery for removal of brain tumours over a period of 6 months, meningiomas seemed to be more common than astrocytomas, (40.8% meningiomas, 26.8% astrocytomas).

Another study done between 2012 and 2014 in the same institution by Wahome and Mwang'ombe found that meningiomas were more common than astrocytomas (41.4% and 26.3% respectively). However these results may be as a result of patient selection, where those patients who were more likely to benefit from surgery were the ones who underwent surgery. Lack of established multidisciplinary care for management of gliomas may also be influencing the observed pattern.

The preponderance of meningiomas to occur in the female population in the developed countries is also true in the developing world as noted by Kanja and Mwang'ombe in a review of 50 patients with meningioma who underwent surgery at the Kenyatta National Hospital over a period of 8 months where the female to male ratio was 2:1.

Late presentation was consistently common in all the studies and, in one study, was associated with total loss of vision in 20% of the children where the delay in diagnosis was associated with the pre-diagnostic symptomatic interval of 3 months. Some of the reasons for the delayed diagnosis were lack of health worker expertise and lack of awareness by the parent/guardian. A histopathological review of all brain tumour patients in children at the Kenyatta National Hospital between June 2018 and April 2019 found that 48.3% were infratentorial, 47.1% supratentorial and the rest (10.6%) were evenly distributed between thalamic, pineal and brain stem. This pattern is different from the pattern observed in the earlier pre-CT scan era studies.

Conclusion: Although earlier studies of patients

who underwent surgery at the Kenyatta National Hospital found glomas to be the commonest tumours (45.8%) followed by meningiomas (34.4%) later studies of patients who underwent surgery have consistently shown meningiomas to be more common than gliomas (40.8% and 26.8%; 41.4% and 26.3%). However these observations may be as a result of patient selection where, in a developing country, emphasis may be directed towards offering surgery to those patients who are likely to benefit. In the most recent study, the distribution of brain tumours in children between the infratentorial and supratentorial compartments was almost equal in frequency. Low grade gliomas are the commonest tumours in children followed closely by medulloblastoma. Late presentation is common especially in children where 20% of the children come when already blind. This is due to shortage of health worker expertise as well as ignorance of the problem by parent/guardian. Future efforts should be directed towards addressing these issues as well as establishing population based brain tumour registry for purposes of surveillance and monitoring and the establishment of population cancer awareness programs. Such programs will provide a true picture on the frequency of various types of brain tumour in the Kenyan Population. The establishment of multidisciplinary care in the management of brain tumour patients in sub-Saharan Africa should be a major priority in all programs, in spite of the financial challenges involved

Key words: brain tumour. Pattern. African population

Abstract 65 [Oral]

Epidermoid cyst of the anterolateral cisterns of the brain stem treated with a minimally invasive sub-asterional approach

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Conflict of interests: None

Objective: The aim of this study is to present a case series of patients operated to remove the epidermoid cyst located in the anterolateral cisterns of the brainstem and to describe our operative technique. According to our medical philosophy, the main objective of the surgical treatment is to preserve the patient's life; the second purpose is not to damage the nervous and vascular structures adjacent to the tumour to avoid neurological sequelae and complications inherent to surgery; and the third should be to eliminate the cause of the symptoms, that is the tumour resection as complete and safe as possible.
Method: A descriptive retrospective observational study was conducted from January 2011 to October 2020. Medical records of 1,996 patients treated at our institution were reviewed. All patients presented a clinical and imaging diagnosis of neurovascular compression of the cranial nerves, manifesting as trigeminal neuralgia (TN) in any of the two clinical presentations: paroxysmal pain (typical TN) or paroxysmal with continuous persistent pain (atypical NT); other manifestations included hemifacial spasm, glossopharyngeal neuralgia, occipital neuralgia, dysfunctional hyperactive syndrome, or vertigo with tinnitus. All cases were classified by their three aetiologies as classic, idiopathic or secondary.

The distribution by age, gender, pre and postoperative imaging studies, the degree of cyst resection, postoperative evolution, complications, and the quality of life based on the Karnosfsky scale, were analysed. The follow-up period ranged from 6 to 66 months with an average of 30 months.

Patients were followed-up at 3, 6, 12 months and annually thereafter either in person or by videoconference and the control images were sent via the internet or acquired by the imaging staff of our hospital, in the pre-established periods.

Result: Of all the 1,996 patients, a secondary aetiology was established in 308, of which 29 were epidermoid cyst. We excluded 3 patients who presented epidermoid cysts extending toward other chiasmatic and supratentorial cisterns due to surgical method and risk of operating on them are totally different to the cerebellopontine angle approach. Infratentorial location of the cyst was determined in 26 patients, either in the posterior fossa or anterolateral cisterns. Only 6 patients underwent surgery in another institution and currently present residual tumour, pain, and are under pharmacological treatment. Almost immediately after tumour diagnosis, 18 patients were operated on at our institution. Using a minimally invasive technique, the cyst was removed completely or as completely as possible, leaving the implant attached to the brainstem or vascular structures due to the high risk of complications or death. The remaining 2 patients were not operated on as pain continues to be adequately controlled with medication.

Total removal of the tumour was achieved in 11 pa-

tients with excellent surgical results. A total resection was considered as the removal of the squamous content, the pseudocapsule around the tumour and its indurated implant. Subtotal resection occurred when the friable content was excised, with visible remains of the pseudocapsule and/or implant. In the remaining 7 patients, it was decided not to remove the implant strongly adhered to the neurovascular structures due to the high risk of causing a neurological lesion. Only 2 patients presented postsurgical complications due to cerebrospinal fluid leak that required reopening and duroplasty in another institution. In 2 patients, MRI showed residual tumour growth at one year of follow-up, with a size of two cubic centimetres without any clinical manifestation

Conclusion: In our expert opinion, the minimally invasive sub-asterional approach to the surgical management of the epidermoid cyst is the best treatment alternative due to the excellent results. When an implant site is located very attached to the brainstem or neurovascular structures with less than 0.5 cm size, it is not recommended to remove it entirely due to the high risk of an irreversible neurological injury or fatal outcome.

Key words: epidermoid cyst, sub-asterional approach, cerebello pontine tumours, anterolateral cisterns, brainstem, skull base

Abstract 66 [Flash]
Radiological evaluation of cervical spine injuries in elderly male patients due to falls
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Objective: Aim of this study was to present cases of cervical spine injuries in male patients (>65 years) due to falls
Method: 10 cases are presented ,10 male patients, range of age was from 65 to 85 and mean age was 75.
Result: In all of them we performed CT and MRI studies.4 of them -40%-they had one level fracture and one level dislocation, 1 of them-10%- had two level fractures and two level dislocations , 3 of them-30%- had combined cervical and thoracic traumas and 2 of them-20% had combined craniocerebral and cervical traumas.
Conclusion: Radiological appropriate evaluation is essential in order to plan an optimal approach of such cases

Key words: cervical spine, trauma, elderly, neuroradiology

Abstract 67 [Oral]
Carotid Endarterectomy - tips and tricks
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Objective: Carotid Endarterectomy continues to be the gold standard in management of symptomatic carotid stenosis. Case series of patients who underwent carotid endarterectomy at Narayana Health from 2009 to 2020 was analysed to derive useful operative tips and tricks.
Method: Fifty-two patients who underwent carotid endarterectomy at Narayana Health between 2009 and 2020 were included in the study. Their clinical and operative notes were analysed to evaluate the surgical technique.
Result: Age ranged from fourth to ninth decade of life, with eleven of them in their seventh decade. There were no perioperative vascular events. Two cases had operative site haematoma. One resolved with conservative treatment and the second underwent a surgical evacuation.

All surgeries were done under general anaesthesia. Shunt was not used in any of the cases. Primary closure of arteriotomy under operating microscope was the routine. Only two cases required a patch closure. In one case, internal carotid artery was ligated as the thrombus was extending proximally up to arch of aorta.

All cases were symptomatic. Transient ischaemic attack was the most common presentation. Atheromatous thrombus, calcified thrombus and floating thrombus were the common causes for carotid stenosis.

No fresh neurological deficits were noted in post-operative period. There were no major strokes in follow up. No fresh transient ischaemic attacks were reported in follow up.

Conclusion: Optimal case selection, developing a routine process flow, rehearsing the steps before arteriotomy and use of operating microscope are the key for a favourable outcome after carotid endarterectomy.

Key words: Carotid endarterectomy, carotid stenosis
Abstract 68 [Oral]

A one year prospective study on the epidemiology of spina bifida cystica in Kenya as seen at the Kenyatta national hospital

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Objective: Spina bifida cystica is a congenital malformation of the neural tube. It is one of the most disabling developmental conditions in children. This study aims to give an insight on the clinical pattern of spina bifida cystica and factors affecting the outcome of its management at the Kenyatta National Hospital (KNH). The study will establish a baseline on parameters such as age at diagnosis and treatment, sex, county of origin, socio-economic status and levels of education. The study will determine the clinical pattern, aetiology and early post-surgical outcome of spina bifida cystica at the Kenyatta National Hospital. The role of surgery in the management of this condition in countries of sub-Saharan Africa is reviewed.

Method: This is a prospective hospital-based cross-sectional observational study of recruited children with spina bifida cystica admitted at the KNH over a period of 12 months, from 1st September 2011 to 31st August 2012.

Data was collected using a questionnaire administered to the parents who met the inclusion criteria. The data collected was then entered and analysed using Statistical Package for Social Sciences (SPSS) version 17.0

All patients who fitted the case definition and met the inclusion criteria and gave informed consent were recruited. Confidentiality was assured.

The patient's full pre admission diagnosis, date first diagnosed, post admission diagnosis, radiological diagnosis were taken.

A complete neurological exam was conducted.

Data was coded, entered and managed in a pre-designed Microsoft Access database. Data entry was done continuously in the course of data collection. Data cleaning was performed at the end of every week and any errors encountered resolved immediately. Data analysis was conducted using SPSS version 17.0. Categorical and continuous variables were summarised using proportions and means/medians respectively. The clinical pattern of open spina bifida, associated clinical presentation and malformations were presented as proportions. Any comparisons performed were done using t-tests for normally distributed continuous variables, Mann-Whitney non-parametric tests for non-normally distributed continuous variable, and chi-square tests for categorical variables. The data was presented using tables and graphs. All statistical tests were performed at 5% level of significance (95% confidence interval).

Result: A total of 65 patients were recruited into the study. The mean age at presentation of the patient was 9 days. There was a male preponderance with forty (61.5%) males and twenty five (38.5%) females. Thirty one (47%) patients were the first-borns in the family.

The average year at conception of the mother was 25.1 years with a range of 17-45 years. Fifty (76.9%) of the mothers at had income of less than Ksh.10,000 (UD$100) per month. Only three (4.6%) mothers had a monthly income of Ksh. 40,000 (US$400) per month and above. The location of the lesions were eighteen (27.7%) lumbar, twenty (30.8%) lumbo-sacral, thirteen (20.0%) thoraco-lumbar, nine (13.8%) sacral and thoracic with five (7.7%). Of the associated malformations forty two children (64.6%) had club foot, twenty (30.8%) had hydrocephalus and seven (10.8%) had kyphosis.

The median age at surgery was fifteen days. Thirty nine (60%) had spina bifida closure alone, nine (13.8%) had spina bifida closure and ventriculoperitoneal (vp) shunt placement at a later date. Nine (13.8%) had spina bifida closure and VP shunt placement simultaneously. Post operatively, twenty three (21.5%) developed wound dehiscence, twelve (11.2%) had features of wound necrosis while a further twelve (11.2%) had concomitant wound infection. Five of the children (7.7%) developed a CSF leak and four (6.2%) developed meningitis. Nineteen (29.2%) of the children developed hydrocephalus.

The cost burden to the family in terms of transport and care was in excess of ksh.45,000 (US$400) per patient over the 30 day period of follow up in a majority of the cases, where the average monthly income is rarely above US$100.

Conclusion: While the incidence of spina bifida cystica may be falling in the developed countries, it remains a very significant cause of morbidity, mortality and disability in the developing world.

In this study the consumption of folic acid pre-con-

ceptually was very low. It was also shown that the awareness of the benefits of once daily administration of folic acid in the reduction of the incidence of spina bifida cystica is low amongst the mothers despite what the study found to be a relatively high literacy level.

Low socio-economic status has been associated with a higher incidence of spina bifida cystica and the high cost burden associated with the treatment and care of a child with spina bifida cystica is also a major factor in the disappointing outcomes seen in the developing countries. Prevention programs should be combined with education programs not only through health facilities, but also using non health facilities such as churches and other social media. In this study, the rate of surgical site infection was rather high due to late closure of the spina bifida cystica. The surgical closure should be done within 48 hours of birth to minimise the risk of infection.

The key impact on the long-term survival of children with spina bifida is proper urological management, including urodynamic evaluation, clean intermittent catheterisation (CIC) and detrusor overactivity relaxants. CIC is effective, cheap, and feasible in developing nations. All care givers must thus be educated on how to administer CIC. The establishment of a multidisciplinary spina bifida clinic to include orthopaedic surgeons, neurosurgeons, urologist, physiotherapist and occupational therapist is currently underway in the newly established paediatric neurosurgery clinic at the Kenyatta National Hospital and this will ultimately lead to the establishment of national guidelines on management of spina bifida in Kenya that will include Folic acid fortification of packaged maize meal and Folic acid supplementation to all mothers in post-natal clinics in Health Centres as part of planned pregnancies. Cultural beliefs are an important factor in deciding whether to offer surgery or not in children with spina bifida associated with severe disabilities.

Key words: spina bifida cystica. surgery. Sub-Saharan Africa

Abstract 69 [Poster]

Cervical and thoracic pain in elderly patients with rheumatoid arthritis

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Objective: Aim of this study was the clinical evaluation of cervical and thoracic pain in elderly patients with rheumatoid arthritis (>65 years old)
Method: 10 patients were evaluated. 5 male (50%) and 5 female (50%), and of age between 65 and 75 years old and mean age 70 years old.1 (10%) case with spine osteoarthritis , 2 (20%) cases with degenerative disc disease, 2 (20%) case with bulging disc, 1(10%) case with pinched nerve,4 (40%) cases with spinal stenosis
Result: Conservative management with appropriate pain killer medication in all patients. Good results in 9 (90%) patients and moderate in 1 (10%)
Conclusion: Accurate clinical evaluation leads to optimal results.
Key words: cervical pain, thoracic pain, spine, elderly

Abstract 70 [Flash]
Pleomorphic xanthoastrocytoma: a case report of a 9-year-old boy

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Objective: To describe a case of a 9 year old boy with a large
temporoparietal pleomorphic xanthoastrocytoma managed at a
tertiary referral hospital in Kenya
Method: One case of a 9 year old boy with pleomorphic xanthoastrocytoma is described in this article. The patient was first seen at the age 6 years, a clinical and radiological diagnosis of a large temporoparietal intra-axial tumour. A craniotomy and tumour excision was done with good clinical resolution. The child was then followed up in the paediatric neurosurgical clinic. 3 years later at the age of 9, the child was noted to have features of raised intracranial pressure and tumour regrowth on repeat imaging. Recurrence and prognosis of pleomorphic xanthoastrocytoma is explored. Management of
PXA is discussed.
Result: Management outcome is discussed. Clinical outcome, resolution of presenting findings following surgery. Histopathologic findings, classic histopathologic findings of pleomorphic xanthoas-

trocytoma with no anaplastic features. Post-operative radiological assessment showed gross total resection. **Conclusion:** PXA are rare and preoperative diagnosis requires high index of suspicion from clinical and radiologic features. Where feasible and safe gross total resection is the preferred management. Histologic assessment should assess for features of anaplasia. PXA have good prognosis

Recurrence are managed by repeat surgery and follow up with
imaging.

Key words: pleomorphic xanthoastrocytoma, Sub-Saharan Africa, recurrent PXA

Abstract 71 [Poster]
Cervical spine traumas, in young population radiological evaluation
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Objective: Aim of this study was to analyse the radiological evaluation and the role of x-ray, CT and MRI findings in 12 young patients (< 20 years) with cervical spine traumas

Method: We analysed 12 patients with cervical spine traumas 7 male, 5 female ,mean age 21, range from 14 to 20 years
Result: All of them 12,100% had admission and x-rays and CT-scans that confirmed the presence of cervical spine trauma. Nine patients, had also MRI-scan (group 1), 3 patients, only x-rays and CT-scan (group 2). We analysed also the timing of injury, recent trauma (group I , 8 patients) and chronic trauma, more than 7 days after the initial injury (group II, 4 patient)
Conclusion: Further radiological studies were warranted but the combination of CT and MRI is is very useful for the evaluation and for the therapeutic approach of spinal trauma patients; evaluation is essential in spinal trauma patients
Key words: Cervical spine, trauma, young patients

Abstract 72 [Flash]
Radiological Evaluation of lumbar and thoracic spine injuries in elderly male patients due to falls
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Objective: Combination of lumbar and thoracic spine injuries are serious traumatic situations. Aim of this study was to present cases of lumbar and thoracic spine injuries in male patients (>65 years) due to falls
Method: 10 cases are presented, 10 male patients, range of age was from 67 to 87 and mean age was 77.
Result: In all of them we performed CT and MRI studies. 6 of them -60%- had two level fractures and two level dislocations (thoracol-umbar junction), 3 of them-30%- had combined lumbar - thoracic traumas plus cervical spine traumas, 1 of them -10% had combined both leg , thoracic and lumbar traumas.
Conclusion: Radiological appropriate evaluation is essential in order to plan an optimal approach of such cases
Key words: lumbar spine, thoracic spine, injuries

Abstract 73 [Flash]
Depressive disorders after whiplash cervical spine injuries in young people
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Objective: Aim of this study is to present cases of depressive disorders after whiplash cervical spine injuries in young people
Method: Six (6) cases are presented. Range of age between 18 and 30 years old. All of them reported depressive disorders during the post traumatic period after whiplash cervical spine injuries mainly due to road traffic accidents.
Result: All of them they receive appropriate neurological, psychiatric, psychological and rehabilitation support and treatment. They managed to have a good outcome after 6-months follow up.
Conclusion: The development of depressive disorders after such traumatic events remains a strong predictor of a variety of dysfunction (social, personal, work, etc.) The emergence of depressive disorders in many cases remains unexplored and poorly understood . The effect into the the overall health remains a very important factor to investigate. The combination and collaboration of the various medical disciplines is essential in order to help young people.

Key words: depressive disorders, whiplash, cervical spine, injuries

Abstract 74 [Poster]
Lymphocytic pituitary disease: difficult differential diagnosis with pituitary adenomas.
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Objective: Hypophysitis is a rare autoimmune disease, corresponding to a chronic inflammation of the pituitary gland whose pathogenesis is complex and still poorly understood. It affects women more frequently. In two-thirds of cases, it occurs at the end of pregnancy or in the immediate postpartum period. The clinical and radiological signs are non-specific, making it difficult to diagnose and frequently confusing with the diagnosis of pituitary macroadenoma.
Method: We report the case of a lymphocytic pituitary hypophysitis taken care of at the Neurosurgery Department of Sfax. This is a 40-year-old patient, without any particular pathological history, who presented, during pregnancy (30 SA), headaches associated with visual disorders with alteration of the visual field. Emergency cerebral MRI confirmed the presence of a saline and suprasellar developing mass in contact with the optic chiasm initially identified as a pituitary macroadenoma. Clinically, there was no argument for diabetes insipidus. Hormonal testing showed physiological hypothyroidism in late pregnancy with a free T4 at 10 picomol/L (n = 11.22.3), TSHus at 0.04 mIU/L (n = 0.44.5), cortisol at eight hours at 74 nmol/L and prolactinemia at 90 ng/mL (n = 27). Immediately postpartum, the patient experienced worsening of symptoms with the development of an intracranial hypertension syndrome resistant to symptomatic treatment, worsening of visual signs .
Result: The patient is operated on trans-sphenoidally, with incomplete removal of a pituitary lesion with simple post-operations. The anatomopathological examination concludes that the patient has lymphocytic pituitary hypophysitis.
Conclusion: The diagnosis of lymphocytic pituitary disease is difficult because of its rarity and the low specificity of the clinical signs. However, in view of its potential seriousness with possible deaths related to corticotropic insufficiency, it should be sought more systematically in the face of atypical pictures associating unexplained headaches in patients with a history of autoimmune pathologies. Although the histological diagnosis of pituitary disease can only be confirmed by biopsy or surgery, a presumptive diagnosis can often be made on the basis of context, clinical and radiological findings. The management of pituitary disease is controversial. The correction of endocrine deficiency, especially corticotropic insufficiency, remains a priority.
Key words: pituitary gland, MRI

Abstract 75 [Poster]
Spontaneous meningoencephalocele of the temporal lobe in the sphenoid sinus in an adult : a case report and review of the literature
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Objective: Meningoencephalocoeles of the sphenoid sinus are infrequent lesions which occur as a result of trauma, iatrogenic injury or skull base erosion due to inflammatory or neoplastic disorders. A spontaneous meningoencephalocoele of the sphenoid sinus lateral wall is rare and it is reportedly most common in the anterior cranial fossa, temporal lobe encephalocoeles into the sphenoid sinus have rarely been reported. There are multiple theories attempting to explain the formation of these basal encephalocoele.
This defect may cause spontaneous cerebrospinal fluid (CSF) rhinorrhoea or even meningitis.

Our objective is to report the theoretical aetiology, surgical technique and outcomes in patients undergoing endoscopic repair of spontaneous meningoencephalocoele of the sphenoid sinus.
Method: Our case is about a 35- year-old female patient applied with rhinorrhoea started 4 years ago. She had no history of cranial trauma or sinus operation. Biochemical analysis of the fluid confirmed that was CSF.
CT and MRI showed a defect in the top wall of the left sphenoid sinus and CSF collection in the left sphenoid sinus.
Result: The dural defect in our case was repaired successfully using pure endoscopic endonasal transsphenoidal approach.
Conclusion: Careful preoperative evaluation and localisation of the sphenoid defect are critical for the selection of the optimal surgical approach by using endoscopic endonasal approach which is an effective and safe treatment modality of spontaneous lateral

sphenoid sinus meningocoeles and efficient in anterior skull base reconstruction.
Key words: meningoencephalocoele

Abstract 78 [Poster]
Intracranial Metastatic Wilms' Tumour in Children: A case report and review of literature
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Objective: Wilms' tumour or nephroblastoma is the most common childhood renal tumour, accounting for about 6% of paediatric malignant diseases. Our aim is to describe the main epidemiological and clinical characteristics, and different radiological, pathological and treatment of this rare tumour.
Method: We report the case of a 12 year old boy with a Wilms' tumour and brain metastasis.
Result: our patient underwent a total excision of the lesion.
Conclusion: Its aetiology is unknown. The peak incidence is between 3 and 4 years of age. It may arise as sporadic or hereditary tumours.
Wilms' tumour spreads by direct invasion as well as haematogenously.
Cerebral metastases may occur in the late stages of the disease but are rarely diagnosed clinically.
Key words: Wilms' tumour, MRI

Abstract 78 [Poster]
Radio-induced pilomyxoid astrocytoma
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Objective: Radiation-induced tumours are very varied and have no specific characteristics. This highlights the difficulty of distinguishing a radiation-induced tumour from a second spontaneous tumour. The effect of conventional external radiotherapy on the appearance of a second tumour has been suspected by the increase in the specific incidence and mortality of some tumours compared to a control population.
Method: We report a case of radio induced pilomyxoid astrocytoma in a woman irradiated for a suprasellar tumour.
Result: Our patient was operated for suprasellar seminoma with adjuvant radiotherapy at a dose of 55 GY on the tumour and the ventricular system with good post-operative clinical course. After 5 years the patient was readmitted for HICT syndrome associated with left hemiparesis. Cerebral MRI revealed a right parietal tempo ICHP. The diagnosis of radionecrosis was retained and the patient was put on high-dose corticosteroid therapy. The evolution was marked by clinical worsening with a deterioration of the neurological state despite corticotherapy. The decision was to operate on the patient as an emergency. The anatomopathological examination concluded that the patient had a pilomyxoid astrocytoma.
Conclusion: The radiological diagnosis of a radio-induced tumour is difficult. The main differential diagnosis is radionecrosis. Radio-induced pilomyxoid astrocytoma is a rare entity and difficult to diagnose radiologically due to the absence of radiological and clinical features. The diagnosis of certainty remains anatomopathological.
Key words: seminoma, radiotherapy

Abstract 79 [Poster]
Benign metastatic leiomyoma of the lumbar spine
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Objective: Uterine leiomyomas are a very common pathology. On the other hand, extrauterine leiomyomas are a rather rare and poorly known entity. In this context, the metastatic benign leiomyoma is an extremely rare pathology. The most frequent localisation is pulmonary. The lumbar localisation is exceptional.
Method: we report the case of a 43 year old woman with a history of myomectomy 9 years ago for benign uterine fibroma who presented with a ponytail syndrome that had been progressing for 2 months. The radiological and intraoperative aspect had evoked a lumbar neurofibroma. She had a lumbar laminectomy and total removal of the tumour. The histo-pathological examination concluded a metastatic benign leiomyoma.
Result: Uterine leiomyomas are rarely associated with benign ectopic tumours. In this case, they are referred to as "benign leiomyoma metastases". In the literature, reported cases of benign leiomyoma metastases are rare. They usually occur in pre-menopausal women with a history of intrauterine leiomyomas. Diagnosis is made on the basis of clinical and histopathological findings with the absence of cellular atypia, necrosis and mitosis: the three main criteria

used histologically to determine malignancy. On immunohistochemistry, these lesions are generally positive for oestrogen and progesterone. These tumours may regress spontaneously at menopause or after pregnancy. They are most often metastases in the lungs, heart or liver. Spinal metastases are extremely rare. The first case of skeletal leiomyomatosis was described in 1983. Since then, a few cases have been described. There is no well-established therapeutic consensus due to the rarity of these tumours. Hormone therapy has been tried with good results.
Conclusion: Metastatic benign leiomyoma is a rare pathological entity that never ceases to surprise the clinician with the paradox created by the metastatic potential of a benign tumour. The aetio-pathogenic hypotheses are multiple.
Key words: lumbar metastasis, leiomyoma

Abstract 80 [Oral]
Minimal invasive microsurgical decompression of the trigeminal nerve with +180/-180˚ exploration
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Objective: The aim of this study is to present our philosophy about surgical management for minimal invasion microsurgical decompression of the trigeminal nerve based on three principles to follow; first, to preserve the patient´s live; the second purpose is not to damage the nervous and vascular structures adjacent to surgical bed to avoid neurological sequelae and complications inherent to surgery; and finally, the third purpose is to eliminate the cause of the symptoms, talking about trigeminal neuralgia is the facial pain; also to present step by step our minimal invasive approach in all times, always keeping in mind to be safe as possible.
Method: A descriptive retrospective observational study was conducted from January 2011 to October 2020. Medical records of 1,996 patients treated at our institution were reviewed with follow-up at least once a postoperative year up to ten years, according to each case. The patients included in the present study had face-to face or virtual follow-up by videoconference by the neurosurgery staff and the control images were via the internet, together with the imaging staff of our hospital, in the pre-established periods.

Step by step we describe our microsurgical decompression to release the trigeminal nerve in patients with classic or idiopathic trigeminal neuralgia associated with single or multiple vascular, membranous and bony contact in the cerebellopontine angle.

Step 1. Positioning in supine position with elevation of the man 30 degrees and rotation of the head 45 degrees in flexion under general anaesthesia and invasive monitoring.
Step 2. Minimally invasive retromastoid approach behind the sigmoid sinus with bone access less than 20mm in diameter, durotomy and depletion of cerebrospinal fluid without the use of brain retractors, taking advantage of the surgical corridor due to gravity.
Step 3. Venous preservation of the superior petrosal venous complex.
Step 4. Microsurgical dissection of the arachnoid membrane around the venous complex, the surrounding SUCA and AICA arteries and their variants, as well as the cistern of the PC angle, trans cerebellum horizontal distal fissure.
Step 5. Internal petrous craniectomy of the suprameatal tubercle in cases of obstructing the microsurgical corridor.
Step 6. Microsurgical exploration and release with the +/- 180 degress technique described by the author along the cisternal segment of the trigeminal nerve.
Step 7. Placement and positioning of sufficient isolation material and fixed with fibrin adhesive.
Step 8. Dural, structural bone, muscle-aponeurotic planes and skin reconstruction.
Step 9. Controlled and early post-anaesthetic wake-up at the end of the surgical procedure
Result: All patients presented a clinical and imaging diagnosis of neurovascular compression of the cranial nerves of the brainstem, manifesting as trigeminal neuralgia (TN) in any of the two clinical presentations: paroxysmal pain (typical TN) or paroxysmal with continuous persistent pain (atypical NT); other manifestations included hemifacial spasm, glossopharyngeal neuralgia, occipital neuralgia or vertigo with tinnitus as complementary symptoms of the dysfunctional hyperactive syndrome. In the other side, all cases were classified by their three etiologies as classic 1479 cases, idiopathic 209 cases or secondary 308 cases. Including both, classical and atypical equal to 1688 cases, we resume the lessons learned from 719 microsurgical decompressive cases operated by the single author.
The distribution by age, gender, pre and postoperative imaging studies, the degree of resection per intraoperative surgeon impression, as well as

postoperative evolution, complications from neurovascular injuries were analyzed. The follow-up period maximum was ten years with an average of 48 months.
Conclusion: In our expert opinion, the surgical management of the trigeminal neuralgia syndrome should be approach with a global vision by a multidisciplinary team of experts. The classic trigeminal neuralgia is recommended to be assess by a multidisciplinary team using a variety of the therapeutic options available such as palliative percutaneous and microsurgical with free technology access.
The minimal decompression in highly specialized centers solve a high number of cases, being the minimal invasive microsurgical decompression the approach recommended in our expert opinion.
Minimal invasive microsurgical decompression of the trigeminal nerve is recommended to be perform in the final phase of the neurosurgeon training, for those with experience in skull base surgery.
In Latin America, we should strengthen the training of specialists in sub-disciplines typical of the specialty as required by modern global society.
Key words: microsurgical decompression, trigeminal neuralgia, skull base surgery, facial pain surgery

Abstract 81 [Oral]
Advances and future perspectives of intraoperative neurophysiology in neurosurgery.
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Objective: Intraoperative neurophysiology (ION) is utilized during surgery in order to monitor the functional integrity of neural structures and pathways that are at risk, or to help the surgeon to map and recognise them with the aim to preserve their function, or to localise them for optimisation of the surgical treatment. The first attempts of ION were done with cortical mapping. ION monitoring was established in spinal cases with somatosensory evoked potentials first, and the development of intraoperative motor evoked potentials afterwards. The last decades ION is evolving rapidly, allowing the monitoring and mapping of more and more structures in the spinal cord, brain, and brainstem. However, there are still several structures and functions of the nervous system that cannot be monitored or mapped during the surgery.
Method: We reviewed the literature for intraoperative neurophysiological monitoring and intraoperative neurophysiological mapping, with a focus on neurosurgical procedures. We identified recent advances and new methods and modalities that can be used in neurosurgery to identify specific structures, prevent neurological injury, guide the surgery, or even to improve the surgical outcome. We also identified important structures and pathways that are not currently monitorable, and modalities that are not available intraoperatively. Moreover, evolving technologies in ION were detected.
Result: ION can be useful in several neurosurgical subspecialties. ION is routinely used in spinal, brain and brainstem surgeries to monitor the functions of essential structures and pathways, such us primary motor, somatosensory and visual cortices, corticospinal tract (CST), medial lemniscus pathway, nerve roots, cranial nerves and their nuclei. Recent advances include CST mapping within the spinal cord, sensory cranial nerve mapping, and brainstem reflexes, such as blink, masseter H- and laryngeal. Cortico-cortical evoked potentials seem to be a promising method for monitoring of specific cortical areas and their connections. There is currently no method that can be used to monitor or map several important pathways, such as reticulospinal tract, auditory cortex and posterior visual pathway. Modalities and methods that would be useful intraoperatively, if they were available, include monitoring of ocular nerves, and autonomic system functions, and monitoring or mapping of higher brain functions during awake or asleep craniotomies. Artificial intelligence (AI) may play an important role in the future of the ION systems.
Conclusion: There is a tremendous improvement of ION methods during the last years, which has revolutionised neurosurgery. Nowadays, several conditions that used to be considered surgically untreatable, due to increased complexity and the high risk of serious postoperative neurological deficits, are routinely treated with the aid of ION. Recent ION methods allow near-real-time monitoring. However, the strengths and limitations of some ION techniques must be explored and/or validated. There is a continuous and dynamic interest in the development of new ION modalities. Close collaboration between ION and neurosurgical teams will help to identify and prioritise the future ION research. Practical and ethical concerns may be raised with the AI involvement in ION and neurosurgery.
Key words: intraoperative neurophysiology, neuromonitoring, mapping

Abstract 82 [Oral]

Influence of syringomyelia on the postoperative outcomes in Chiari malformation type I patients. International, multi-center, retrospective study.

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Conflict of interests: none

Objective: Syringomyelia accompanies Chiari malformation type I in up to 70% of diagnosed patients. Its presence can cause irreversible damage to the spinal cord, resulting in the persistence of symptoms after successful decompressive surgery. However, recent studies have not revealed syringomyelia as a negative prognostic factor, with no impact on the Chicago Chiari Outcomes Scale scores. This study aimed to evaluate the influence of syringomyelia on the postoperative outcomes in Chiari malformation type I patients.
Method: We performed a retrospective analysis of symptomatic Chiari malformation type I patients from Neurosurgical Departments in Hamburg, Gdansk, Wroclaw, Katowice, and Szczecin, who underwent posterior fossa decompression between 2010 and 2018. Patients with incomplete imaging and clinical data were excluded. Outcomes were evaluated during the hospital stay and in the outpatient visits and finally assessed with Chicago Chiari Outcome Scale (CCOS) at the last outpatient visit. Statistical analysis between syringomyelia and non-syringomyelia patients' groups was performed using the Statistica 13.1 software. Quantitative data were compared using the Mann-Whitney test. To compare the effect of syringomyelia on the qualitative variables, an analysis was performed using the Pearson independence test. The level of significance was established at the level of $p = 0.05$.
Result: A total number of 31 symptomatic patients from six different Neurosurgical Departments were included in the study. 13 patients were diagnosed with accompanying syringomyelia. 7 patients underwent bony-only decompression, 18 with duraplasty, whereas the remaining 6 underwent additional tonsillectomy. The clinical improvement assessed during hospitalisation showed no difference between groups ($p=0.726$) with an 88.9% improvement rate for non-syringomyelia patients and 84.6% for syringomyelia individuals. CCOS pain, nonpain, functionality, complications, and total CCOS values assessed at the last outpatient visit showed no differences between both groups. Consequently, the rate of clinical improvement at the last follow-up visit has not reached statistical significance, with 61.1% for non-syringomyelia and 76.9% for the syringomyelia group ($p=0.353$). Moreover, there was no correlation between syringomyelia occurrence and clinical worsening ($p=0.656$). Furthermore, syringomyelia reduction seemed not to condition the clinical improvement in patients with Chiari-associated syringomyelia ($p=0.188$). We found that patients with syringomyelia were at a greater risk of reoperation (30.8%) than those without syringomyelia (5.6%), which almost reached statistical significance ($p=0.059$).
Conclusion: Our findings indicate that syringomyelia does not influence surgical outcomes in patients with Chiari malformation type I. Moreover, the clinical improvement does not correlate with syringomyelia improvement. Consequently, patients with syringomyelia are not at a greater risk of clinical worsening than non-syringomyelia ones. Presented results are consistent with existing literature, which does not point to syringomyelia as a negative prognostic factor.
Key words: Chiari malformation type I, syringomyelia, Chicago Chiari Outcome Scale, posterior fossa decompression

Abstract 83 [Oral]
Secondary effects of occult spinal dysraphism: scenario in Nepal
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Conflict of interests: none

Objective: Late presentations of secondary effects of occult spinal dysraphism with their complications are often found in orthopaedic OPD of Nepal. Due to the ignorance of the patient and even the medical fraternity implicating musculoskeletal abnormality to occult dysraphism, the diagnosis was delayed till the complications appear. An institutional experience is studies and shared here.
Method: This a combined prospective and retrospective study from 2010 to 2020. There were 235 patients, age ranging from 15 months to 21 years with male to female ratio of 3:2. The most common presentations were gait disturbances (67%), sphincter disturbances (45%), neurological deficit (43%), scoliosis (38%), foot deformities (25%) and mental subnormality (15%). MRI was done in all these patients which showed tethered cord in 88%, syringomyelia in 28%, Chiari I malformation in 15%, hydrocephalus in 6%, diastatomatomyelia in 6% and normal cord in 4%.
Result: 92% patients underwent tethering of the cord, decompression of posterior fossa in 15%, syringotomy in 8% and Ventriculo-peritoneal shunt in 6%. The significant postoperative complications included CSF leak in 6%, wound dehiscence in 11%, wound infection 4%, recurrence of tethering requiring surgery in 4 patients. The follow up was poor and in average was of 2.5 years in only about 35% patients after discharge from the Hospital.
Conclusion: Awareness campaigns and prophylactic folic acid distribution in ladies of child-bearing age have been initiated. More frequent mobile medical camps to remote places of Nepal have been organised to detect these patients early so that timely referral and management could be instituted to avoid the crippling complications.
Key words: Occult spinal dysraphism, secondary effects, tethered cord

Abstract 84 [Oral]
How Can We Make Global Neurosurgery Truly Global?
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Objective: In 2015 the United Nations (UN) established the Sustainable Development Goals (SDGs) to be achieved by 2030 – in essence a challenge to the world [UN A/Res/70/1 2015]. Also in 2015 the Lancet Commission on Global Surgery published its landmark study on the unmet needs for surgery worldwide [Meara J et al Lancet 2015]. It has been said that Global Neurosurgery has as its primary purpose "delivering timely, safe, affordable neurosurgical care to all who need it" [Rosseau G et al J Neurosurg 2019].

The "Golden Hour" of trauma care highlights the weakness of present-day surgical care in disaster response – particularly in low- and middle-income countries (LMICs). Natural disasters – notably earthquakes - frequently kill 200,000 people or more in a year. Un-natural or manmade disasters – either infrastructure failures (e.g. transportation accidents, building collapse) or terrorist/conflict events – also claim more than 200,000 lives in a typical year, with terrorist/conflict events on the increase since the beginning of the 21st century.
Neurosurgeons are notable for "rising to the challenge". In this case the challenge is to establish healthcare that greatly reduces the 1/3 of all deaths worldwide that are due to lack of surgical care.

Method: Global Neurosurgery began with individual neurosurgeons traveling outside their home country to cross-pollinate neurosurgical concepts and techniques. It expanded later in the 20th century with missions to other countries involving groups of individuals (neurosurgeons and often other colleagues), frequently on a recurring basis. This became formalised as centres in high-income countries (HICs) paired with centres in LMICs for clinical, research, and training exchanges – twinning or dyad programs. To broaden and enhance sustainability, paired programs involved hospital administrators and ministries of health.

During the latter part of the 20th century, evidence was gathered that 24/7/365 availability of trauma and stroke care greatly reduced morbidity and mortality. Trauma/stroke centres have become prevalent in HICs: in the United Kingdom (UK) there are approximately 30 trauma centres; in the United States (US) there are approximately 200 each of Level I trauma centres and Comprehensive Stroke Centres. At its best, a trauma/stroke centre incorporates prevention programs, rapid and efficient prehospital care, timely surgical and intensive care, and rehabilitation. Resources include radiology, blood bank, pathology, and laboratory services.

The benefits of trauma/stroke centres are not limited to trauma and stroke. A nationwide study in India determined that at least 50,000 lives would be saved each year if the nation's population was entirely within 2 hours of a surgical centre that could treat acute abdomen [Dare A et al Lancet Global Health 2015]. Other surgical conditions with significant morbidity/mortality due to lack of timely surgery include cancer, difficult childbirth, and acute hydrocephalus.

The UN Institute for Training and Research (UNITAR) has addressed this need for expanding surgical care with the National Surgical, Obstetric, and Anesthesia Plan (NSOAP) [NSOAP Manual 2020 UNITAR 2020]. NSOAP provides an outline for improving surgical care at the country level. It identifies the stakeholders needed in all phases of NSOAP planning and implementation, as well as the 6 domains of a surgical system: infrastructure, service delivery, workforce, information management, finance, and governance.

Result: Numerous examples of the resources to improve surgical care are available. Telemedicine has been shown both to improve neurotrauma care and to reduce cost in Albania [Olldashi F et al World Neurosurg 2019]. Drones, robots, smart glasses, and smartphones can enhance both daily healthcare and mass casualty disaster response: (1) drones deliver medications, lab samples, and blood products to remote sites in Rwanda and Ghana; (2) smartphones improve maternal care and childbirth through an Uber-like system in Kenya; (3) smart glasses act as personnel extenders for intensive care rounds in Malaysia; (4) drones plus smart phones reduce the time to deliver a defibrillator to a cardiac arrest victim; (5) mobile, battery-powered CT scanners provide resilient imaging during both routine power outages and disasters [Quintana L et al to appear in Neurosurgery and Global Health Springer 2021].
Perhaps the best example of combining the NSOAP program with the trauma/stroke centre model is Pakistan. Thanks largely to Tariq Khan, the qualities of a trauma/stroke centre have been evolving for over a decade in Peshawar: a community trauma preven-

tion program began over 20 years ago; a rehabilitation facility has been operational for over a decade; a full-service hospital was opened in 2009; in the past 5 years a second hospital, Schools of Medicine and Nursing, and an ambulance service have all been started. This province-wide effort can be scaled up for the recently-adopted NSOAP strategy for Pakistan – National Vision for Surgical Care – whereby emergency and essential neurosurgical conditions will be identified early, stabilised, transferred safely, and managed appropriately at different tiers of the surgical and healthcare system across the country.
The benefits of combining surgical and disaster planning have been documented [Pyda et al BMJ Global Health 2019]. The resources available for developing centers to address both mass casualty disaster response and daily surgical healthcare have been summarised [Khan T et al BMJ Global Health 2019; Aguilera et al BMJ Global Health 2020].

Conclusion: To make Global Neurosurgery truly global requires the integration not only of the various specialities involved in NSOAP narrowly defined, but collaboration among all parties involved in healthcare at the national and international level. The integration and collaboration must be not only across all healthcare personnel and all countries, but also across the spectrum of healthcare for each patient (i.e. each citizen) – from prevention programs, to prehospital and outpatient care, to inpatient care, to rehabilitation, to re-integrating the patient back into society. Some may comment that we cannot afford to implement such sweeping global healthcare integration and collaboration. Au contraire! In fact, we cannot afford NOT to implement these changes. It has been estimated that the cost – in terms of lost economic activity (i.e. lost Gross Domestic Product – GDP) – if such changes are not implemented will be at least 20 times the cost of "doing it right the first time" [Meara J et al Lancet 2015; Park K et al World Neurosurg 2016].
Although organized medicine has frequently been "on the wrong side of history", neurosurgeons are not known for being Luddites. Let's inspire the Global Healthcare community to create the progress that we all know is essential!

Key words: disaster response, emergency response, global health, global surgery, mass casualties, trauma/stroke centres

Learning Together, Serving All