

EGYPTIAN SPINE ASSOCIATION 11th International Annual Conference 2021 Abstracts

Advanced Spine Journal 2021;40:91–98
<https://doi.org/10.1016/j.clnesp.2023.09.010>

#ESA Abstracts 20210101 Classifications And Therapy Recommendations For Thoracolumbar Spinal Injuries: A Comparison Between AO Magerl, TLICS, and AOSpine

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Introduction: To determine the efficiency or reliability of a new classification system, a direct comparison with existing classification systems should be performed. The aim of the present work is a comparative evaluation of the interobserver reliability of the three international classification systems for thoracolumbar spine injuries (AO Magerl, Thoracolumbar Injury classification score "TLICS", Thoracolumbar AO Spine classification "TL AOSpine") and the determination of modification possibilities with regard to reliability, usability as well as therapy recommendation of the currently common TL AOSpine classification system.

Method: This is a monocentric, prospective analysis of patients with fractures of the thoracolumbar region. Only cases with traumatic fractures were included, pathological fractures were excluded. The available x-rays, CT and MRT images were classified by 5 spine surgeons with different degrees of experience using the three classification systems AOSpine, AO Magerl and TLICS, and the associated treatment recommendation according to Thoracolumbar AO Spine classification injury score "TL AOSIS", German society for trauma surgery "DGU" and TLICS. For the statistical evaluation, the interobserver reliability according to Cohen's kappa was calculated.

Results: Radiological and clinical data of 100 patients were included. AO Magerl showed moderate Interobserver reliability ($\kappa = 0.46$) for morphological classification and substantial agreement ($\kappa = 0.71$) for DGU therapy recommendations. TLICS showed fair Interobserver reliability ($\kappa = 0.35$) for morphological classification, substantial agreement ($\kappa = 0.69$) for therapy recommendations according to TLICS. TL AOS showed substantial Interobserver reliability ($\kappa = 0.69$) for morphological classification and a substantial agreement ($\kappa = 0.77$) for therapy recommendations (TL AOS IS).

Conclusion: In the present study it could be shown that TL AOS is a reliable classification, with superior interobserver reliability compared to AO Magerl and TLICS. The treatment recommendations of TL AOSIS have higher interobserver reliability compared to other treatment recommendations (DGU and TLICS).

#ESA Abstracts 20210102 Injury Of The Thoracolumbar Posterior Ligamentous Complex: A Bibliometric And Critical Literature Review

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Introduction: In last 2 decades, the integrity of the posterior ligamentous complex (PLC) has been cited as a major determinant of thoracolumbar fracture classification and treatment algorithm. Since then, there was a growing number of publications on PLC injuries of the

thoracolumbar spine. However, the Assessment of PLC injuries has been one of the most controversial issues in diagnostic evaluation and current classifications of TLFs.

Methods: We conducted a keyword-based search from January 2000 to September 2021 using the Scopus database. Only publications relevant to PLC injury were analyzed for year of publication, authorship, publishing journals, institution and country of origin, subject matter and article type. In addition, content analysis of clinical article were analysed for sample size, study design (retrospective vs prospective), single vs multicenter, and level of evidence. A bibliometric and content review of literature Objective To provide a content and bibliometric analysis of literature on PLC injury of TLFs, aiming to add to the understanding of the trends, shortcomings and guide future research in this area.

Results: A total of 262 publications published in 61 journals, by 537 authors, 162 institutions and 29 countries were included in the analysis. Thomas Jefferson University, University of Calgary and University of Toronto had the largest number of publications related to PLC injury. The United States, Canada and China were the most contributing countries in terms of number of publications. Spine was the most prolific and top cited Journal, while Vaccaro A.R. was the most prolific author. The most cited publication was the Thoracolumbar Injury Classification and Severity Score (TLICS) classification by Vaccaro a.r. in 2005 (Vaccaro et al., 2005). The majority of the publications were case studies, with diagnostic accuracy being the most frequently discussed topic. The sample size for a large portion of the case series was less than 50. The majority of case series were retrospective studies conducted at a single center.

Conclusion: Our study provided an extensive list of the most historically significant spinal imaging articles, acknowledging the key contributions made to the advancement of this research area.

#ESA Abstracts 20210103 Posterior Cervical Foraminotomy Vs Anterior Cervical Discectomy And Fusion In Treatment Of Cervical Radiculopathy

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Introduction: Cervical radiculopathy caused by either cervical disc herniation or bone spurs due to cervical spine degeneration. It is common in middle aged and elderly patients. Those patients who are refractory to conservative treatment are candidates for surgical management. The surgical approaches for cervical radiculopathy are either anterior cervical discectomy and fusion (ACDF) or posterior cervical foraminotomy (PCF). This study aims to compare anterior cervical discectomy and fusion (ACDF) with posterior cervical foraminotomy (PCF) for the treatment of cervical radiculopathy, regarding the surgical, clinical and radiological outcomes.

Methods: This was a prospective randomized controlled clinical study carried on 44 patients with unilateral cervical radiculopathy. They were divided into 2 groups; group (A) include 23 patients underwent ACDF and group (B) included 21 patients underwent PCF, with 1 year follow up. The patient age, sex, clinical manifestations, surgical outcomes as number of cervical level, operative time, blood loss, complications and length of hospital stay were recorded. Visual analogus scale (VAS) and neck disability index (NDI) were used for evaluation of clinical outcomes. Postoperative imaging was done after 1 year to detect instability or adjacent level degeneration.

Results: Clinical improvement of the mean values of VAS and NDI were more pronounced in PCF group as compared to ACDF group with statistically significant difference.

Conclusion: Posterior cervical foraminotomy is a safe and effective technique for the treatment of cervical radiculopathy as compared to anterior cervical discectomy and fusion.

#ESA Abstracts 20210104

Scoliosis in Prader Willi Syndrome: A Case Presentation And Short Review

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Introduction: Prader-Willi syndrome (PWS) is a rare genetic disorder due to a de novo paternal 15q11-q13 deletion. PWS is considered the most common genetic cause of marked obesity in humans. Scoliosis, kyphosis, and kyphoscoliosis are commonly seen in children and adolescents with PWS with a prevalence of spinal deformities cited between 15% to 86%. Childhood risk is 70% or higher, until skeletal maturity, with a bimodal age distribution with one peak before 4 years of age and the other nearing adolescence.

Methods: In this presentation we will go through clinical presentation, common problems associated with the management of scoliosis in PWS. Lines of management include radiographic screening, physical therapy, bracing and surgery, depending on the size of the curve, and the child's age.

Results: Surgical treatment of scoliosis in PWS is either definitive spinal fusion, or growing rods in severe deformity in young immature children.

Conclusion: A clear understanding of the risks involved in surgically treating children with PWS is important and will be discussed.

#ESA Abstracts 20210105

Posterolateral Corpectomy With PyraMesh Titanium Cage Reconstruction In Thoracolumbar Metastatic Lesions

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Introduction: The vertebral column represents the most common bony site for metastasis with an incidence ranged from 30% to 70% in patients with metastatic neoplasms. The dorsal spine carries the highest frequent site for metastasis all over the vertebral column followed by the lumbar spine. These metastatic lesions are clinical entities that often necessitate a complex spinal decompression and anterior reconstruction. Posterolateral approaches alone allow for excellent decompression with transpedicular fixation and safe visualization of the neural elements for corpectomy and reconstruction so we can avoid the complications that can happen with the staged surgery.

Methods: A retrospective study included 26 patients presented to the Neurosurgery Department at Sohag University Hospital within 3 years, between August 2014 and August 2017. Evaluation was made through using the Quebec Back Pain Disability Scale and muscle power grading scale. Twenty-six patients with metastatic dorsolumbar spine lesions underwent a single -stage surgery by midline posterior approach. Posterior decompression with transpedicular fixation above and below the affected segment was done for all patients. Unilateral facetectomies and pediclectomy followed by corpectomy were done. Insertion of pyramesh titanium cage filled with iliac bone graft with tightness of the screws bilateral. Follow-up period was 6-12 months postoperatively. Our study aims to report cases and evaluate our approach for fixation and assess the postoperative period regarding pain improvement and neurological deficit.

Results: The average age was 58.36 ± 5.96 (range 33-67) years. More than two-thirds of them were males (69.2%). Majority of the lesions

were dorsal (77%). Postoperative infection was observed in four patients (15.4%) who improved by IV antibiotics and frequent dressing while CSF (cerebrospinal fluid) leak occurred in three patients (11.5%) who stopped after daily dressing, and we made CSF lumbar tap in one patient. Twenty-two patients showed neurological improvement postoperatively (84.6%). The remaining four were paraplegic with no improvement. Back pain improved for all cases.

Conclusion: Posterolateral approach alone is efficient and safe for dorsolumbar decompression and reconstruction in the metastatic spine.

#ESA Abstracts 20210106

Pars Repair: A Local Experience In Suhag City

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Introduction: Pars interarticularis defect could be a missing cause in persistent low back pain in adolescence especially athletic one. Surgical repair using transpedicular screws with U shaped rod and placing a cortical bone fragment in the fracture line is a minimal invasive surgery with preservation of all dynamic function of the spine. This study aims to assess bone fusion within 3-6 months after performing a minimal invasive pars repair using transpedicular screws in patients with bilateral fracture parts underwent this operation with preservation of the bony spine elements and the disc material.

Methods: In the period from October 2018 to October 2020, fifteen adolescent patients admitted to Sohag university hospital neurosurgical department with bilateral fracture pars interarticularis with no evidence of disc degenerative changes or incidence of spondylololthesis. Radiological assessment by Palin dynamic films, CT lumbosacral spine and MRI lumbosacral spine for all patients was routinely done. Bilateral transpedicular screws of the affected level were placed with application of U shaped rod and under compression, a cortical bone graft from the hip bone was placed in the fracture line after decortication with diathermy and bone curate. The Oswestry Disability Index (also known as the Oswestry Low Back Pain Disability Questionnaire) was used for post-operative evaluation. Post-operative follow up with x ray every 3 months and CT after 6 months during which the patient should wear a brace and reduce the normal activity.

Results: Males were predominate in our study with ratio 4:1, the main age was 16.7. An L5 vertebra was the common site of pars fracture with an incidence of 80%. Persistent low back pain with failure of medical treatment was the only complain with no patient record a sciatic pain or neurological defect. Apart from one case with superficial wound infection no post-operative complications were recorder for our patient. Back pain improved in all patients within 3 months post-operative. Using CT spine follow up complete fusion noted within 6 months in 11 cases with partial fusion in 4 cases.

Conclusion: Surgical pars repair with internal fixation to make the site of the fracture rigid while the bone attempting to heal with the bone graft is a good option for preservation of the biomechanics of the spine and regain the normal life with normal spine within one year.

#ESA Abstracts 20210107

Cervical Disc Arthroplasty versus Anterior Cervical Discectomy and Fusion: Personal Experience and Long term Follow up Literature Review

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Introduction: Superiority of cervical disc arthroplasty (CDA) to anterior cervical discectomy and fusion (ACDF) remains controversial. The

purpose of this study is to present our initial trial using DCA, and evaluate the long-term safety and efficiency of CDA and ACDF for cervical disc disease.

Methods: This retrospective study and systematic review presents experience in using CDA and how to apply safely. Literature reviewed the long term follow up, comparing both techniques outcome measures included the success rate, functional outcome measures, adverse events (AE), adjacent segment degeneration (ASD), secondary surgery, and patients' satisfaction and recommendation rates.

Results: The study included 10 cases of CDA. The review included 11 articles involving 3505 patients (CDA/ACDF:1913/1592) were included. Compared with ACDF, CDA achieved significantly higher overall success, neck disability index (NDI) success, neurological success, patients' satisfaction, and patients' recommendation rates. Functional outcome measures such as visual analog score neck pain and arm pain, revealed superiority in the CDA group. CDA also achieved a significantly lower rate of symptomatic ASD, total secondary surgery, secondary surgery at the index level, and secondary surgery at the adjacent level. However, no significant difference was found in radiological success.

Conclusion: CDA had a higher long-term clinical success rate and better functional outcome, and resulted in less symptomatic ASD.

#ESA Abstracts 20210108

Unstable Odontoid Fractures: Anterior Open Reduction Internal Fixation (ORIF): A New Concept With Long Term Results

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Introduction: Odontoid fractures with significant displacement are associated with atlantoaxial instability. The fracture and the instability need to be addressed. Anterior odontoid screw is insufficient if both problems coexist. In unsuitable fractures or unstable fractures, posterior atlantoaxial fixation (PAAF) is another option but does not address the fracture directly. Vertebral artery injury is a potential problem in addition to paravertebral venous plexus bleeding.

Direct anterior extrapharyngeal surgery with fixation of the fracture with plate and screws in compression mode can enhance success in treatment of unstable odontoid fractures.

Methods: Since 2013 - 2021 we have treated 68, M/F 45/23, age 18-78 years patients of unstable odontoid fractures. All patients underwent X-rays, CT scan and MRI with MR angiography.

Preoperative lateral X-ray of the neck in extension to check position of angle of mandible with respect to C2-3 disc was done in all cases. All patients were operated by, right sided anterior submandibular extrapharyngeal approach for fracture realignment followed by fixation in compression mode with customized variable screw placement (VSP) plate and screws with bilateral anterior transarticular screw fixation of atlantoaxial joints.

Results: X-rays and CT at discharge 3 months in 100% cases showed solid fusion across the fracture. Mild transient hypoglossal paresis was noted in 8 patients which resolved in 3 weeks. There was no need for blood transfusion or intraoperative navigation and operative time was between 2-3 hours. There was no procedure related mortality.

Conclusion: Unstable Odontoid fractures need fixation. Displaced Odontoid fractures need realignment. Fixation in compression mode enhances and ensures fusion in 100% cases. Associated atlantoaxial instability can be treated from same exposure with anterior transarticular screws. The anterior extrapharyngeal approach is easy, safe, avoids the vertebral artery and preserves the posterior tension band.

#ESA Abstracts 20210109

Do Simultaneous Translation On Two Rods ST2R Combined With Direct Vertebral Rotation Offer Better Outcomes Compared To The Classic DVR In The Surgical Treatment Of Adolescent Idiopathic Scoliosis?

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Introduction: DVR enables a powerful tri-planar correction in scoliosis surgery. However, the ability of achieving powerful rib hump reduction and more physiological sagittal profile is still unclear. Simultaneous translation on two rods (ST2R) maneuver combined with DVR was introduced to improve thoracic apex translocation and achieve better clinical satisfaction. It is however still not well established how efficiently ST2R with DVR affects results of scoliosis correction in regard to sagittal plane and rib hump correction. This study aims to introduce a new technique, simultaneous translation on two rods (ST2R), involving rods contoured with a convexity at the desired thoracic kyphosis (TK) apex level, combined with direct vertebral rotation (DVR), and to evaluate the surgical results as regard sagittal profile correction, thoracic apex translocation and degree of rib hump correction.

Methods: This prospective randomized control clinical trial study analyses forty-three adolescent idiopathic scoliosis patients treated by same surgeon with segmental pedicle screw fixation were analyzed. They were divided into two groups. Group A: 23 cases treated with ST2R plus DVR Group B: 20 cases treated with RR plus DVR. All patients had a minimum follow-up of 18 months. we assessed the corrections of tri-planar deformities by examining the main Cobb angle, TK, rib hump, apical vertebral rotation, Scoliosis Research Society 22-item questionnaire scores, and TK apex translocation. In order to better grasp the potential of ST2R, the outcomes were compared with those of group B matched case control cohort treated with a standard rod rotation (RR) maneuver combined with (DVR).

Results: Data were analyzed for 23 AIS patients treated with ST2R-DVR and 20 patients treated with DVR. The ST2R group had significant improvements in the main Cobb angle and TK, reduction in the rib hump size at each time point, and a final correction rate of 72%. ST2R treatment significantly increased the kyphosis apex by an average of 2.2 levels. The correction rate was higher at each time point in the ST2R group than in the DVR group. ST2R engendered favorable TK corrections, although the differences were nonsignificant, at 2 years compared with the DVR group ($p = 0.056$). The TK apex location was significantly improved in the ST2R cohort ($p < 0.001$).

Conclusion: The technique of combined ST2R with DVR significantly improved the coronal and sagittal corrections with proper apex translocation, rib hump reduction and better clinical outcomes by SRS 22r questionnaire. It allowed for distribution of correctional forces over two rod implants instead of one, which should decrease the risk of screw pullout and rod flattening.

#ESA Abstracts 20210110

Real Time Cervical Spine MRI For The Assessment Of Dynamic Spinal Instability

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Introduction: There is a large agreement that cervical spine instability (CSI) can be essentially diagnosed with clinical judgments e.g. intolerance to prolonged static postures, fatigue and inability to hold head up, better with external support, episodes of acute sharp pain with sudden movements.

Objective criteria have been established in the analysis of end-range flexion and extension radiographs to diagnose CSI. However,

radiographs do not provide information about the quantity or quality of motion in the neutral zone, which limits their value in the diagnosis of CSI. Even after severe whiplash injuries, plain radiographs are usually normal despite clinical findings indicating presence of soft tissue damage. We addressed the question: can MRI techniques provide quantitative means to evaluate dynamic CSI and supplement standard static MRI acquisition? Our objectives were to (i) develop real-time cervical spine MRI method to image the neck during their active motion (ii) demonstrate feasibility of the method for assessing standards relevant to the presence and degree of CSI.

Methods: Ten cervical spine (of healthy participants) were scanned during neck flexion and extension maneuvers. Using 1.5T MRI scanner (Philips Ingenia), sagittal and axial T1 and T2 images of the cervical spine were obtained in routine neutral position. Real time MRI was performed in the sagittal plane using a balanced fast-field echo (BFFE) sequence with the patient slowly moving his/her neck to flexion and extension.

Results: Functional imaging technology, as opposed to static standards, is superior to illustrate the normal physiological changes during movement. Cervical spine dynamic imaging can provide quantitative measures relevant to evaluate the presence and degree of dynamic CSI.

Conclusion: This pilot study demonstrates that real-time cervical spine MRI of the moving neck is feasible. Real Time MRI has potential to be a useful clinical diagnostic tool. This technique is at an early stage of development but encouraging.

#ESA Abstracts 20210111

Surgical Outcome Of Three-Dimensional Correction Of Adolescent Idiopathic Scoliosis: Local Experience In Neurosurgery Department, Mansoura University

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Introduction: The surgical management of adolescent idiopathic scoliosis (AIS) has witnessed several developments in the past few years. One of those is 3D correction via posterior only approach. This study aimed to express our recently developed experience in management of AIS using the 3D correction techniques.

Methods: We retrospectively reviewed 28 patients with idiopathic scoliosis treated in our department from January 2019 to June 2021 with posterior spinal fusion followed for a minimum of 1 year. Patients 10-18 years old with coronal curve measuring more than 45° were included. Optimal care was reached on many aspects including: preoperative radiographs; posterior surgical approaches; use of intraoperative spinal cord monitoring; use of local autologous bone (not iliac crest) and bone substitutes for grafts; use of pedicular screws; use of titanium anchor points and aspects of postoperative care including ICU admission for 1 day and radiographs.

Results: This study included 28 cases with mean age of 15.1 ± 2.1 years and range between 11 and 18 years. Among the cases, there were 6 males (21%) and 22 females (79%). According to Lenke classification, there were 16 patients (57%) with type 1 curve type, 4 patients (14.2%) with type 2, 3 patients (10.5%) with type 3, 1 patient (3.5%) with type 5, 4 patients (14.2%) with type 6. Mean preoperative Cobb was 51.8°, ranged from 40° to 81°; while mean postoperative Cobb was 8°, ranged from 3° to 25°, with significant decrease in Cobb immediate and 1 year postoperatively when compared to preoperative level (p<0.001 for both). Mean percentage Cobb decrease was 84.4%, ranged from 54.3 to 100%. Also, the means of shoulder balance and spinopelvic parameters assessment were evaluated pre and postoperatively.

Conclusion: Analysis of patients with adolescent idiopathic scoliosis (AIS) with curve more than 45° treated with posterior spinal fusion

(PSF) and minimum 1-year follow-up shows a success rate of 83% in all lumbar curves and in 79% of thoracic curves.

#ESA Abstracts 20210112

Minimally Invasive Hemilaminectomy Approach in Cases of Intradural-Extramedullary Spinal Tumors: Local Experience

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Introduction: Intradural-extramedullary (IDEM) tumors represent two-thirds of spinal cord tumors. As IDEM tumors are mostly benign, advocated approaches for surgical excision of these lesions should aim for total excision of the lesion with avoiding unnecessary disruption of spinal stability. This study aims to assess the feasibility and advantages of a minimally invasive hemilaminectomy approach for excising IDEM spinal tumors.

Methods: This study was conducted in our institution to review retrospectively cases of IDEM spinal tumors that underwent a minimally invasive hemilaminectomy approach from January 2016 to January 2019. Twenty-six patients who presented with twenty-seven tumors fulfilled our criteria and were included in this study. The history of all patients was taken and they were subjected to clinical examination and preoperative MRI with contrast. Frankel scale was used to assess the neurological status of the affected limbs and Visual Analogue Scale (VAS) for the evaluation of associated radicular pain. Regular follow-up visits were arranged for our cases one month after surgery and then every three months for at least 6 months.

Results: In this is a retrospective case series, twenty-six patients with 27 tumors were included in this study, 15 females (57.7%) and 11 males (42.3%). The mean age of patients was 42.3 ± 12.8 years. This study included 15 schwannomas (55.6%), 4 neurofibromas (14.8%), and 8 meningiomas (29.6%). Gross total excision was achieved in 26 tumors (96%). Early mobilization and short hospital stay (1.38 ± 1.09) days were reported in all these cases. Complications reported in this study included one case of wound infection, one patient developed a CSF leak, and one patient experienced a mild deterioration of motor power.

Conclusion: This study suggests that a minimally invasive hemilaminectomy approach offers an adequate, safe, and convenient corridor for the total excision of IDEM tumors. However, good patient selection, accurate preoperative and intraoperative tumor localization, and meticulous microsurgical resection are mandatory.

#ESA Abstracts 20210113

Differentiation of Mesenchymal Stem Cells towards Neurotrophic Phenotypes: Identifying Novel Therapies for Peripheral Nerve Injury

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Introduction: Following peripheral nerve injury, a sequence of events termed Wallerian degeneration (WD) takes place at the distal stump in order to allow the regenerating axons to grow back toward the target organs. Schwann cells (SCs) play a lead role in this by initiating the inflammatory response attracting macrophages and immune cells, as

well as producing neurotrophic signals that are essential for nerve regeneration. The majority of existing research has focused on tools to improve regeneration, overlooking the critical degeneration phase. This is also due to the lack of in-vitro models recapitulating the features of in-vivo WD. In particular, to understand the initial SCs response following injury, and to investigate potential interventions, a model that isolates the nerve from other systemic influences is required. Stem cell intervention has been extensively studied as a potential therapeutic intervention to augment regeneration; however, data regarding their role in WD is lacking.

Methods: In-vitro model using rat sciatic nerve explants degenerating up to 14 days was designed. Characterization of this model was performed by gene and protein expression for key markers of WD, in addition to immunohistochemical analysis and electron microscopy. As a means of testing the effects of stem cell intervention on WD we established indirect cocultures of human adipose-derived mesenchymal stem cells (AD-MSCs) with the degenerating nerve explants to study effects of AD-MSCs on WD. Purpose: Establishing an in-vitro Wallerian degeneration model and characterizing it. The model will be used to study the effect of AD-MSCs intervention in the early WD phase. Establishing the model by obtaining 8 sciatic nerves per experiment de-sheathing and cut them into small pieces, put in incubator. - Perform immune-staining, western blot, PCR and trichrome staining on the explanted nerves at different time points. (1,3,5,7,14) - Co-culture nerve explants with AD-MSCs for 3 days and study them at (0, 1, 3) time points to study how they influence each other.

Results: In this work we described an in-vitro model using rat sciatic nerve explants degenerating up to 14 days. Characterization of this model was performed by gene and protein expression for key markers of WD, in addition to immunohistochemical analysis and electron microscopy. We found changes in keeping with WD in-vivo: upregulation of repair program protein CJUN, downregulation of myelin protein genes and subsequent disorganization and breakdown of myelin structure. As a means of testing the effects of stem cell intervention on WD we established indirect cocultures of human adipose-derived mesenchymal stem cells (AD-MSCs) with the degenerating nerve explants. The stem cell intervention potentiated neurotrophic factors and Cjun expression.

Conclusion: Our in-vitro model is a viable tool to investigate in depth the biology of Schwann cells after injury for innovative solutions to enhance nerve repair. Recommended future work is to implement this model to study in depth Schwann cell behavior and myelin clearance after nerve injury.

#ESA Abstracts 20210114 Minimally Invasive Versus Conventional Transforaminal Lumbar Interbody Fusion in Treatment of Single-Level Low Grade Lumbar Spondylolisthesis: A Systematic Review and Meta-analysis

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Introduction: Degenerative lumbar spine including spondylolisthesis is a common clinical condition that affect human in the most productive period of their life. There are many surgical options for the management of such conditions after failure of conservative therapy.

Recently there has been a great debate regarding the use of minimally invasive (MI) versus open transforaminal lumbar interbody fusion (O-TLIF) in treatment of single-level low grade lumbar spondylolisthesis, so there was a need to reach a consensus over this issue. This study aims to compare the clinical efficacy and safety of MI-TLIF versus O-TLIF in the treatment of single-level low grade degenerative lumbar spondylolisthesis.

Methods: In this systematic review for recent studies in the context and Meta-analysis, we searched online databases of PubMed, Google Scholar, Cochrane Library, and DOAJ (2016-2020) which yielded 1352 articles. Based on our inclusion and exclusion criteria, we included retrospective, prospective and randomized control trial which came down into 11 research articles. Operative time, blood loss, hospital stay, back pain scores (Visual Analogue Scale), functional score (Oswestry Disability Index), complication rate, and reoperation for both techniques were recorded and presented as means. We then performed a meta-analysis.

Results: There is overall advantage for the MI-TLIF over the O-TLIF in different parameters. There was a statistically significant difference in blood loss of -0.954 ml ($p=0.000$), and in hospital stay of -1.19 days ($p=0.000$) favoring M-TLIF. There was a statistically insignificant difference in the total operative time ($P=0.071$), the postoperative VAS of -0.22 ($P=0.384$) and in the postoperative ODI of -2 ($P=0.331$). Also, there was a reduced combined Odds Ratio for complications and a reduced Odds Ratio for re-operation.

Conclusion: The reported data in this study suggest that there was a significant difference in operative blood loss, and hospital stay between both groups that favor MI-TLIF procedure. While there was no significant difference in operative time, VAS, ODI, reoperation rate, and rate of postoperative complications between both groups.

#ESA Abstracts 20210115 Multi-slice Computed Tomography Scan Assessment of Accuracy and Safety of Free-hand Pedicle Screw Fixation in Adolescent Idiopathic Scoliosis

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Introduction: Various methods to help guidance of screw purchase in AIS have been described in the literature. Free-hand technique is a relatively easy and is as accurate as other methods. MSCT scan, the most accurate method of postoperative evaluation of screw purchase still needs more research. This study aims to evaluate the accuracy and safety of the pedicle screw fixation (PSF) with free-hand technique in AIS using postoperative MSCT scan.

Methods: In this prospectively study all patients with AIS underwent correction using the free-hand PSF were reported. All patients underwent whole spine X-ray and MSCT scan during the follow up. Screw purchases were evaluated according to Gertzbein Robbin classification.

Results: A total of 45 patients were recruited for this study with mean age 14.7 ± 1.7 including 39 females and 6 males. Of the total 870 pedicle screws, 85.1% (740) screws were accurate within the pedicle, while 14.9% (130) screws penetrated the pedicle including medial wall penetration in (5.9%) and lateral penetration in (9.0%). Overall, 18.3% of thoracic screws penetrated the pedicle while 5.9% of lumbar screws penetrated the pedicle. Correlation of screw purchase accuracy to age, sex, curve type, Cobb angle, spinal region showed no statistically significant correlation.

Conclusions: The data of this prospective study suggest that pedicle screw fixation with free-hand technique in adolescent idiopathic scoliosis population appears to be an accurate and safe procedure.

#ESA Abstracts 20210116

C2 Translaminar Screw as an Alternative to C2 Pedicle Screws in Subaxial Posterior Cervical Fusion

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Introduction: A broad range of disorders may be addressed via posterior cervical spine approach. It is easy to consider the approach in two distinct anatomic regions, the occipitocervical junction (including the occiput to C2) and the subaxial cervical spine (C3 to C7). despite the approach to both regions is similar, the anatomy, function, and associated pathologic features of these two segments are different. At the occipitocervical junction, many techniques of fusion were discussed including the use of C2 translaminar screws (Wright's technique) but in the subaxial region a little technique was discussed The use of C2 as the proximal anchoring point for the subaxial construct is common as it provides the strongest anchoring point through its strong pedicle however this carries the risk of catastrophic vertebral artery injury. Translaminar C2 screws can provide the same quality of fixation with nearly zero percent of any complications. The objectives of the study is Analysis and assessment of the validity of C2 translaminar screws as proximal anchoring point in subaxial spine fusion and comparing it with the C2 pedicle screws used for the same purpose.

Methods: This is a comparative study of 10 patients with posterior subaxial fusion divided into 2 groups the first 5 patients with C2 pedicle screws as proximal anchoring point and another 5 patients with C2 translaminar screws as proximal anchoring point. Standard C2 to T1 instrumented decompression technique was used in both groups. Points for comparison include -Surgical time -Complications -Use of C-arm -Incidence of pulling out -Bony fusion.

Results: Surgical time, need for frequent C-arm, operative and post-operative complications and bony fusion in both groups were recorded and compared. Both operative time and blood loss were much better in C2 translaminar screw technique, C-arm was not used in any step in this group however in C2 pedicle screw group frequent use of the C-arm was mandatory, Satisfactory clinical improvement, some restoration of the cervical lordosis were obtained in both groups. No complications were recorded in either of the two groups as regards screws pulling out or other implant related complications.

Conclusion: C2 translaminar screw is easy applicable option for subaxial spine instrumentation in all cases in which the removal of the C2 posterior arch is not necessary and can be used safely as an alternative for the traditional C2 pedicle screw with no risk of neural or vascular complications and no need for radiologic exposure of the operating team or the patient.

#ESA Abstracts 20210117

Surgical Anterolateral Decompression Of Type A3 Thoracolumbar Fractures And Fixation Using Vantage Anterior Plate System. A Report Of Six Cases

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Introduction: Anterior approach for thoracolumbar fracture is an old known technique. More surgeons preferred the posterior approach for these fracture. Anterior column reconstruction is better achieved by direct anterolateral approach. The VANTAGE system is recently

introduced as spinal anterior fixation plate system. This work report a three years follow up for patients operated by this system by anterolateral approach. Purpose This study reports the use of new anterior plate fixation system Vantage (Medtronic Sofamor Danek - Memphis, USA.) in treatment of type A3 unstable thoracolumbar fractures and evaluation of surgical technique feasibility and possible complications. **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 anterior stabilization using VANTAGE anterior plate system. The following are the Inclusion criteria; 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 years (range, 18-62 .years). Mean interval between initial injury and vantage plate instrumentation was 5 days (range, 3-7 days). Mean follow up period 18 months (range, 12-36 months) a total of six cases operated. 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 complication apart from one case with intercostal nerve injury with abdominal wall hypoesthesia which improved during follow- up. No hardware related complications detected in this work.

Conclusion: Anterior approach to the thoracolumbar spine is very effective in decompression and provide solid fixation by the vantage system. The indications for anterior approach are limited but exist. The low complications rates should encourage spine surgeon for its use. A low profile user friendly vantage system makes anterior stabilization fixation is easy and safe with low hardware related problems on long follow up.

#ESA Abstracts 20210118

Extra Spinal Findings Seen In Conventional Spine Magnetic Resonance Imaging

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Introduction: Extraspinal findings are seen in spine magnetic resonance image (lumber, dorsal and cervical). There is limited evidence concerning their prevalence, importance, how often they are missed by interpreting physician in the radiographic reports, and how to improve their detection.

Methods: In the period between 2019 to 2020 at the spine outpatient clinic at AL-Azhar university hospital Assiut branch we recorded 100 patients (73 female and 26 male) with the age between 20 and 67 with spinal pathology that necessitates doing MRI and discovered to have extraspinal pathology other than the index spine pathology all discovered extraspinal finding are recorded and consulting a suitable physician was asked for, these lesions were reported in may organs including (kidneys, prostate, uterus, colon, big vessels, ovaries, lungs, and thyroid).

Results: results were evaluated according to the system having the abnormal finding in these 100 patients (73female and 27 male). Systems affection were reported according to the incidence of these extraspinal finding and arranged as follow. gynecological (the most common) 56% renal 20% endocrine 3% male genital1% and vascular 5%.

Conclusion: extra spinal findings are quietly common and usually missed from the spine surgeons and the radiographic reports during examining a routine spine MRI specially if the patient have a marked spine pathology and should be searched for in any MRI.

#ESA Abstracts 20210119

Clinical Outcome of Standalone Posterior Approach Correction in Adolescent Idiopathic Scoliosis; First 15 Cases in Suhag

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Introduction: Adolescent idiopathic scoliosis (AIS) is a complex 3D deformity of the spine affecting the children between the age of 11 and 18 years with an incidence about 2% to 3% in the general population, with almost 10% of patients requiring some form of treatment and up to 0.1% undergoing surgery. The relative indication for surgery in patients with AIS are curves with Cobb angle >40-50 or in cases with rapidly progressive curve. Correction of the deformity with stabilization of the spine are the goal of the surgical intervention. Standalone posterior correction with pedicle screws system represents mainstay of the surgical approach while anterior approach or combined approaches preserved to some thoracolumbar curve with severe deformity.

Methods: 15 patients presented by AIS treated with posterior correction using screw rod-system between 2017-2021 with a follow up period from 6 months to two years. The inclusion criteria were age between 14 to 30 years and preoperative coronal Cobb angle >40. We excluded patients with previous correction or spine surgery. The Lenke classification system for AIS was used. Preoperative sagittal parameters were measured for all cases in whole spine X-ray films. Intraoperative walk-up test after deformity correction and before screw tightening was the neurological evaluation test for all patients. SRS-30 patient questionnaire scoliosis was used for clinical post-operative evaluation.

Results: The gender incidence in our study showed female predominance with the mean age 20+₂ years. The mean hospital stay was about 5 days including two days in ICU. Intraoperative blood loss was 500-1000 cc. Mean surgical time was 4.5 hours. The mean of post-operative correction of the coronal Cobb angle achieved was 76.3% in major curves and 64.2% in minor curves. There was significant improvement of the SRS-30 questionnaire ($P > 0.001$). No postoperative neurological deficit. No pseudoarthrosis or system failure. The mean follow up period was 18 months.

Conclusion: Standalone correction of AIS approach can achieve a satisfactory safe deformity correction with less hospital stay and better quality of life.

#ESA Abstracts 20210120

Which Patient With Thoracolumbar Fracture Needs MRI For Evaluation Of Posterior Ligamentous Complex Injury?

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Introduction: Posterior ligamentous complex (PLC) injury is an important problem in thoracolumbar fractures. This study aims to analyze the diagnostic accuracy of combined CT findings for detecting posterior ligamentous complex (PLC) injury in thoracolumbar fractures (TLFs) using MRI as a reference study.

Methods: A retrospective review of 275 consecutive patients with TLFs (T1-L5) presented to a tertiary referral level 1 trauma center between

2014-2021. All patients underwent CT and MRI within ten days of injury. Patients with translation injury, osteoporotic fracture, or pathological fractures were excluded. Two reviewers (a spine surgeon and a neuroradiologist) independently evaluated CT for the following findings suggestive of PLC injury: Facet joint malalignment (FJM), facet joint widening (FJW), horizontal laminar fracture (HLF), spinous process fracture (SPF), and interspinous widening (ISW). We used multivariate logistic regression analysis to elucidate the independent association of each CT findings with PLC injury before calculation the accuracy measures of combined CT findings [sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), positive likelihood ratio (+LR), and negative likelihood ratio (-LR)]. PLC injury was defined as a black stripe discontinuity due to rupture of the supraspinous ligament or ligamentum flavum. We used Cohen's kappa (k) statistic to assess the inter-and intraobserver agreement on each CT finding's binary results and PLC injury by MRI.

Results: FJM, SPF, HLF, and ISW were independently associated with PLC injury (Adjusted odds ratio range 4.1-25.4). A negative CT for all four findings had an NPV of 94% (95 % CI 89-97) for PLC injury. A single positive CT finding yielded a +LR of 1.0 (95 % CI 0.65-1.6) and -LR of 0.99 (95 % CI 0.87-1.1) for PLC injury. ≥ 2 CT findings yielded a PPV of 91% for PLC injury (95 % CI 89-97) and an NPV of 85% (95 % CI 81-89), and accuracy 87% (95 % CI 82-91). The inter-intraobserver agreement on each CT finding was substantial to excellent (k range 0.57-0.91 and 0.65-0.93, respectively), while agreement on PLC status by MRI was excellent (k = 0.78, 0.86, respectively).

Conclusion: The analysis of combined CT findings could improve the ability to confirm or rule-out PLC injury. A negative CT for the four CT findings, independently associated with PLC injury, provided a high NPV for PLC injuries and can be used as a screening tool for PLC injury. A single CT finding lacks sufficient predictive value to confirm or rule-out PLC injury. A combination of ≥ 2 CT findings provided the highest correct classification accuracy (87%) for PLC injury; thus, it can be proposed as a CT criterion for injured PLC.

#ESA Abstracts 20210121

Titanium Versus PEEK Cages In Lumbar Interbody Fusion

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Introduction: spinal interbody fusion is a widely performed surgical treatment for degenerative spinal disorders owing to its high fusion rate. Many types of cages are used as interbody spacers. Unfortunately three disadvantages emerged with the use of titanium cages. They are the subsidence of the cage in the adjacent vertebrae, difficulties in assessing fusion in radiological imaging and the stiffness of the material. To overcome these problems, polyetheretherketone (PEEK) cages have been introduced. PEEK is a polymer that is biomechanically similar to cortical bone. In addition, it is radiolucent. PEEK cages augmented by pedicle screwing have been shown to promote spinal interbody fusion with high fusion rates and to provide excellent clinical outcome. Compared to titanium cage, polyetheretherketone (PEEK) cage with pedicle screw fixation has been increasingly used in cervical and lumbar interbody fusion. However, there is insufficient evidence supporting the superiority of PEEK cages over titanium cages as optimal interbody spacers. The aim of this study was to compare the operative, clinical and radiographic outcomes of patients at a (duration?) follow-up after undergoing instrumented interbody fusion in which either a PEEK or a titanium cage were used.

Methods: A prospectively collected database including 20 consecutive patients who underwent single-level interbody fusion with a PEEK

cage or a titanium cage for degenerative spinal conditions was retrospectively analyzed. 10 patients who received a PEEK cage compared to 10 patients who received a titanium cage. They presented with chronic low back pain (LBP) and irradiating lower extremity symptoms after an unsuccessful conservative therapy, covering a period of at least 6 months. Patients were excluded from the study if they had spinal deformities, destructive processes, and previous operations on the lumbar spine. For clinical evaluation, visual analogue scale (VAS) and Japanese Orthopaedic Association (JOA) score were obtained. Radiographic evaluations were performed using plain radiographs and CT scans. The parameters included presence or absence of bridging bone, cage subsidence, and vertebral osteolysis.

Results: Of the 20 patients initially enrolled in the study, 10 patients received a titanium cage (Titanium group) and 10 were treated with a PEEK cage (PEEK group). Operative times and blood loss showed no significant differences between both groups. A significant improvement on VAS score for LBP and leg pain was demonstrated in both groups. Based on the criteria by CT, fusion rate in Titanium group was (97 %) while in PEEK group was (74 %). These differences were statistically significant. Cage subsidence was observed in 4 patients (40 %) in Titanium group and 2 patients (20 %) in PEEK group. There was a tendency for lower risk of cage subsidence in PEEK group.

Conclusion: Although clinical outcomes were comparable, the superiority of PEEK cages over titanium cages for bony fusion in interbody fusion was not demonstrated. Additionally, we found unfavorable radiographic findings in the cases with a PEEK cage, which may lead to nonunion. cage subsidence were more in titanium cages

#ESA Abstracts 20210122 Complication Versus Malpractice

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Introduction: There is always debate about whether the sequelae is considered complication or malpractice. This study aims to compare the radiographic and clinical outcomes of distal fusion to L5 versus the sacrum in ASD.

Methods: This case presentation clarify the different between complication or malpractice.

Results: There is a clear significant difference between complication or malpractice.

Conclusion: Complications are faced through our career. But we must handle once happen, and not ignoring it. Analyse your case thoroughly, to minimize complications. Do the right with maximum effort, to avoid malpractice

#ESA Abstracts 20210123 360 Degrees Fixation And Fusion For Cervical And Dorsal Dislocations In One Step Surgery

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Introduction: 360° surgery is essential for spinal surgeon dealing with different pathology. This study aims to evaluate the role of 360 fixation and fusion for cervical and dorsal dislocations in one step surgery.

Methods: This study was conducted on 36 consecutive adult patients presenting with cervical and dorsal dislocations and admitted to the Neurosurgery Department at Alexandria Main University Hospital. Their main complaint was neck pain following trauma or back pain with or without neurological deficit. All patients were assessed neurologically. The 360 fixation approach was done for all patients with fusion in one step surgery either in single anterior approach or with add on posterior one.

Results: Cervical and dorsal adequate alignment was achieved in all patients. Radiological and neurological follow up was compared to the preoperative one.

Conclusion: The 360 approach in one step surgery for cervical and dorsal dislocations provide good construct with easy rehabilitation with no fear of hardware failure.

#ESA Abstracts 20210124 Arthrodesis to L5 Versus S1in Long Segment Fixation: Literature Review and Personal Experience

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Introduction: Choosing an optimal distal fusion level for adult spinal deformity (ASD) is still controversial. This study aims to compare the radiographic and clinical outcomes of distal fusion to L5 versus the sacrum in ASD.

Methods: Present our cases in a retrospective study and literature review.

Results: No significant difference was found in overall complication rate and revision rate between fusion to L5 and fusion to the sacrum group. Significant lower rate of pseudarthrosis and implant-related complications as well as proximal adjacent segment disease was found in L5 group. Patients in S group obtained a better correction of lumbar lordosis and less loss of sagittal balance.

Conclusion: Fusion to L5 had advantages in lower rate of pseudarthrosis, implant-related complications, and proximal adjacent segment disease.