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High Grade Spondylolisthesis

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Introduction: High grade lumbosacral spondylolisthesis is a relatively uncommon pathology with considerable anatomical distortion. Operative reduction is beneficial. Spinal endoscopic procedures have been established in an attempt to reduce surgical morbidity.

Objective: To evaluate the safety and effectiveness of Endoscopic-Assisted Surgery for reduction of high grade spondylolisthesis.

Patients and Methods: The study included 13 patients presented with intractable pain, neurological deficits, abnormal posture. After adequate neural un-tethering and discectomy, endoscope has been introduced in the disc space where a partial corpectomy of the two adjacent vertebral bodies was done. Partial reduction, circumferential fusion and transpedicular screws stabilization were performed.

Results: Average duration of follow-up is 58.4 months. The preoperative slippage (Meyerding classification) was 6 patients in grade V, 5 in grade IV, and 2 in grade III. It is improved by a mean of 3 grades (range, 2–5). Complications were 2 dural tears, 2 pedicle fractures and a single transient paraparesis. Serial X-rays revealed no implant subsidence or loosening. By 1.5 years postoperatively, the mean numeric pain rating scale reduced by 5 points.

Conclusions: This method is safe and effective technique that provides excellent visualization of the locked anterior elements, ensures perfect corporeal release and obviates the need for staged surgery.

Posterior Midline Suboccipital Approach for Surfacing Foramen Magnum Meningiomas

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Background: Meningiomas are common neoplasms representing 14.3% to 19% of all intracranial tumors. Among all the meningiomas, only 2%–3% arises at the foramen magnum region. Foramen magnum meningioma (FMM) are challenging tumors in the vicinity of brain stem, vertebral artery and lower cranial nerves. They represent about 70% of benign tumors arising at the foramen magnum. FMM have a very slow growth pattern, leading to a long term unexpressive clinical symptoms and a late diagnosis. Different surgical approaches have been described for managing FMM including the midline suboccipital craniotomy with upper cervical laminectomy, the anterior transoral, lateral transcervical, and posterolateral suboccipital approaches.

Hypothesis: Tumor growth creates a surgical corridor with sufficient posterior or posterolateral tumor surfacing provides enough working space for the surgeon.

Methods: From 1995 to 2014, 33 patients with FMMs underwent operations in the Department of Neurosurgery, Mansoura International Hospital & El-Sahil Teaching Hospital. Patients were evaluated using Karnofsky Performance Scale score and McCormick scale for neurological status. Posterior or posterolateral tumor surfacing was a prerequisite for inclusion in this study. Surgical removal of the tumors was performed through posterior midline suboccipital approach, with bone removal fashioned according to the pathological anatomy of each lesion.

Results: The patient's ages ranged from 19 to 76 years. There were 21 females and 12 males. The average length of follow-up is 63 months. Total excision (Simpson grade I&II) was possible in 26 patients and Subtotal excision

(Simpson grade III&IV) in 7 patients.

Conclusions: Posterior midline approach is time tested, allows sufficient exposure, has a possibility of lower exposure extension, and familiar to neurosurgeons. The tumor growth displaces the neuraxis and this usually opens a surgical corridor through which the tumor can be safely and effectively resected. It avoids the risk of vertebral artery manipulation and the inherent risks associated with condylar resection.

Lumbar Transpedicular Implant Failure: A Clinical and Surgical Challenge and Its Radiological Assessment

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Study Design: It is a multicenter, controlled case study review of a big scale of pedicle-screw procedures from January 2000 to June 2010. The outcomes were compared to those with no implant failure.

Purpose: The purpose of this study was to review retrospectively the outcome of 100 patients with implant failure in comparison to 100 control-patients, and to study the causes of failure and its prevention.

Overview of Literature: Transpedicular fixation is associated with risks of hardware failure, such as screw/rod breakage and/or loosening at the screw-rod interface and difficulties in the system assembly, which remain a significant clinical problem. Removal or revision of the spinal hardware is often required.

Methods: Two hundred patients (88 women, 112 men) were divided into 2 major groups, with 100 patients in group I (implant failure group G1) and 100 patients in group II (successful fusion, control group G2). We subdivided the study groups into two subgroups: subgroup a (single-level instrumented group) and subgroup b (multilevel instrumented group). The implant status was assessed based on intraoperative and follow-up radiographs.

Results: Implant failure in general was present in 36% in G1a, and in 64% in G1b, and types of implant failure included screw fracture (34%), rod fracture (24%), rod loosening (22%), screw loosening (16%), and failure of both

rod and screw (4%). Most of the failures (90%) occurred within 6 months after surgery, with no reported cases 1 year postoperatively.

Conclusions: We tried to address the problem and study the causes of failure, and proposed solutions for its prevention.

Keywords: Lumbar, fixation; Screw, failure; Fusion; Fracture fixations, prosthesis; Loosening

Natural Course of Cervical Spondylotic Myelopathy

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Introduction: Cervical spondylotic myelopathy are degenerative changes affecting the cervical spinal cord secondary to continuous or repeated pressure affecting the spinal cord with subsequent atrophic or ischemic changes affecting the spinal cord, this process may be due to aging of the spinal cord, Methods We tried in this presentation to clarify the factors leading to development of Cervical spondylotic myelopathy and the clinical presentation of the condition and the investigations required to reach Myelopathy diagnosis.

Discussion: The condition is accompanied by neurological dysfunction affecting the structures supplied by the affected segments of the spinal cord since the affected segment is the cervical spinal cord the neurological affection will be in both from of upper motor neuron type for the lower part of the body which is supplied by spinal segments below the affected ones and of lower motor neuron type for the parts of the body supplied by the same spinal segment. The changes affecting the cord will occur secondary to bony and ligamentous hypertrophy or calcification following the long lasting strain on the musculoskeletal structures of the vertebral column.

Conclusions: Those changes of cervical spondylotic myelopathy are expected to continue if the strains in the musculoskeletal structures is continuing so the ideal management of the condition should include prevention or reductions of those strains if these changes are to be stopped otherwise surgical decompression with or without instrumentation is inevitable.

***En-Bloc* Resection of Grade II and III Spinal Ependymomas without Intraoperative Neurophysiological Monitoring**

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Background: Grade II and III intramedullary ependymomas (IME) are circumscribed with a plane of cleavage that should facilitate high gross total resection rates (GTR). Gross total resection of grade II/III IME is superior to subtotal resection (STR) and radiotherapy (RTx) for progression free and overall survival.

Purpose: The authors compare their GTR with other series that have utilised standard intraoperative monitoring techniques and they explored factors that may influence rates of resection.

Study Design/Setting: All patients with a grade II/III intramedullary ependymoma operated on by the senior author between 2003 and 2013.

Patients: 17 patients from the senior authors practice from 2003–2013.

Outcome Measures: Preoperative, postoperative, and last follow-up McCormick Function scores, postoperative magnetic resonance imaging.

Methods: We performed a retrospective chart and radiological review of all grade II or III spinal ependymomas over a ten year period from the senior authors practice (C.B.). In addition, we performed a comprehensive PubMed search to identify similar series that identified histology, McCormick Function scores (MCC) preoperatively and postoperatively, surgical strategy and use of intraoperative monitoring for spinal cord ependymomas. Standard statistical analysis was performed.

Results: 17 patients were identified. 16 grade II and 1 grade 3. GTR was 94.12%. Factors that correlated with a decline in MCC were longitudinal extension of the tumour ($p=0.0238$) and presentation with motor signs and symptoms ($p=0.0223$). There was no statistical difference between preoperative factors that influence postoperative outcomes in the current study when compared with other published series. There was no statistical difference between preoperative and postoperative MCC scores between our series and other published series.

Discussion: Our surgical experience with spinal ependymomas compares favourably with other published series with regard to GTR (94.12% vs. of 55.8%–84%, respectively) and with no significant difference in functional outcomes. Series with low GTRs should examine their operative strategy or false positive alarm rates which may lead to higher STRs. This series may be viewed as an opportunity to compare GTR rates of circumscribed intramedullary tumours in series seeking to examine their intraoperative monitoring experience.

Keywords: *En bloc* resection; Ependymoma; Intraoperative monitoring; Intramedullary spinal cord tumours

Prognostic Factors of Surgery for Cervical Cord Tumors

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Background: Spinal cord tumors represent 10% to 15% of central nervous system (CNS) neoplasms. In adults, two thirds of these tumors are extramedullary and the remaining third are intramedullary.

Objective: We aimed to outline the prognostic factors that affect the final outcome of cervical cord tumor surgeries.

Patients and Methods: Sixty one patients with cervical spinal cord tumors underwent surgery between March 2009 and March 2014. The neurological status before surgery, 1 month after the operation and at the most recent examination were assessed based on the grading system of McCormick outcome. The 61 patients, divided according to the histopathological diagnosis.

Results: There were 22 ependymoma (36.1%), 13 schwannoma (21.3%), 12 meningioma (19.7%), 6 neurofibroma (9.8%), 3 astrocytoma (4.9%) and 5 other pathologies collectively (8.2%). In this study there was 75% of patients with total resection, 11.4% had subtotal and 13.1% had partial resection or biopsy. Thirty seven patients was improved (60.7%), thirteen patients with no change (21.3%), ten patients deteriorated (16.4%) and one died (1.6%). By statistical analysis, there was significant correlation between postoperative outcome and the tumor grade ($p=0.015$), the less the grade the better outcome. We

found a significant correlation between the preoperative state and the final functional outcome, that, the better the preoperative state the better outcome. There is statistically relevant correlation between the recurrence and the degree of resection.

Conclusions: The spinal cord tumors can be treated safely and effectively by surgery. Total resection must be the essential aim before surgery. Preoperative neurological state, pathological type, pathological grades, and degree of resection are the most important factors that affect the final outcome.

Keywords: Cervical cord tumors; Prognostic factors; Outcome

Easy Go Surgery of Lumbar Disc Prolapses with the Orange Trocar

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Background: Easy GO system offers the elegant opportunity to combine microsurgical skills with spinal endoscopic surgery. This provides superior cosmetic results, less damage of soft tissue damage and faster recovery for the patients. The authors present now their first results of endoscopic lumbar disc removal through a 1.5 cm working sheath.

Methods: Thirty patients with lumbar disc herniation and accordant clinical symptoms underwent 31 endoscopic discectomies through the Easy GO orange working sheath with a diameter of 1.5 cm between 2009 and 2012. All surgeries were video documented and afterwards subsequently analyzed. Clinical follow-up was recorded in our outpatient clinic. In this retrospective analysis our focus was on surgical technique, outcome, complications, and cosmetic appearance.

Results: Twenty-seven patients showed clinical and neurological improvement after surgery. It was necessary to switch to a bigger trocar in two cases and to microscope in one case. Complication rate stayed low with no injury of dural sack or nerve root, one re-prolaps occurred after eight days. The main part of the patients could be discharged from hospital three days after surgery. Skin incision stayed minimal with 1.2 to 1.4 cm.

Conclusions: Lumbar disc removal is sufficient and safe by using the orange tube with an excellent functional and cosmetic outcome for the patients. Complication rate is low. Endoscopic discectomy through the orange trocar in adequate patients should be the goal for minimally invasive spinal endoscopy in the lumbar spine.

Peek Rods for Posterior Lumbar Fixation: Pros and Cons. The First French Series

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The ideal lumbar spine fixation system should provide sufficient stability without excessive rigidity for optimum fusion, natural posturing and spinal alignment without increasing prevalence of adjacent level degeneration. We review retrospectively a cohort of 48 patients from a personal series who underwent posterior lumbar fixation from June 2011 to May 2014 using Polyetheretherketone (PEEK) rods. There were 28 males and 20 females with an average of 61 years. Thirty patients (62, 5%) suffered from multilevel disease and 18 patients (37, 5%) on one level only. 29 patients (60, 4%) had already been operated before (recurrent disk herniation, posterior decompression, posterior instrumented fusion, interspinous device). The most frequent operated level (31, 2%) were L4L5S1. Some patients had surgery with interbody cages for fusion, some had only posterior fixation and some had hybrid systems. According to Oswestry disability index scale, the global success was 54% after 28 months. There was no reoperation for 89,7%, no screw breakage for 84,2% (no rod breakage and no screw breakage on 1 level fixation). No migration for 94,7%. We reported 15% patients with postoperative adjacent degeneration and 21% with preoperative degenerative signs but absent on last evaluation. Fusion was obtained with cages after 8 months. PEEK rods can be used as a fusion system promoting a better anterior fusion with less implant failure, as a non-fusion system to protect adjacent levels or as a hybrid system combining both advantages with stability comparable to Titanium.

Postoperative Outcomes after Trans-Sacral Epiduroscopic Laser Decompression (Seld)

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Aim: Trans-sacral epiduroscopic laser decompression (SELD), a new, minimally invasive therapeutic technique, may be useful in many patients with lumbar disc herniation. We investigated the clinical outcomes of SELD for chronic low back pain and radicular pain in lumbar disc herniations including the patients who had surgery.

Methods: Patients with lumbar disc herniations (n=58, median age 42.37 years) were divided into two groups: a group without any operations and those *who have* had back surgery. Each patient in whom relevant findings were present on MR images, was submitted to SELD. The patients with motor weakness, spinal stenosis and spondylolisthesis were excluded from the study. Outcomes of the patients were assessed with visual analogue scale (VAS) score and Oswestry disability index (ODI). Data are presented as median for age, duration of symptoms, radiological findings, VAS and ODI scores. Statistical analyses were carried out using Mann-Whitney U-tests. A *p*-value of <0.05 were considered significant.

Results: Significant improvement in low back and lower limb pain was observed on the first day after the procedure. There were significant decreases in both groups with regard to the VAS and ODI scores after SELD. 6 of the patients showed deterioration of motor or sensory deficits requiring surgery during the follow-up period. One patient presented urinary incontinence and two of them had headache after the operation. We experienced dural puncture in 3 patients during procedure.

Conclusions: From these findings, we suggest that SELD is a safe and effective treatment modality for lumbar disc diseases in selected cases.

Spinal Dural Arteriovenous Fistula: Report of 10 Cases

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Introduction: Spinal dural arteriovenous fistulas (SDAVFs), are a rare acquired enigmatic form of malformation. They are the most common variety of spinal cord arteriovenous (AVM). Major symptoms are those of a slowly progressive myelopathy and radiculopathy.

Materials and Methods: In this study we report 10 cases of spinal dural arteriovenous fistula were treated in our department.

Results: We report 10 cases of spinal dural arteriovenous fistula (9 males and one female patient with a mean age of 64 years; range, 49–77 years). 7 of the SDAVFs were located at the thoracic level, 2 at the lumbar and one at the sacral level. Clinically, symptoms were divided between radiculopathy and myelopathy. Diagnosis was made using magnetic resonance imaging and confirmation with angiography. We clipping of the fistula in 8 cases and 2 cases fistulas were closed by endovascular embolization. 6 patients totally recovered with no neurological deficits and stabilization in 4 cases.

Conclusions: Spinal dural arteriovenous fistulas are rare because of myelopathy but sometimes because of radiculopathy. Diagnosis is the key in prevention of irreversible neurological damage. Treatment consists of closure of fistula through clipping or embolization.

Keywords: Spinal dural arteriovenous fistula; Radicular artery; Myelopathie and radiculopathy

Depression in Patients with Degenerative Spine Disease

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Introduction: Surgically for cervical myelopathy and lumbar stenosis. Depression occurrence was correlated with preoperative patients' status.

Methods: There were 45 patients (23 males, 22 females, mean age 56.2 years, range 32–74 years). All patients preoperative completed a depression scale score. Patients with cervical myelopathy completed the Japanese Orthopaedic Association Score (JOA-score). The rest of the patients completed the visual analogue scale (VAS) for the assessment of pain.

Results: Twenty-eight patients suffered from cervical myelopathy and 17 from lumbar stenosis. Thirteen patients (28.8%) suffered from depression (10 from mild and 3 from moderate). Nine patients with depression were females and 4 males. None of these patients had a previous diagnosis of depression. No significance correlation was found between depression occurrence and gender ($p=0.3$), age ($p=0.6$) and cervical disease type ($p=0.8$). There was a trend towards a significance correlation between preoperative patient's JOA score and depression occurrence ($p=0.08$).

Conclusions: Depression was detected in a significant number of patients with degenerative spine disease. Patients with severe preoperative symptoms more frequently suffered from depression.

Endoscopic Tubular Lumbar Procedure and Postoperative Spinal Infection

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Object: Postoperative spinal infection is a highly morbid complication. There is an increasing in researches aiming to reduce and prevent infection after the operations. Efforts include preparing the patients, sterility of instruments, applications of antibiotics and intraoperative techniques. The purpose of this review is to minimize the rate of postoperative spinal infection through the surgical technique using tubular endoscopic lumbar technique.

Methods: The study was performed from August 2006 to November 2014 on 213 patients with lumbar degenerative diseases, lumbar disc prolapse and spinal canal stenosis using the tubular endoscopic technique (Easy GO). The patient group consisted of 213 Patients (134 males, 79 female) with a mean age of 52 years (range 22 to 85 years).

Results: In 7% of the cases a switch to the microsurgery was performed due to fixation of the nerve root to the lateral recess by the prolapse or due to the time schedule of the surgeon. In these cases the procedure was continued microsurgically without problems. The cases, which were performed endoscopically showed intraoperatively no complications, no dural tears, no bleeding and no nerve root injuries. After removing the working tube a compression of the paravertebral muscles was not noticed. Intraoperative results showed no extension of the time of the operations (average 75 minutes). Postoperative pain reduced significantly. Postoperative hospital stay was shortened. In 88% of the patients could continue their daily activities without pain modification. Postoperative and in the follow up visits infection (wound infection, spondylodiscitis and paravertebral abscesses) was not recorded.

Conclusions: Infection after spinal surgery is serious condition, which had an important impact on the health of the patient and the costs. Using the tubular endoscopic lumbar technique could reduce the rate of infection to a high limit through many aspects (skin incision, less muscular trauma, shorter operation time, smaller operative field and shorter postoperative hospital stay). We recommend the using of the endoscopic tubular lumbar system in risky patients, who are going lumbar disc or stenosis operations to reduce the rate of the spinal postoperative infection.

Surgical Management of C5 Palsy Resulting from Posterior Spinal Decompression for the Treatment of Cervical Spondylotic Myelopathy

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Introduction: In this study we hypothesized that anterior cervical decompression would benefit these patients through widening the cervical foramen, directly by rongeurs and drills and indirectly by placing an intervertebral spacer (cervical cage). The aim of the study is to assess whether a more proactive approach would benefit these patients.

Materials and methods: Between January 2005 and Sep-

tember 2011, 200 posterior cervical procedures have been done by the authors, for the treatment of cervical spondylotic myelopathy. The procedures done were laminectomy with or without instrumentation. Forty cases developed C5 palsy postoperatively (20%). 20 cases (50%) presented immediate postoperatively and the rest presented during the first week postoperatively. All the cases started a course of conservative treatment of steroids, analgesics and physiotherapy. Thirty patients (75%) improved on conservative treatment. Ten patients did not improve after more than one year of conservative management. Two cases had a single level anterior cervical discectomy and cage fusion (ACDF), 3 cases had single level ACDF with plate fixation and 3 cases had 2 levels ACDF with plate fixation. Two cases had 3 levels ACDF with interbody fusion and plate fixation. The operative choice was made in order to increase the lordotic curve and the foraminal diameter.

Results: Immediately postoperatively all patients had improved radicular pain. Assessment of the motor power was made immediately postoperative and 3 months afterwards with continuous physiotherapy. There was no change in the C5 palsy in all cases on the immediate postoperative examination, whereas all cases showed improvement of at least 2 grades in the 3 months postoperative visits. All patients at the final follow up had an manual muscle test (MMT) grade of at least 3. Six patients reached an MMT grade of 4 or more. One case had recurrent myelopathy 9 months after 3 levels ACDF and fixation. His magnetic resonance imaging showed adjacent segment degeneration at a higher level and had led to myelopathy. He improved on conservative treatment. Two cases died during follow up period: one at 10 months postoperatively from complications of massive myocardial infarction and the other one 15 months postoperatively from bronchogenic carcinoma diagnosed 7 months after surgery.

Conclusions: Postoperative C5 palsy following posterior decompression for cervical spondylotic myelopathy is not an uncommon occurrence and the majority of cases will respond to conservative treatment. Anterior decompression procedures may offer a safe and effective solution for those few patients who do not respond to a prolonged period of conservative management.

Victimology Profil and Damage Reparation of Spine Trauma: About 100 Expertises

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Tunisia is actually doted than texts of law about compensation for physical damage after spine trauma. After making a brief evaluation of injuries caused by spine trauma of 100 people, the authors focussed their attention on the procedure involved in assessing compensation for the physical damage suffered by the victims. This amicably negotiated method of compensation is described and their opportunity at the civil trial. All of this considerations will be explicated that be referenced to official Reckoners in Tunisia.

Mislabeling and Misclassification of Research Methods in Neuro-Spine Surgery

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Medical evidence is obtainable from approaches which might be descriptive, analytic and/or integrative and ranked into levels of evidence, graded according to quality and summarized into strengths of recommendation. Sources of evidence range from expert opinions and anatomic studies through well randomized control trials to meta-analyses. Recently, we with other authors have published a number of papers indicating that a significant proportions of neurosurgical articles are mislabeled and misclassified viz.: 16% confusion between case reports and case series, 70% misclassification for case series, and 40%–50% for case control studies, and 48% of randomized surgical trials being of “bad-to-moderate” quality. Spine journals represent the greatest proportion of mislabeling as well as publications related to spine surgery. This inconsistent, inappropriate and incorrect use, and mislabeling impairs the appropriate indexing and sorting

of evidence, a situation aggravated when these studies are pooled in metaanalyses. Herein, we have underscored and addressed the problems of misclassification of research methods in neurosurgery in general and spine surgery in particular and the consequence on practice of evidence-based neurosurgery. We have developed a statistical proof for the sample size of case reports and case series and underscored the novel “descriptive cohort” study confused with case series. A distinction between between the different study designs is absolutely necessary to enable the appropriate indexing, sorting, and application of evidence. Spine Surgeons need better training in methods and terminology, and editors and reviewers should scrutinize manuscripts for publications more carefully.

The Value of the Use of the O-Arm and Neuro-navigation in the Minimally Invasive Spine Surgery Cases

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Purpose: The type and extent of image guided-surgery for spine disorders still lacks evidence-based medicine proof. It is up to the health care providers sound judgement and expertise to do what is needed for the patient. This is very true when it comes to minimally invasive surgery. Surgical challenges include yet not limited to; limited exposure, decompression near vital or neural structures, decompression at a blind angle, and difficult trajectories for instrumentation. The use of intraoperative computed tomography-quality O-arm, and neuronavigation are still tested as aiding tools in such operative modalities.

Methods: We selected our preliminary group of 15 cases of MIS that were operated upon during the years 2012–2014 in our institute by the first two authors to be included in this retrospective study. Cases include traumatic spinal fractures, infective, virgin and recurrent disc-osteophyte compressive lesions, affecting different parts of the spinal column. All of them had technical challenges regards adequacy of decompression or safety of instrumentation. All had undergone a combination of decompression and instrumentation of different modalities and/or bone

grafting. In all cases the Medtronic O-arm and Medtronic StealthStation were used as intraoperative mapping tools.

Results: Intraoperative navigation tools were so useful in securing adequate neural decompression, neural and vascular tissue safety together with tough bony purchases of the hardware from the first and only trial of application when needed. Intraoperative computed tomography taken by the O-arm was a useful confirmatory intraoperative test of proper hardware placement. A group of technical problems have been faced. All are studied in some details. A learning curve existed though it was smooth and easy to catch up with.

Conclusions: The intraoperative use of the O-arm and stealthStation is very useful in different modalities of MIS spine surgeries.

Modified Oblique Cervical Corpectomy Approach in Cervical Spondylotic Radiculomyelopathy

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Study Design: This study has been conducted as a simple prospective case series.

Purpose: Modified oblique corpectomy (MOC) is an alternative technique to oblique corpectomy (OC) in treatment of cervical spondylotic myelopathy and radiculomyelopathy so as to avoid the reported high incidence of sympathetic chain and vascular injury associated with (OC).

Overview of Literature: Numerous techniques have been described for cervical corpectomy for management of cervical Spondylotic myelopathy (including OC). OC necessitate the mobilization of the carotid sheath medially and sympathetic chain dissection/retraction to access the lateral aspect of the vertebral body. This is accompanied with a high incidence of its injury (transient/permanent).

Methods: A prospective study was conducted on 18 pa-

tients with predominantly unilateral cervical multilevel Spondylotic radiculomyelopathy, refractory to conservative measures for at least 6 months. Partial corpectomy and neural decompression through lateral retraction of the carotid sheath and exposure/drilling along the medial aspect of the longus colli muscle (instead of its lateral aspect) is achieved. Clinical outcome was graded according to the modified Japanese Orthopedic Association (mJOA) Scale. Radiological follow up to report adequacy of the approach and any resultant instability/deformity or vertebral collapse was applied (X-ray/ computed tomography immediate postoperative and later every 6 months)

Results: The mean age at presentation was 51 years (Male/female 2:1). Average duration of symptoms was 12.25 months. 12 patients presented with radiculopathy, 6 cases radiculomyelopathy. Excellent and good outcomes were obtained in 83.33% of the patients (mean recovery rate: 68.5%). The mean follow up period was 17.1 months with no clinical or radiological deterioration (instability, progressive kyphosis or vertebral collapse).

Conclusions: The MOC is an effective surgical corridor for the treatment of predominantly unilateral multilevel spondylotic myeloforaminopathy, with avoidance of OC reported vascular/sympathetic injury.

Keywords: Cervical spondylosis; Radiculomyelopathy; Modified oblique corpectomy

Outcomes of Posterior Cervical Foraminotomy

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Introduction: Posterior cervical foraminotomy (PCF) is a surgical technique used for cervical radiculopathy secondary to foraminal or discogenic stenosis. While the safety and efficacy of minimally invasive PCF has been established, reports on long-term outcome and need for secondary surgical intervention at the index or adjacent level are lacking.

Methods: We prospectively followed 40 patients who underwent minimally invasive PCF (65 cervical levels) between 2007 and 2013. Outcomes assessed were complications and improvements in Neck Disability Index (NDI)

and visual analog scale Neck/Arm (VAS N/A) scores. All complications were reviewed.

Results: Patients were followed for a mean of 38.3 months. Of 40 patients operated, there were 3 complications (1 cerebrospinal fluid leak, 1 postoperative wound hematoma, and 1 radiculitis), none of which required a secondary operative intervention. One patient required an anterior cervical discectomy and fusion NDI scores improved significantly immediately postoperatively, and continued to decrease gradually with time. VAS N/A scores improved significantly ($p < 0.0001$) from baseline immediately postoperatively, but tended to plateau with time.

Conclusions: Minimally invasive PCF is an excellent alternative for cervical radiculopathy secondary to foraminal stenosis or a laterally located herniated disc. There is a low rate of complications.

Clinical and Radiological Analysis of Modified Open-Door Cervical Laminoplasty Using Hydroxyapatite Spacers and Miniplates

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Aim: Cervical laminoplasty has been widely accepted as one of the major treatments for cervical myelopathy and various modifications and supplementary procedures have been devised to achieve both proper decompression and stability of the cervical spine. We present the retrospectively analyzed results of a modified unilateral open-door laminoplasty using hydroxyapatite spacers and malleable titanium miniplates.

Materials and Methods: From June 2008 to May 2012, among patients diagnosed with cervical spondylotic myelopathy and ossification of posterior longitudinal ligament, the patients who received laminoplasty were reviewed. Clinical outcome was assessed using Frankel grade and Japanese Orthopaedic Association score. The radiologic parameters were obtained from plain films, 3-dimensional computed tomography and magnetic resonance images.

Results: A total of 125 cervical laminae were operated in

38 patients. 11 patients received 4-level laminoplasty and 27 patients received 3-level laminoplasty. Postoperatively, the mean Frankel grade and Japanese Orthopedic Association score were significantly improved from 3.97 to 4.55 and from 12.76 to 14.63, respectively ($p < 0.001$). Radiologically, cervical curvature was worsened from 19.09 to 15.60 ($p = 0.025$). The percentage of range of motion preservation was $73.32\% \pm 22.39\%$. The axial dimension of the operated spinal canal was increased from 1.75 to 2.70 cm^2 ($p < 0.001$).

Conclusions: In our study, unilateral open-door laminoplasty using hydroxyapatite spacers and miniplates appears to be a safe, rapid and easy procedure to obtain an immediate and rigid stabilization of the posterior elements of the cervical spine. This modified laminoplasty method showed effective expansion of the spinal canal and favorable clinical outcomes.

Outcome and Complications of Percutaneous Pedicle Screw Fixation

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Introduction: Percutaneous pedicle screw insertion represents a novel technique, recently introduced in the literature. The successful percutaneous placement of pedicle screws requires surgical skill and experience because of lack of dorsal anatomic surface landmarks. Fluoroscopy-based guidance has been shown to be effective in guiding the accurate percutaneous placement of lumbar pedicle screws. Many systems are now available.

Objective: This study aims to report our preliminary experience with the use of percutaneous transpedicular screw fixation systems in patients with thoracic, thoracolumbar and lumbar instability. Potential drawbacks are also detected.

Materials and Methods: The study groups were recruited from patients with absolute indication for thoracic, thoracolumbar or lumbar instability who had had proper diagnostic assessment. We conducted a prospective operative and postoperative analysis of 40 patients (mean age 54.5 years) with thoracic, thoracolumbar and lumbar instability who underwent fluoroscopy-guided percutaneous fixa-

tion of the spine between January 2009 and June 2013.

Results: Percutaneous lumbar transpedicular screw fixation was found to minimize the morbidity associated with open techniques without compromising the quality of fixation. A total of 54 screws were inserted. There was no additional morbidity associated with the procedure. Postoperative computed tomography scans and plain X-rays were obtained in all patients. In 2 (8.3%) penetration of the pedicle border occurred without neurological sequelae for the patient. Reduction of visual analogue scale scores regarding back pain during the first postoperative week was noted. Follow up ranged between 6 months and 24 months.

Conclusions: Preliminary experiences with this technique found it equally effective and safer than open fixation. Fluoroscopy-guided percutaneous trans-pedicular fixation of the thoracolumbar, lumbar, and lumbosacral spine is feasible and can be performed safely. Preoperative planning is essential in order to avoid intraoperative complications with the instrumentation system.

Keywords: Lumbar; Percutaneous; Transpedicular; Screw Fixation; Minimally invasive

Pediatric Spine Surgery

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Introduction: Most of the neurosurgeons may face pediatric patient with spinal problems that required surgical intervention although most conditions affecting the spine in the pediatric group are congenital malformations mainly the spinal dysraphism conditions but acquired conditions may also be seen. The most common acquired conditions are the spinal deformities mostly the scoliosis, but other conditions like spinal trauma tumors and sometimes degenerative conditions

Aims of the Study: Is to study the pattern of spinal conditions admitted and treated surgically in the national center of neurological sciences In Khartoum Sudan in the period from January 1995 to December 2014 and to study the types of surgeries performed and their outcome

Results: Out from 3110 patients operated during the study period 122 were pediatric patients 3.9%, age was ranging

from 1–17 years, male were predominating representing 75%, the most common conditions were spinal tumors 41.8% followed by spinal injuries in 17.2 and spinal infection in the same percentage, the procedures done were mostly limited laminectomies but other procedures were also done, the outcome was cure in 16.4%, improvement in 57.4, while 13.1 remained static and 2.5% died.

Conclusions: Pediatric spinal conditions might be seen by the neurosurgeon so he should have systemic approach to diagnose and treat these conditions, the pediatric spinal conditions are usually different from these seen in adult person the majority are deformities, injuries or tumors beside congenital and inborn conditions, the surgical interventions in these conditions should be tailored or each patient and the type of the intervention should be kept as minimal as possible.

Usefulness of Expandable Cage for Corpectomy Reconstruction in Unstable Lumbar Burst Fractures *via* a Single-Stage Posterior Approach

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Aim: Patients with unstable mid and lower lumbar burst fractures require surgical treatment to relieve pain, address paralysis, and stabilize the spine to prevent further segmental deformity. The purpose of this study is to examine the efficacy and usefulness of corpectomy and reconstruction of vertebral body using an expandable cage *via* a single-stage posterior approach for unstable mid and lower lumbar burst fractures (below the L3).

Materials and Methods: Fifteen patients underwent single-stage transpedicular vertebrectomy and vertebral body reconstruction using an expandable cage. Neurologic status was classified using the American Spinal Injury Association (ASIA) Impairment Scale, while functional outcome was analyzed using a visual analog scale (VAS) for back pain. Segmental Cobb angles were measured above and below the fractured vertebral body preoperatively, immediate postoperatively, and at the last follow-up.

Results: The preoperative neurological status was ASIA

grade E in 3 patients, grade D in 6, grade C in 4, and grade B in 2. Postoperatively, neurologic stability was demonstrated in 3 patients, and 12 patients showed improvement in the ASIA grade. The mean preoperative VAS score was 8.3, which decreased to 4.5 postoperatively, and to 1.8 at the final follow-up. The mean preoperative segmental lordotic angle was 9.2°, which increased to 16.9° postoperatively, and decreased to 15.1° at the last follow-up. Regarding surgical complications, an intraoperative dural tear occurred in one patient and early stage cage subsidence was demonstrated in a severe osteoporotic patient.

Conclusions: The results of our series suggest the feasibility, efficacy, and safety of this surgical option for unstable mid and lower lumbar burst fractures. This technique from a single posterior approach offers several advantages over traditional anterior or combined approaches using strut graft or nonexpandable implants.

Surgical Management of Spinal Cord Cavernomas

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Purpose: Spinal cord cavernomas can be asymptomatic; however, if they bleed they are often associated with severe neurological deficits. Spinal cord cavernomas are infrequent, which might explain that larger institutional series are lacking. After having operated 35 spinal cavernomas, we feel encouraged to report our operative strategies as well as the postoperative long-term outcome.

Methods: We retrospectively identified 35 patients with symptomatic intramedullary cavernoma, who underwent surgical treatment. Preoperative and postoperative clinical findings, imaging data, cavernoma location, type of surgical approach and surgery-associated complications were evaluated.

Results: The mean age of the patients was 49 years (range, 18–80 years). There were 18 females and 17 males. Sensory deficits were found in 80% of the patients, motor deficits in 34% and bladder dysfunction in 26%. To reach medially located cavernoma, median myelotomy *via* laminectomy/laminoplasty was performed in 14% of the patients. For laterally located cavernoma myelotomy at the area of the dorsal root entry *via* hemilaminectomy was

done in 63%. In 20%, the laterality of the location guided the bony approach in patients with exophytic cavernoma. In 1 patient with ventrally located cavernoma, corporectomy and cage implantation was performed. After the operation 54% of the patients experienced worsening of the preoperative symptoms, in 14% an improvement was seen and in 32% the symptoms remained unchanged. After a mean follow-up of 6 months, an improvement was seen in 54% of the patients and the rate of neurological worsening dropped to 9%.

Conclusions: Defining the exact location of the cavernoma in relation to the pial surface is essential for guidance of the bony approach and the area of myelotomy. In the majority of the patients, a limited approach is adequate for successful resection of symptomatic cavernoma with a good long-term outcome. However, the rate of transient neurological worsening is substantial.

Trans Sacral Epiduroscopic Laser Decompression in Lumbar Disc Herniation

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Purpose: To investigate the effect of trans sacral epiduroscopic laser decompression (SELD) in patients suffering from herniated lumbar disc (HLD) including analysis of evidence based clinical data, comparing the changes of disc size on magnetic resonance image (MRI) scans, pain scores and functional capacity scores before and after the surgery.

Materials and Methods: Study was designed prospectively to determine the outcomes of SELD in regard to reduction of pain and improvements of functional status in patients with low back pain (LBP) and radiculopathy caused by definitive neural compression proven from MRI. A total of 850 patients with LBP and with simultaneous radiculopathy were operative with SELD technique applying Ho:Yag laser. Clinical outcomes were evaluated using visual analogue scale (VAS) score for LBP and radiculopathy and functional status was measured with Oswestry disability index (ODI).

Results: At 2 weeks after procedure, the average VAS score

for leg pain fell to 3.6 from 7.1 (p -value<0.01) and the average VAS score for back pain fell to 4.1 from 5.9 (p -value <0.01). At three months the average leg and back pain VAS scores fell to 2.6, 2.7, respectively. Mean ODI improved from 50 to 19 at postoperative two weeks and further decreased to 12 at three months. Postoperative 2 weeks Magnetic resonance imaging revealed sufficient removal of the herniated nucleus pulposus (HNP).

Conclusions: The results of this study show significant improvements of VAS score and ODI after SELD for HNP patients with LBP and radiculopathy. Magnetic resonance imaging scan following the surgery revealed notable decrement of the size of HNP and reduction of neural compression. The SELD is suggested to be an effective therapeutic modality for patients with symptomatic HNP.

Keywords: Epiduroscopy; Ho:Yag laser; Lumbar disc herniation; Adhesion of nerve root

Craniocervical Posterior Fixation

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Background: Atlanto-occipital dislocation (AOD) is a rare and often fatal condition. Pain, limitation of movements, and weakness, were the main complaints of patients with Atlantoaxial and Atlanto-occipital fractures. Internal fixation and fusion was indicated in patients with AOD and upper cervical lesions. Computed tomography (CT) is the imaging modality of choice for evaluation.

Objective: Restoration of spinal alignment, stability, and improving neurological function was the aim of surgical interference through posterior craniocervical fixation.

Methods and Results: Ten patients were operated upon in the last two years, nine males and one female. There were two patients presented by pathological instability and eight patients presented by traumatic lesions. The age of patients ranged between 24–63 years. Follow up of patients up to one year. All patients were investigated pre and postoperatively with plain X-ray, CT scan, and magnetic resonance imaging. The patients were operated through craniocervical posterior fixation without operative or postoperative complications. They all improved clinically postoperatively.

Conclusions: There is insufficient scientific evidence to

support diagnostic and treatment standards or guidelines in specific treatment of upper cervical spine fractures. Surgery in this area is possible with confident results.

Keywords: Spine; Atlanto-occipital; Atlanto-axial; Cranio-cervical; Posterior internal fixation

The Techniques of Ventral Reduction and Stabilization for Cervical Facet Dislocation: Early Experience and Review of Literature

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Background: Facet dislocation constituted an important subgroup of cervical spine injuries that result from flexion-rotation or flexion-distraction injury. Management of cervical spine dislocations represents an area of substantial controversy regarding the appropriate diagnostic work-up and the available treatment options either conservative or surgical. Anterior cervical approach is an option for treatment of cervical spine facet dislocations.

Objectives: To evaluate the efficacy and safety of anterior cervical stabilization in treatment of cervical facet dislocation and to review the specific areas of controversy generated by this issue.

Patients and Methods: Ten patients with single level cervical facet dislocation were admitted in the Department of Neurosurgery, Benha University in the period between January 2012 and December 2014. Seven male and three female patients who ranged in age from 18 to 50 years (average 32.1 years). Six patients presented with unilateral cervical facet dislocation and four patients with bilateral cervical facet dislocation. The level of facet dislocation was C5–6 in four, C6–7 in two, C3–4 in two and C4–5 in two patient. Three patients presented with a complete spinal cord injury (SCI), two patients with an incomplete SCI, four with radicular symptoms, and one patient was neurologically intact. All patients underwent computerized tomography evaluation of the cervical spine. Plain radiography and preoperative magnetic resonance imaging cervical spine were not routinely done, but tailored according to patient's condition. Decompression, reduction, and stabilization of the cervical spine *via* the ventral approach was accomplished in all cases.

Results: Adequate decompression of neural tissue by sat-

isfactory reduction of deformity and meticulous discectomy was achieved in all patients, followed by fixation using anterior plate. Postoperative neurological status was unchanged in three patients and improved in four patients, one patient died due to respiratory compromise caused by diaphragmatic paralysis that was present preoperatively. There was no deterioration of preoperative neurological function. The only complication related to the approach was transient recurrent laryngeal nerve palsy encountered in one case.

Conclusions: Anterior only cervical approach is effective and reliable alternative for decompression, reduction, and stabilization of the dislocated cervical spine facets in selected patients.

Keywords: Cervical facet dislocations; Anterior cervical approach

Free Hand Technique for C1 Lateral Mass Screws and Transpedicular C2 Screw Fixation: Experience in 12 Consecutive Cases

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Introduction: Although C1 lateral mass fixation to transpedicular C2 technique is frequently performed in upper cervical instabilities, it requires the guidance of fluoroscopic imaging. The fluoroscopy guidance is time-consuming and has the risks of accumulative radiation. Biplane fluoroscopy is also difficult in upper cervical pathologic conditions because of the use of cranial fixations. This study aimed to demonstrate that the screws could be placed safely and rapidly without fluoroscopy guidance.

Materials and Methods: Between 2012 and 2014, C1-C2 screw fixation were done in 14 consecutive patients with odontoid fractures using the harms technique for segmental C1-C2 fixation.

C1 screw lengths ranged from 18 to 32 mm. conformatory fluoroscopic imaging is done intraoperatively. Postoperative CT scans were done to confirm proper screw insertion.

Results: There were no screw malposition or neurovascular complications related to screw insertion. Postoperatively, 3 patients complained of hypoesthesia, whereas on 2

patient had superficial wound infection.

Conclusions: C1 lateral mass screws and C2 transpedicular screws may be used safely and rapidly in upper cervical instabilities without intraoperative fluoroscopy guidance. Preoperative planning and determining the ideal screw insertion point, trajectory, and the length of the screws are the most important points in preoperative planning.

Keywords: C1 lateral mass; Screw fixation; C2 transpedicular screw; Fluoroscopy

Spinal Schistosomiasis? Medical or Surgical Treatment!

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Introduction: Spinal schistosomiasis, an unusual form of schistosomiasis, this condition affect young individuals, producing clinical features consisting of low backache, lower extremities weakness, numbness, urinary incontinence and features of cauda equine lesion of recent onset.

Methods: The study was conducted in the period from 1995–2009. All patients with diagnosis of spinal space occupying lesions whose histopathology revealed spinal schistosomiasis were included.

Results: Ten patients satisfied the study criteria. The age range was from 6–42 years, the mean age was 19.7 years. Nine of the ten patients were males. Seven were students the rest 3 have other jobs. 50% were from endemic area. The clinical picture was. Backache, lower extremities hypoesthesia, weakness and urine incontinence. The duration ranged from two weeks to two months. Three patients were diagnosed by magnetic resonance imaging which showed D 12 to L1 or L2 spinal cord swelling with hyper intense patches in T2 images, the remaining two patient were diagnosed by computed tomography myelogram which showed D12 to L1 or L2 spinal cord intramedullary swelling. Nine patients were treated by D11 to L1 Laminectomy and spinal cord biopsy. One patient was treated by antibilharzial drugs. In surgically treated patients histopathology was schistosomal ovae surrounded by inflammatory cells and edema. All patient received Praziquantel and corticosteroids and all showed improvement.

Conclusions: Spinal schistosomiasis has characteristic

features. The condition produce severe neurological disability in young individuals. We advise medical treatment trial if failed then surgical decompression and biopsy to confirm the condition followed by administration of praziquantel and corticosteroids.

Revision in Spinal Surgery

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Introduction: Revision in spinal surgery is an unpleasant situation faced by many spinal surgeons, the indications for revisions varies widely from missed pathology site like disc or a tumor or recurrence to surgical site infection, cerebrospinal fistula or leak, failure of fixation or many other conditions.

Aims: The aims of this study is to identify the causes and the indications of revision of spinal surgery in the patients revised in our institution.

Methods: all patients who underwent primary and then revision spinal surgery were included. The data of those patients were collected and analyzed.

Results: In the period from January 1995 to December 2010, and from 2,553 patients operated for different spinal conditions, 68 patients 2.7% were re-operated, the characteristics of those patients are, age was ranging from 15 to 80 years with mean age of 45 years, sex 47 patients (69%) were males. While 21 patients were females (31%) the main indications for reoperation were residual or recurrent discs disc 29 (45.6%) residual or missed tumours 5 (7.4%), canal stenosis 12 (17.6%), fibrous adhesions 7 (10.3%), disc + fibrous adhesions 3 (4.4%), foreign body + abscess 2 (2.9%) the final out come was Cure or improvement in 54 (79.5%) of the patients who remained Static were 3 patients (4.4%), who died were 2 patients (2.9%) and some of the patient lost the follow up 9 patients (13.2%).

Conclusions: although most surgeons do not like to revise their surgeries but sometimes they are obliged to do so, the most useful way to avoid these is the proper preoperative patient selection and following the slandered surgical methods and to try to correct any faults during the primary surgery and to be clear in discussing that with the

patient and if revision is indicated one should be shy of doing that and that should start from the moment of discovering the need for revision most of the patients will accept that and if proper procedures were done the outcome will be acceptable.

Degenerative Spine Condition: An Experience of 13 years in 1,749 Cases

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Introduction: Degenerative spine disease is the commonest spinal disorder in elderly patients. Wide range of treatment modalities can be used to treat this condition ranging from simple conservative measures to surgical intervention including minimally invasive procedures and instrumentations.

Materials and Methods: An observational descriptive retrospective study has been conducted in the National Center for Neurosciences (N.C.N.S) at Shaab hospital, Khartoum Sudan in the period between 1997 to 2010. All patients with degenerative spine diseases together with their long-term follow up over 10 years assessments were collected using SPSS. Data was then analyzed and interpreted

Results: 1,749 patients were encountered during this period, male:female ratio was 2:1, (404/1,749) were workers and (485/1,749) were having other professions. Backache (94%), both lower extremities (LEs) pain (366/1,749), both lower extremities weakness (417/1,749), both lower extremities numbness (547/1,749), both urine and fecal incontinences (80/1,749) and abnormal gait (54%) were the main presenting symptoms. Most patients were investigated by magnetic resonance imaging (MRI) where L4-5 and L5-S1 discs with or without hypertrophied ligamentum flavum were the commonest findings. Laminectomy was done in most cases (1,250/1,749) and fixation was done for some of them (79/1,749) with good overall outcome (1,269/1,749 improved).

Discussion: This study revealed predominance in male gender and most of them presented with backache. This disease tends mainly to affect the lower spine causing variable LEs symptoms including pain, weakness and numb-

ness and consequently abnormal gait.

Conclusions: Spinal degenerative disease is associated with aging process however younger patients are not immune against the disease process. MRI remains the best imaging of choice with computed tomography and plain X-rays reserved for selected cases. Laminectomy was found to be as effective as other minimally invasive procedures in terms of long term patient follow up.

Novel Use of Recombinant Tissue Plasminogen Activator in an Acute Extensive Spinal Epidural Haematoma in a Patient with Coagulopathy

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Background: Spontaneous extensive spinal epidural haematomas poses unique challenges for the neurosurgeon. Performing extensive laminectomies to remove all of the compressive haematoma can destabilise the patient's spinal column which may require fixation. This is further complicated in patients with coagulopathy.

Case Description: A 61-year-old male presented to the referring hospital with acute onset lower limb weakness with a past medical history of severe autoimmune haemolytic anaemia, essential thrombocytopenia with several previous thrombotic episodes including PEs. He was on aspirin and warfarin. Magnetic resonance imaging (MRI) spine revealed a spinal epidural haematoma from T3 to L3. On arrival to Beaumont hospital, the patient had a sensory level to T7 with 1/5 power proximal, 4-/5 distal the left lower limb. He had 4-/5 power in all myotomes on the right. A 2 level laminectomy was performed (T11/T12). A 6Fr soft feeding tube was passed into the epidural space 18.5 cms cranially and 13 cm caudally. 1 mL of 1 mg/mL Alteplase was instilled at 1 cm intervals. This was aspirated after 30 seconds. This was repeated several times until free flowing liquefied clot was retrieved.

Results of Investigations: Preoperative image demonstrating extensive haematoma. Intraoperative image demonstrates technique. Postoperative MRI 3 days later demonstrates complete evacuation of haematoma. The patient was discharged home on the 8th postoperative day, mobilising with a single walking stick, last follow up mobilising independently.

Discussion: To our knowledge, this is the first reported case using recombinant tissue plasminogen activator to evacuate a spinal cord epidural haematoma of any size. This technique represents a quick, cost effective and minimally invasive approach, sparing spinal column destabilisation and may be applied to patients without pre-morbid conditions.

Benign Osteoblastoma Mimicking a Dumbbell Schwannoma

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Introduction: Osteoblastoma is an uncommon benign primary bone tumor arising from osteoblasts and osteoid tissues, its clinical and histologic manifestations that are similar to those of an osteoid osteoma but the osteoblastoma is generally larger and more invasive. It represents 10% of all spinal tumors and the location to the spine is found in 32%–40% of all cases of osteoblastomas.

Case Report: We report the case of a 30-year-old woman with no particular medical history who presented with progressive weakness of the two lower limbs over 3 months with no sphincter alterations. Neurological examination on admission revealed spastic paraparesis with superficial hypoesthesia with an upper level at T9. The magnetic resonance imaging (MRI) found a well-limited lesion, homogeneous, with a dumbbell shape, extended through the T9-T10 foramen, with spinal cord compression. It appeared isointense in on T1 and T2 weighted imaging, with homogeneous enhancement after Gadolinium. The patient was operated, a T9 right hemilaminectomy was performed and revealed an extradural lesion lateralized to the right side completely compressing the dural made of soft, brittle bone, decompression of the dural was performed. Postoperative showed improvement of the motor deficit. Histopathology concluded to a Benign Osteoblastoma.

Conclusions: Through this case, the authors discuss the clinical and radiological manifestations of this pathology.

Keywords: Osteoblastoma; Bone tumor; Spinal cord compression

Rerto-Odontoid Mass, Its Nature and 360 Degree Surgical Approach Case Report

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Retro-odontoid mass associated with chronic atlantoaxial subluxation are extremely rare. This article describes a case of retro-odontoid mass associated with chronic atlantoaxial subluxation and its management by transoral resection of the retro-odontoid mass with posterior C1 up to C6 laminectomy and occipito-cervical fixation. Retro-odontoid mass associated with chronic atlantoaxial subluxation is extremely rare. They are represented in the literature predominantly as case reports. The etiology of the mass remains controversial. Takeuchi *et al.* explained formation cystic mass that the transverse ligament becomes degenerated and hypertrophic because of chronic mechanical stress by atlantoaxial subluxation. Then, a part of the ligament develops reactive granulation tissue with a small vessel formation. Finally, rupture of these small vessels cause repeated episodes of microbleeding, resulting in formation of a cyst. Direct excision of the cysts and fixation has commonly been performed for the surgical treatment of retro-odontoid cystic mass associated with chronic atlantoaxial subluxation. Here, we present a case of a retro-odontoid mass associated with chronic atlantoaxial subluxation and located in the ventral side of spinal cord. Mass is surgically excised transoral and occipito-cervical fixation with posterior cervical laminectomy from c1 to c6.

Comparison of Epidural Morphine Soaked Gel Foam and Continuous Intravenous Morphine Using Patient-Controlled Analgesia in the Management of Postoperative Pain Following Lumbar Spinal Fixation Surgery

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Background: Pain management can be a major challenge after spinal surgery. The use of parenteral opioids has

been the mainstay of analgesia for patients undergoing posterior lumbar spinal surgery. The route of opioid administration can be epidural, intrathecal, intramuscular (IM), or intravenous (IV), or opioid administration can be in the form of a continuous infusion or as patient-controlled analgesia (PCA) with or without background infusions. Intravenous or IM administration of opioids is associated with dose-dependent side effects such as respiratory depression, nausea and vomiting, sedation, and gastrointestinal ileus.

Aim of the Study: To compare the analgesic effect of epidural morphine soaked Gelfoam with that of continuous intravenous morphine using PCA following lumbar spinal fixation surgery.

Patients and Methods: A prospective non-randomized controlled trial of 100 cases of spinal fixation surgery of at least one motion segment of the lumbar spine was involved. Patients were divided into 2 groups. Group one included 50 patients who underwent placement of gel foam soaked with 1 mL of 0.1% morphine. Group two, included 50 patients as well, with intravenous patient controlled analgesia set.

Results: Our patient population included 33 females and 67 males. The mean age at time of operation was 48.2 in group 1 (the youngest was 30 and the oldest was 56) and 47.1 in group 2 (the youngest was 28 and the oldest was 59). There was no procedure related morbidity or mortality in the series. 62 cases included fusion of one motion segment, 38 cases included fusion of 2 motion segments. We had statistically comparable results for pain control in both groups. There has not been statistically significant difference in the pain control between both groups in the first 48 hours. No correlation has been found between the levels operated upon or the number of levels operated and the pain control or the failure in both groups. No correlation was found between the sex and the ages of the patients and the pain control or failures.

Conclusions: We conclude that the use of morphine soaked Gelfoam placed epidurally following spinal surgery is an effective analgesic method. The results are compared to intravenous continuous infusion of morphine with fewer side effects, and lower cost.

Percutaneous Pedicle Screw Fixation Combined with Posterior Minimal Access Decompression of Neural Canal in Unstable Thoracolumbar Fractures

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Background: Minimal invasive spine (MIS) surgery using percutaneous fixation of unstable thoracolumbar (TL) fractures is increasingly used as an alternative to open surgery. The complexity of fracture pathology and spine dynamics affects the use and limits indications of percutaneous techniques.

Objectives: To evaluate the percutaneous pedicle screw fixation combined with posterior minimal access decompression of neural canal in unstable thoracolumbar fractures.

Materials and Methods: Patients with single level unstable thoracolumbar fracture or without neurologic deficit were included. Cases with major deformity in the axial and/or sagittal planes were excluded.

Results: The study included twelve patients with a total of one hundred screws with fixation of two levels above and two levels below the fractured level (fracture site screws in four patients unilaterally). Screw malposition with no clinical effect was observed in follow up computed tomography scan in two screws (2% of the screws) and needed no revision. Full laminectomy was done to all patients. Reduction of retro pulsed fragments achieved but not fully. No surgery related complications occurred in any patient. Limitation of the exposure and difficulty to fully reduce the central retro pulsed fragments were evident. No fusion attempts were done to any of these patients. No blood transfusion given. No wound related problems.

Conclusions: this technique in treatment of unstable thoracolumbar fractures extends the spectrum of indications of MIS techniques to spine trauma. Partial reduction of retro pulsed fracture can be obtained. Combining anterior column reconstruction to percutaneous transpedicular screw fixation is a valid option to extend the indications of the technique.

Day Case Lumbar Decompression & Discectomy Compared with In-Patient Decompression Patients

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Introduction: With the increasing financial pressures on the NHS, more specialties are looking towards advances that allow significant savings, improved utilization of resources, whilst keeping patient safety first. Day Case Surgery may be that option. The objective of this study was to compare complications and outcomes of lumbar decompression and discectomies between day case surgery and in-patient surgery at Chorley Hospital, assessing whether this was a safe and viable option.

Method: A retrospective analysis looked at complications *via* case notes, operative notes and clinic letters over two consecutive years for surgeries performed under the same spinal surgeon. An inclusion and discharge criterion for day case surgery and in patient surgery were utilised. The outcomes were compared with one another as well as the International Spinal Surgery Information Sheet.

Results: 57 day case and 97 in-patient cases with the same pathology were selected. In the day case group, the incidence of complications was comparatively lower than the in-patient cohort. Especially long-term postoperative pain (28% [day case] vs. 42% [in patient]) was significantly better. Both groups of patients had statistically lower complications than identified by the International Spinal Surgery information sheet.

Conclusions: The results highlight the added social and economic benefits that day case surgery can bring. The reduction on inpatient stay and emphasis on keeping patient safety paramount can have implications locally and nationally. The study highlighted that keeping patient pre-operative, operative and post-operative safety measures stringent, day case lumbar decompression discectomy is a safe option for patients and the NHS.

Percutaneous Pedicle Screw Fixation for Traumatic Type a Thoracolumbar Fractures: Preliminary Report of 29 Pedicle Screws

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Objective: To evaluate short outcome and potential advantages of a minimally invasive percutaneous pedicle (MIPP) screw short segment fixation for burst fractures of the thoracolumbar (TL) junction (type A3) in neurologically intact patients.

Methods: Six patients admitted to Neurosurgery Department with type A3 TL fracture without neurologic deficits were included in this preliminary study. A total of six male patients (mean age, 31 years; range, 23 to 43 years). An average preoperative days was 3.33, range 1 to 6 days. All are involved in road traffic accidents. Follow up period from 4–18 months. No bone fusion or surgical decompression was needed. All patients operated by MIPP screw fixation using cannulated screw system. Short term outcomes are evaluated.

Results: A total of 29 screws inserted for single level fractures with a short segment fixation. Fracture level was involved in the construct in 4 patients (3 patients pedicles fixed unilaterally and one bilaterally fixed). All patients were mobilized on same day except one patient with associating fracture femur. Mean preoperative angle of kyphosis (sagittal plane deformity) was 19 degrees improved to 2.8 degrees postoperatively. The mean preoperative anterior vertebral height is 17.83 mm improved to 23.8 mm with 33.4% increase. No effect seen on the posterior vertebral height perioperatively. All patients discharged from spine care two days postoperatively. No extra need for strong analgesia apart from the regular diclofenac injections. Bleeding was minimal. No complications recorded in the postoperative or follow up time. Single screw (3.4%) was not optimum radiographically without clinical effect.

Conclusions: MIPP screw fixation for TL fractures is considered a good alternative when decompression is not indicated and open surgery is not justified. The procedure is considered a good alternative for conservative treatment to ensure safe and fast return to normal activity. The technique is not demanding and has a fast learning. This

technique is recommended for selected types of spine fractures with more experience and new systems modifications more complex procedures can be done. The low complication rate and better outcome make the future of this technology more promising.

Keywords: Percutaneous; Pedicle; Fracture; Fixation; Thoracolumbar; Spine

Photo-Stimulation to Control Bladder Function Followed Spinal Cord Injury

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Background and Hypothesis: Spinal cord injury (SCI) usually results in the loss of locomotor, bladder, bowel, and sexual functions. Although people with SCI can gain mobility with adaptive strategies such as using wheelchairs, for example, urinary dysfunction such as incontinence or detrusor sphincter dyssynergia do not have an effective adaptation. Current treatments available are either limited in success or elicit troublesome side effects. Normally, stimulation of the pontine micturation center produces relaxation of the external urethral sphincter (EUS) *via* direct projections to GABAergic neurons in the sacral dorsal gray commissure (DGC), which in turn, inhibit the EUS motor neurons (Onuf's Nucleus). SCI disrupts this pontine-spinal connection. Previous work in our laboratory has demonstrated that the light activated channels, channelrhodopsin-2 (ChR2) and halorhodopsin (HaloR), can manipulate neuronal spiking to create or inhibit action potentials in neurons following light exposure in the SCI setting without any pre-synaptic inputs. Thus, we hypothesize that expression of ChR2 or HaloR and subsequent photostimulation in the DGC GABAergic neurons will affect neuronal excitability and produce or inhibit action potentials in the EUS motor neurons after injury and ultimately restore proper urinary function following experimental SCI.

Methods: Bladder behavior activity (recording both frequency and volume of micturition) was recorded, and

evaluated between experimental groups, before and after photostimulation (using a pattern of 20 minutes intermittent light - 0.5 Hz, 1s on, 1s off). These groups include non-injured and T8 contused (200 KD, Infinite Horizon Impactor, Precision Systems and Instruments) rats expressing the depolarizer ChR2, the hyperpolarizer HaloR, or control GFP alone. Additionally, recordings were performed before injury and after injury in the injured rat groups. GFP expression was examined in DGC GABAergic neurons and their projecting axons to EUS motor neurons.

Results: Our preliminary results show that light-activation of ChR2 or HaloR expressing animals was able to augment or inhibit bladder activity in both uninjured and injured animals. Animals that were transfected with ChR2 demonstrated a return of urination (recordable urine volume and frequency) on the day of stimulation. This return of activity was lost two days following stimulation. HaloR was tested in non-injured rats. These rats demonstrated a very typical pattern of voiding and volume of urine during the recording period. Following transfection with HaloR, photostimulation resulted in a temporary loss of this micturition pattern. Normal voiding returned two days following stimulation. Immunocytochemistry showed that these light activated channels were expressed in DGC neurons with GABAergic projections to Onuf's nucleus.

Conclusions: We have demonstrated that targeting the spinal cord DGC GABAergic neurons with optogenetic photostimulation strategies can manipulate EUS spinal cord motor neurons, as well as, induce some urinary functional recovery in experimentally SCI rats. This technology has the impact for clinical translational use for control of the lower urinary tract in patients following SCI.

Posterior Decompression and Occipito-Cervical Fusion in Occipito-Atlanto-Axial Instability due to Rheumatoid Arthritis: A Case Report

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Objective: The cranio-vertebral junction is the most com-

plex anatomic region of the columna vertebralis. The term cranio-vertebral junction refers to the occipital bone, the foreman magnum, and the atlas and axis vertebrae. Rheumatoid arthritis is one of the most common deforming diseases. Rheumatoid arthritis is inflammatory, chronic, relapsing arthritis that usually affects multiple joints. However the cervical vertebrae is the most common region affected by Rheumatoid arthritis. We present the case of posterior decompression and occipito-cervical fusion in occipito-atlanto-axial instability due to rheumatoid arthritis

Methods: A 60-year-old male patient was admitted to our clinic with severe neck pain, suboccipital pain, progressive weakness and no more ambulatory for 3 months (ranawat grade IIIB). Patient is followed for 15 years with diagnosis of rheumatoid arthritis

Findings: On his cranial magnetic resonance imaging was detected C1–C2 dislocation, foramen magnum and spinal cord compression, brain stem compression, cervical myelopathy. Computed tomography scan of the cervical spine revealed the presence atlantoaxial subluxation.

Results: Surgical treatment for patient (ranawat as atlanto-occipital fusion, posterior instrumentation and fusion of cervical spine performed.

Conclusions: Occipito cervical fixation is a very effective procedure for the treatment of craniovertebral junction instability. Especially, the currently used implants allow us to achieve high stability in rheumatoid arthritis.

The Outcome after Unintended Dural Tears During First-Time Lumbar Discectomy with One Year Follow up

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Object and Aim of Work: Unintended dural tears are an unfrequent but a well-known and troublesome complication during lumbar disc surgery. The effects of a dural tear on long-term outcome are, however, controversial. We examined the effects of a dural tear occurring during disc surgery and how it impacts long-term clinical outcome.

Methods: Patients who had an established diagnosis of intervertebral disc herniation at our department and who

underwent a standard first-time open discectomy starting from January 2014 till January 2015 were followed up at 6 weeks and at 3, 6, and 12 months after surgery and were included in this prospective study. Patients who had dural tears were managed either surgically or conservatively according to their respective conditions. Patient data from their gathered database were reviewed and analyzed.

Results: 199 patients underwent lumbar discectomy during that period. There were dural tears in 7 patients (3.5%). There were no statistical significant differences between the group who had dural tears and the group with no dural tears regarding age, sex, race, body mass index, herniation level or type, or incidence of smoking, diabetes, or hypertension. The group with dural tears had significantly increased operation time, increased intra-operative blood loss, and increased length of hospital stay. However, no significant differences were found regarding incidence rates of nerve root injuries intra-operatively, additional surgeries, or in the SF-36 scoring for bodily pain or physical function, or Oswestry disability index scores at 1 year. There were no mortalities.

Conclusions: Unintended dural tears during first-time lumbar discectomy does not appear to affect long-term outcome in affected patients.

Keywords: Lumbar spine; Clinical outcome; Dural tear; Surgical complication; Lumbar disc surgery

Treatment of Atlanto-Axial Instability Related to Os Odontoideum due to Smith-McCort Dysplasia

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A very rare autosomal recessive spondylo-epi-metaphyseal dysplasia, Smith–McCort dysplasia (SMC) is a close variant of Dyggve-Melchior-Clausen syndrome (DMC). The only difference is the absence of mental retardation in SMC. The characteristic features of the syndromes are such skeletal features as a short trunk dwarfism with a barrel-shaped chest, rhizomelic limb shortening, a double vertebral hump and an irregular lace-like appearance of iliac crests. Atlantoaxial instability-induced spinal cord compression is a severe and preventable complication of

both disorders. Fusion surgery can prevent permanent neurological damage or sudden death due to spinal cord compression.

We report a 39-year-old woman with myelopathy and significant neck pain related to DMC syndrome and concomitant severe atlantoaxial instability. She had complaints for 6 years. The neuroradiological investigation revealed an atlantoaxial subluxation due to os odontoides, and a compression and signal changes in the spinal cord due to subluxation. Vertebral height with a double humped appearance and intervertebral space were observed to have reduced. Atlantoaxial stabilization was performed with C1 lateral mass and C2 pedicular screws and so was interarticular fusion. And now, at the end of 3-year follow-up, she has no complaints except for mild gait disturbances.

Keywords: Dyggve-Melchior-Clausen syndrome; Smith-McCort dysplasia; Atlantoaxial instability; Odontoid hypoplasia; Posterior fusion; Screw fixation

Median Cervical Corpectomy for Cervical Myelopathy Associated with Ossified Posterior Longitudinal Ligament

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Background: Ossification of posterior longitudinal ligament (OPLL) is a known disease that causes cervical spondylotic myelopathy (CSM). It is usually underestimated by giving more attraction to the disc herniation and osteophytic changes. Direct decompression ventrally is more radical and curative than posterior approaches in which just widening of the spinal canal leaving the compressing anterior elements in place that progressively grow.

Hypothesis: OPLL is a ventral offending pathological changes that causes cord compression and neurological deterioration. Median cervical corpectomy (MCC) can directly deal with this pathological tissues radically and safely.

Methods: From 2005 to 2013, 40 patients of CSM with

OPLL underwent MCC, autologous graft insertion, with plate and screws fixation, in Neurological Surgery Departments in Mansoura International Hospital (Mansoura, Egypt) & El-sahil Teaching Hospital (Cairo, Egypt). Patients were preoperatively evaluated clinically using BmJOA modification of Japanese Orthopedic Association (BmJOA) score and radiologically by computed tomography and magnetic resonance imaging cervical spine. Clinical and radiological followup were recorded immediately postoperatively and every 6 months for at least 2 years.

Results: The study included 40 patients (24 men & 16 women). The age ranged between 35–65 years. The average follow up time was 61 months. Single level MCC was done in 21 patients, double level in 19 patients. Improvement average using BmJOA was $69.96\% \pm 18.98\%$. Transient hoarseness of voice occurred in 6 cases. Pain in the graft site takes place in 9 patients that subside with time. Revision surgery in one patient. Adequate fusion was obtained in 39 cases.

Conclusions: MCC with resection of OPLL mass considered a radical surgical procedure best indicated in CSM with OPLL.

Failed Short Segment Posterolateral Fixation For Multiple Non-Consecutive Lumbar Burst Fracture without Anterior Support

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We would like to report on a 15-year-old female patient, who presented with a non-consecutive burst fracture of the second and fourth lumbar vertebrae. The patient was initially treated by posterior fixation from L1 to L5 with the placement of two cross bars. On follow up, there was a bending of the two screws in the first lumbar vertebra. Later on, both screws became broken, causing the patient to develop new neurological manifestations. Repair was achieved by placement of a spacer between L1 and L2, removal of the broken screws and placement of two new screws with extension of the fixation one level superiorly.

Keywords: Thoracolumbar spine; Burst fracture; Postero-

lateral approach, Interbody fusion

Surgical Anterolateral Decompression of Type A3 Thoracolumbar Fractures and Fixation Using Vantage Anterior Plate System: A Report of Six Cases

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Background: Thoracolumbar fractures (TLF) are common spine injuries, mostly of traumatic origin. Treatment options include conservative, open surgery and minimal invasive techniques; depending on the type of fracture, neurological state, available equipment, and surgeon's experience.

Objectives: To evaluate the new Vantage anterior fixation plate system (Medtronic Sofamor Danek, Memphis, TN, USA) in treatment of these fractures and evaluation of surgical technique feasibility and possible complications.

Materials and Methods: Over a 3-year period, 6 male patients with unstable thoracolumbar burst admitted in Neurosurgery Department Saudi German Hospital were treated with anterolateral decompression and stabilization using Vantage system. Inclusion criteria are; patients without neurologic or with partial neurologic deficits, intact posterior column structures (type A3, AO classification), marked compromise of the neural canal, average body built, young ages, no history of active or chronic lung diseases, no previous renal surgery or ureteric injuries.

Results: Mean age at surgery was 38, and the mean interval between initial injury and vantage plate instrumentation was 5 days. Mean follow up period was 18 months. There were complete canal clearance and correction of deformity in all patients. All patients showed neurologic recovery except one patient with persistent incontinence. No major perioperative complications were encountered except one case with intercostal nerve injury, which improved during follow-up. No hardware related complications were encountered.

Conclusions: Anterior approach to the thoracolumbar spine is very effective in decompression and provide solid

fixation by the vantage system. A low profile user-friendly vantage system makes anterior stabilization fixation is easy and safe.

Keywords: Thoracolumbar; Anterolateral; Thoracotomy; Retroperitoneal; Fracture

Open versus Percutaneous Fixation for Thoracolumbar Flexion Distraction Injuries in Poly-Trauma Patients

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Background and Hypothesis: Unstable flexion distraction fractures (FDI) of the thoracolumbar (TL) spine are typically treated with conventional open fixation and arthrodesis. At times these procedures are associated with prolonged operative times and increased blood loss. This is problematic in the polytrauma patients where the morbidity may be magnified. Minimally invasive techniques for spine fixation have evolved and have been used more extensively in spine trauma in an attempt to minimize these complications and improve outcomes. The objective of this study is to examine the perioperative outcomes for patients with thoracolumbar FDI treated purely posterior either with percutaneous minimally invasive transpedicular screws (MIS) or open stand-alone posterior fixation (OSPF) in a cohort of consecutive patients at a level I trauma center.

Materials and Methods: A cohort of 21 consecutive polytrauma patients (injury severity score > 16) with a flexion distraction TL injury were included in the study. Fourteen patients had been treated conventionally with OSPF and seven patients received MIS transpedicular screws fixation. The injury severity score for the OSPF group was average 26.7±10.0 while 24.1±6.1 for the MIS group. Minimum follow-up was 6 months for the entire cohort. Variables analyzed included intraoperative blood loss, operative time, complications, intensive care unit (ICU) stay, and length of hospital stay.

Results: The average operation time, ICU stay and total length of hospital stay were not statistically different between the two groups. The intraoperative blood loss was significantly less in the MIS group (average 31 ± 13.4 mL) when compared to the open group (average 579 ± 379.1 mL). Wound infection and total complications including the ICU complications were greater in the open group as compared to the MIS group (14% versus 0% and 43% versus 0%, respectively).

Conclusions: Minimally-invasive posterior fixation can be a good treatment option for poly trauma patients with flexion distraction TL injury by reducing surgical morbidity and simplifying the immediate postoperative recovery.

Cervical Locked Facet: Ventral Reduction and Stabilization

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Objective: To demonstrate the safety and effectiveness of a single ventral approach for decompression, reduction, and stabilization in patients with cervical facet dislocation. The authors reviewed their experience in 62 cases

Methods: 35 patients presented with bilateral cervical facet dislocation, 16 patients with unilateral cervical facet dislocation and 11 patients presented with perched facets. There were 47 male and 15 female patients who ranged in age from 16 to 64 years (average 32 years). The level of facet dislocation was C3–4 in three, C4–5 in six, C5–6 in twenty-nine, and C6–7 in twenty-four patients. Fourteen patients presented with a complete spinal cord injury (SCI), thirty-three patients with an incomplete SCI, nine with radicular symptoms, and six patients was neurologically intact. All patients underwent plain radiography, magnetic resonance imaging, and computerized tomography evaluation of the cervical spine. All patients underwent ventral decompression surgery, reduction, and stabilization of the cervical spine.

Results: Decompression, reduction, and stabilization of the cervical spine *via* the ventral approach was accomplished in all but two patient. These two patients under-

went dorsal reduction and fusion in which a lateral mass screw fixation was used after initial anterior decompression. Postoperative neurological status was unchanged in twenty-six patients and improved in Thirty-six patients. No patient experienced neurological deterioration after undergoing this surgical approach.

Conclusions: The authors conclude that a ventral surgical decompression, reduction, and stabilization procedure provides a single safe and effective approach for the treatment of patients with cervical facet dislocation.

Evaluation of the Shoulder Imbalance Parameters and the Usage of Midtrapezial Angle Clinically and Radiologically in Lenke Type 1 Adolescent Idiopathic Scoliosis Cases

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Introduction: To evaluate adolescent idiopathic scoliosis (AIS) patients with shoulder imbalance that are generally used parameters are: radiographically costoclavicular intersection angle (CCA), angle of the line connecting the coracoids (Corac), the angle of line connecting the upper limit of the first costal angle (FRA), and the tilt angle of the first thoracic vertebra line (T1T). The angles shown on digital photographs are axillary folds line (a), deltoid peak line (d) and midtrapezial line angle (t).

Materials and Methods: A total of 29 cases of AIS has been divided to two groups, having the distance of the horizontal lines drawn from coracoids as 2 cm shoulder height differences (SHD).

Statistics: Paired-samples T test or wilcoxon test used depending the normalization of variables. Each variables receiver operating characteristic analysis performed.

Results: Values of d has a significant correlation with shd values. In ROC analyses significant youden values of; ax, tra, CCA are >2.9 ; >2.8 ; >4 , respectively. Sensitivity of ax is the highest value of %90 than tra and CCA %80. Also tra and CCA angles has highest specificity values %63,16 than ax %57,89.

Conclusions: The mid trapezial and axillary fold angles over 2,8 and 2,9, respectively is points the shoulder imbalance.

ance in cosmetic parameters. The costoclavicular intersection angles over 4 degrees shoulder imbalance parameter in radiologic expectation of shoulder imbalance preoperatively in lenke type1 ais.

Low Back Pain and Sciatica, New Approach

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The recent advances in Transforaminal Endoscopic Spine surgery under local anesthesia over the last two decades has led to the understanding of pain generators causing back pain and sciatica. So the real questions to be asked are where is the pain coming from? And why is it persisting? Moreover it has become evident that the cause of pain is the inflammation in the majority of cases rather

than the mechanical compression, so our attention should be directed towards the clinical examination and what information we can draw from it rather than on image findings. A tear in the annulus leads to leak from the nucleus which causes inflammation. Inflammation leads to mechanosensetization of nerves and up regulation of sodium channels, which causes the pain. Nauciceptors in the Dorsal Root Ganglion are pseudounipolar cells which means that their axons centrally and peripherally are affected in the same way. This is the principle for the Gore sign and the distal block at the ankle and foot. We have utilized the Gore sign to differentiate inflammatory from mechanical compression of nerve roots at L4-5 and L5-S1, i.e., Mechanosensetization from mechanical compression. Using the Mackenzie test to detect the integrity of the annulus and combining it with the Gore sign we have devised an algoriththem for examination of back pain and leg pain and the suitable ways of treatment utilizing local injections and Stitchless Transforaminal Endoscopic Spine Surgery under Local Anesthesia.