# Type II Odontoid Process Fractures: A Clinical Results according to a Modified, Treatment-Oriented Grauer’s Classification

Se-Hoon Kim, MD, PhD  
Department of Neurosurgery, Ansan Hospital, Korea University College of Medicine, Seoul, Korea

**Introduction:** Odontoid fracture is common in cervical injury, representing about 20% of total cervical fractures. Classic odontoid fracture classification focused on anatomy of fracture site has not treatment recommendation and a modified treatment-oriented classification of odontoid fractures was suggested in 2005. We reviewed our odontoid fracture patients to assess the feasibility and efficacy of Grauer’s classification.

**Methods:** Between October 2000 and September 2015, we collected data from patients who came to our institute for odontoid fracture. Demographic data of patients was reviewed, and neck visual analog scale (VAS) score and fusion rate were assessed by reviewing electronic medical records retrospectively.

**Results:** Sixty-nine patients out of a total of eighty-two odontoid fracture patients were reviewed according to Grauer’s classification. Neck VAS of all subtypes in odontoid fracture classification were decreased at last follow-up (p<0.001). Overall fusion rate was 88.4% at last follow-up. The concordance rate between Grauer’s recommendation and our treatment was 69.9%, especially in type II with the concordance higher than 80%. Complication was minimal representing 7.2%, only in types I and III.

**Conclusion:** In this study, there were statistically significant improvement in all subtypes of neck VAS at the last follow up, especially in types II and III. Grauer’s classification appears to be meaningful to decide treatment plan for odontoid fractures, especially type II odontoid fracture.

# Cervical Spinal Arthroplasty: New Hope or Not?

Se-Hoon Kim, MD, PhD  
Department of Neurosurgery, Ansan Hospital, Korea University College of Medicine, Seoul, Korea

**Introduction:** Anterior cervical discectomy and fusion (ACDF) has been a widely accepted procedure for treatment of cervical disc diseases. However, several reports about post-fusion exacerbation of adjacent segments gave rise to development of motion preserving prosthesis. There has been a recent vogue for the use of artificial disc prostheses to decrease the risk of accelerated degenerative disease at adjacent levels. The short-term results of total disc replacements (TDRs) have been encouraging, but the long-term justification for using this new technology hinges on whether the incidence of adjacent segment disease decreases. It will also be necessary to demonstrate that movement at the operated levels is maintained and the incidence of device failure is low.

**Methods:** The author presents the retrospective analysis comparing cervical TDR with ACDF using stand-alone cage. The segmental range of motion of operated level, rostral adjacent level, and caudal adjacent level were measured from plain dynamic radiographs using Cobb angle. We found that cervical arthroplasty showed favorable motion preservation at the operated level.

**Results:** Radiologically, the ACDF group showed more increase of adjacent segment motion 1 year after surgery, which implies that cervical arthroplasty may have advantages in preventing adjacent segmental diseases compared with ACDF.

**Conclusion:** The radiological, biomechanical and clinical evidence for adjacent segment disease, and the rationale for using cervical TDR will be reviewed, along with the author’s clinical experiences.
Purpose: To evaluate the long-term clinical efficacy and adjacent level degeneration of two-level cervical artificial intervertebral disc replacement. Study design: A retrospective study.

Method: 15 patients with two-level Bryan cervical disc replacement including 11 patients with malalignment of cervical spine preoperatively between December 2003 and December 2007 were enrolled in this study. The average age was 50 years and was followed for more than 10 years. Japanese Orthopaedic Association (JOA) scores, neck disability index (NDI), Odom's scale, O/Local and global range of motion (ROM), neutral alignment of cervical spine, adjacent level disc Pfirrmann grade before and after operation were compared.

Results: JOA score was 13.2 ± 2.7 before operation, 15.9 ± 1.2 after surgery, the difference was significant (p = 0.002), NDI index was 27.6% ± 6.6% before operation, 15.1% ± 9.7% after operation, with significant difference (p < 0.001), Odom's Satisfaction rate was 93.3%. The global range of motion of patients with malalignment of cervical spine preoperatively was decreased (p = 0.059), and there were 8 levels (53.3%) above the disk replacement level showed degeneration, (P = 0.015), and 11 levels (73.3%) below the disk replacement level showed degeneration, (p = 0.003). No significant difference in other radiographic indexes were observed before and after operation.

Conclusion: Two-level artificial cervical disc replacement has satisfactory long-term clinical outcomes, which maintain the local and global range of motion and the alignment of the cervical spine. Adjacent levels disc degeneration occurs after long-term of artificial disc replacement.

#ESA Abstracts 20170105
Analysis of the Influence of the Implant Size for Heterotopic Ossification in Patients with Single-Level Cervical Artificial Disc Replacement

Song Qingpeng, MD., Tian Wei, MD., He Da, MD., Han Xiao, MD., Wang Jinchao, MD.
Department of Spine, Fourth Clinical Medical College of Peking University, Beijing Jishuitan Hospital, Beijing, China

Introduction: The size of artificial disc is not exactly same to cervical vertebral endplate. However, the effect of implant size to cervical disc replacement have not yet been clearly identified. This retrospective study aims to evaluate the correlation between implant size and heterotopic ossification (HO) after cervical artificial disc replacement (CADR). This is retrospective study including 71 patients underwent single-level Bryan disc replacement from 2003 to 2007 were reviewed retrospectively. All patients were followed for more than 10 years. Radiological outcomes including the overall and segmental range of motion (ROM) were evaluated by X-ray at the preoperation, 3 months follow-up and the last follow-up. Clinical outcomes including JOA, NDI were evaluated at the preoperation and the last follow-up.

Methods: The implant size is expressed as the ratio of the artificial disc to the endplate at the lateral X-ray, specifically: (Bryan artificial disc sagittal diameter*2) / (upper endplate sagittal diameter + lower endplate sagittal diameter). The grades of HO were determined by McAfee classification at the last follow-up. Analyzed the influence factors of grade 3–4 HO as well as the correlation of implant size, ROM and the clinical outcomes with the grade of HO.

Results: At the last follow-up, HO was detected in 66 of 71 patients. Grade 0–2 HO occurred in 46 patients and Grade 3–4 HO in 25 patients. The implant size (OR=0.550) and the segmental ROM at 3 months follow-up (OR=0.343), presented statistical correlation with formation of Grade 3–4 HO (P<0.05). The segment whose implant size greater than 95% would have a lower HO grade (P<0.01), and more segmental ROM (P<0.01) at the last follow-up. The clinical outcome was not significantly correlated with the implant size and the Grade of HO.

Conclusion: The smaller implant size will cause the higher grade of HO in the long-term follow-up and will decrease the long term ROM, and especially we should avoid the implant size smaller than 95%.

#ESA Abstracts 20170107
Investigation on the Diagnostic and Biomarker Utility of NODDI with Postoperative Degenerative Cervical Myelopathy Patients

Wang Jinchao, MD., Tian Wei, MD., Han Xiao, MD., He Da, MD., Li Donghang, MD., Song Qingpeng, MD.
Department of Spine, Fourth Clinical Medical College of Peking University, Beijing Jishuitan Hospital, China

Introduction: Neurite orientation dispersion and density imaging (NODDI) is a biophysically plausible models developed for estimating
neurite density and orientation dispersion separately. Until now, there are few research on the diagnostic and biomarker utility of NODDI in degenerative cervical myelopathy (DCM) patients. This retrospective study aims to preliminary Investigate the diagnostic and biomarker utility of NODDI parameters in postoperative patients.

Methods: A follow-up study was carried out using NODDI. 59 postoperative DCM patients with 222 to 727 days after surgery were recruited, as well as 21 healthy volunteers for control group. NODDI parameters intra-cellular volume fraction (Vicf) and orientation dispersion index (ODI) were measured at levels of maximal compression (LMC) in patients and corresponding levels in control group. Symptoms and signs were noted to identify myelopathy, JOA scale was used to assess spinal function status. Using t-test to compare parameters between two groups. Receiver-operator characteristic (ROC) analysis and spearman?Ts correlation were used to determine the diagnostic and biomarker utility of NODDI parameters.

Results: The t-test showed that there are significant difference in Vicf at LMC between patients with myelopathy and healthy control, while ODI was not except at C5/6 level. The area under the ROC curves of Vicf in each level and ODI at C5/6 were more than 0.7. Spearman?Ts correlation showed that Vicf was significantly correlated with JOA, but ODI was not.

Conclusion: The NODDI parameters Vicf, describing neurite density, could diagnosis and evaluate postoperative DCM patients, while ODI, describing neurite orientation dispersion could not.

#ESA Abstracts 20170108
A Follow-Up Study to Investigate the Diagnostic and Biomarker Utility of DTI Parameters in Postoperative DCM Patients

Wang Jinchao, MD., Tian Wei, MD., Han Xiao, MD., M.D. He da, Li Donghang, MD., Song Qingpeng, MD. Department of Spine, Fourth Clinical Medical College of Peking University, Beijing Jishuitan Hospital, China

Introduction: Diffusion tensor imaging (DTI) parameters are correlated with the clinical assessment of preoperative degenerative cervical myelopathy (DCM) patients. But DTI parameters change immediately after decompression surgery. The research on the value of DTI in postoperative DCM patients is still blank. This retrospective study aims to investigate the diagnostic and biomarker utility of DTI parameters in postoperative DCM patients.

Methods: A follow-up study was carried out using DTI. 59 postoperative DCM patients with 222 to 727 days after surgery were recruited, as well as 21 healthy volunteers for control group. DTI parameters were measured at levels of maximal compression (LMC) in patients and corresponding levels in control group. Symptoms and signs were noted to identify myelopathy, JOA scale was used to assess spinal function status. Using t-test to compare parameters between two groups. Receiver-operator characteristic (ROC) analysis and spearman?Ts correlation were used to determine the diagnostic and biomarker utility of DTI parameters.

Results: The t-test showed that fractional anisotropy (FA), axial diffusivity (AD), radial diffusivity (RD) and mean diffusivity (MD) were significant different between LMC in patients with myelopathy and control group. ROC analysis show that RD, MD and FA at LMC could identify subjects with myelopathy well (area under the cure more than 0.85). Spearman correlation show that FA, RD, MD in LMC were significantly correlated with JOA.

Conclusion: The DTI parameters RD, MD, and FA are valuable for the diagnosis of myelopathy and could be biomarkers for myelopathy severity of postoperative DCM patients.

#ESA Abstracts 20170109
Myelopathy Associated with Instability Consequent to Resection of Ossification of Anterior Longitudinal Ligament in DISH

Man-Kyu Park, MD., Kyoung-Tae Kim, MD., Dae-Chul Cho, MD., Joo-Kyung Sung, MD. Department of Neurosurgery, Kyungpook National University Hospital, 50 Samduk-2-ga, Jung-gu, Daegu 700-721, Republic of Korea

Introduction: The presence of prominent OALL (ossification of anterior longitudinal ligament) in the anterior cervical spine has been implicated as a cause of dysphagia. Surgical resection of the OALL is considered effective for the management of diffuse idiopathic skeletal hyperostosis (DISH)-related dysphagia. Although many reports have been published on DISH-related dysphagia, no cases of postoperative cervical instability have been reported thus far. We present a case in which the patient developed myelopathy associated with instability consequent to resection of OALL in DISH.

Methods: A 62-year-old man presented with progressive dysphagia that persisted for a year. The patient's symptoms were successfully resolved by resection of OALL. Five years after the surgery, the dysphagia resurfaced and was found to be caused by the regrowth of the OALL. A repeat surgery was performed, and the dysphagia disappeared. Eleven months after the second surgery, he visited the hospital with progressive quadriparesis and pain in the cervical region.

Results: Nine-month follow-up radiologic study revealed cervical instability at the level of C5/6 resulting in myelopathy. The patient underwent decompressive laminectomy and posterior fusion surgery. Conclusion: Surgical resection of DISH-related dysphagia typically yields excellent outcomes, but our experience in this case highlights the possibility of OALL regrowth and subsequent cervical instability after resection of OALL.

#ESA Abstracts 20170110
Risk Factors for Cage Migration and Cage Retropulsion Following Transforminal Lumbar Interbody Fusion: Do Osteoporosis Carry Higher Risk?

Man-Kyu Park, MD., Kyoung-Tae Kim, MD., Dae-Chul Cho, MD., Joo-Kyung Sung, MD. Department of Neurosurgery, Kyungpook National University Hospital, Daegu, Korea

Introduction: TLIF is a widely accepted surgical procedure, but complications of cage migration (CM) or cage retropulsion (CR) are associated with poor outcomes. This retrospective study aims to identify risk factors for these serious events.

Methods: Over a 5-year period, 881 discs in 784 patients were treated using TLIF at 3 spinal centers. Patient records, including medical history, operative notes, and radiographs were analyzed for factors related to CM or CR.

Results: Of 881 discs treated with TLIF, CM was observed in 56, and CR was observed in 17. Osteoporosis was found to be a significant risk factor for CM and CR, occurring in 18 of 56 levels with CM (P < .001), and 9 of 17 levels with CR (P < .001). A pear-shaped disc was also found to be significantly related to CM and CR, occurring in 10 of 56 levels with CM (P = .001), and 7 of 17 levels with CR (P < .001). The incidence of unilateral single cage was similar in levels with CM, 13 of 56, and levels with CR, 4 of 17, and both occurrence rates were significantly higher than the incidence in levels without CM (P < .03). The presence of endplate injury was significantly correlated with CM (P < .001), and CR (P < .001). The position of cage was not a significant factor in CM, but a significant factor in CR (P = .04). Most CMs started within 3 months after surgery and all CMs stopped at 9 months. The fusion rate was significantly lower in levels with CM (46.4%) and CR (17.6%).
Conclusion: Our study suggests that osteoporosis, a pear-shaped disc, the posterior position of cage, the endplate injury and unilateral single cage are risk factors for CM and CR.

#ESA Abstracts 20170111

Jin Hoon Park, MD.1, Subum Lee, MD.2
1Department of Neurological Surgery, Gangneung Asan Hospital, University of Ulsan College of Medicine, Korea;
2Asan Medical Center, University of Ulsan College of Medicine, Korea

Introduction: As is well known, minimally invasive spine surgery has several benefits because of posterior neck muscles preservation. Many studies have demonstrated the biomechanical superiority of cervical pedicle screw (CPS). Among the various current minimally invasive spinal surgery techniques, image guided percutaneous pedicle screw insertion is not suitable for cervical pedicle application unlike a lumbar spine, because of a risk of neurovascular injury. We several times showed the safety and accuracy of CPS placement even with freehand technique.

Case Report: In this report, we described the posterolateral CPS placement by freehand technique using tubular retractor through intermuscular approach. The patient was a 77 years old male presented with quadripareseis and neck pain currently. In the preoperative MR image, extensive posterior epidural abscess and infectious discitis of C6-7 and epidural abscess was extended at C6-C7-T1 levels. First, bilateral posterior paramedian skin incision were made about 2 cm length. After serial dilation of muscles, intermuscular approach to the lateral mass of C6-7 was done and a tubular retractor was inserted. The CPSs were inserted into both side of C6, C7 with a freehand technique through the tubular retractor. After X-ray image confirmation of proper screw position, posterior lateral fusion was performed with cancellous iliac bone chips after two rod connections. Through this posterolateral approach, we could easily reach the screw starting point and lateral mass for a fusion bed. In addition, this approach also gave us an opportunity for a preservation of posterior ligaments and erector muscles. In the subsequent anterior approach, C6-7 disctectomy with partial upper bony resection of C7 body was enough to completely remove the epidural abscess. Anterior interbody fusion was performed with only iliac bone block (12 mm height) without plate. We believe that the strong fixation power of CPS will give a longer durability and stability comparing to an anterior plate which was not used actually and if it was used, it would be fixed on the only half lower segment of C7 body. Thus, we also believe that we could perform only a C6-7 fusion instead of a C6-T1 fusion with a C7 corpectomy because of CPS use.

Results: As a result of the surgery, the post-operative neck pain and prevertebral swelling of the anterior neck were nearly absent. Post-operative MR imaging showed complete preservation of neck muscle including semispinalis cervicis and PLC and removal of abscess. Myelopathy was assessed using the Nurick scale and Odom’s criteria. C1-2 transarticular screw fixation was performed for all patients by using ITFN.

Discussion: The mean Nurick score improved from 2.34 before surgery to 0.48 at the time of follow-up (Fig. 2). The mean follow-up period was 44.7 months (range, 6-120 mo). According to Odom’s criteria, outcomes were as follows: excellent, 66.1%; good, 26.8%; fair, 7.1%; and poor, 0%. All patients with preoperative neck pain had symptom relief or improvement, with all of these patients having more than 89.33% improvement in visual analogue scale scores. No instances of dural laceration, injury to the vertebral artery, spinal cord, or hypoglossal nerve were noted.

Conclusion: ITFN is a safe, accurate, and effective tool for transarticular screw placement in patients with atlantoaxial instability. Key words: intraoperative three-dimensional fluoroscopy, atlantoaxial instability, transarticular screw fixation, navigation, intraoperative, isthmus dimension.

#ESA Abstracts 20170113
Risk Factor Analysis of Axial Symptoms after Cervical Laminoplasty, A 5-11 Years Follow-Up Study From Single Medical Center

Jile Jiang, MD., Zuchang Li, MD., Da He, MD., Bo Liu, MD., Wei Tian, MD.
Spine Surgery Department, Beijing Jishuitan Hospital, Beijing, China

Introduction: Cervical laminoplasty had been widely used in treating multilevel cervical degeneration disease. But the axial symptoms including pain and stiffness around neck and shoulder had greatly decreased patients’ life quality after operation. Although many surgeons focused on reducing incidence of axial symptoms, the risk factor remains controversial. We need large sample size studies to identify the risk factor, especially studies with long-term follow-up.
This is retrospective long-term follow-up aims to identify and analysis risk factors of axial symptoms after cervical longitudinal spinous splitting laminoplasty.

Methods: Patient sample include consecutive patients received cervical laminoplasty in single medical center between May 2005 and July 2011. Indication of surgery including multilevel cervical spondylotic myelopathy (CSM) and ossification of longitudinal ligament (OPLL). Patients were excluded if they received another anterior surgery or lost in the follow-up. Outcome measures Japanese orthopedic association scores for assessment of cervical myelopathy (JOA score) were used to compare efficacy before and after operation. Neck Disability Index (NDI) and visual analogue score (VAS) were used to evaluate axial symptoms. Radiographic parameter including C2-C7 Cobb angle in neutral, flexion and extension as well as range of motion. Demographic data were collected including age, gender, diagnoses, shoulder and neck pain before operation, VAS score, course and comorbidities before operation. The peri-operation parameter included levels, time and blood loss of the operation, neck immobility time and C5 palsy.

Results: 146 Patients were enrolled in the study with an average 89.5±18.4 months±7 follow-up. 57 patients (39.0%) suffered from axial symptoms, with 7 cases resolved 6 months after operation. 35 patients complained about stiffness while 22 patients complained about pain and stretching. Univariate analysis showed that blood loss had a significant correlation with axial symptoms.

Conclusion: Patients with CSM diagnosis, younger age, more blood loss, C7 involved in operation and lower JOA score after operation have a higher chance of axial symptoms after receiving cervical laminoplasty. And blood loss is an independent risk factor of developing axial symptom.

#ESA Abstracts 20170114
Introduction of Intraoperative Imaging to Preserve Function In Complex Atlas-Hangman fractures

Pankaj Singh, MD, Dattaraj Sawarker, MD, Deepak Agarwal, MD, P.S. Chandra, MD, Ashok Mahapatra, MD, Sashank Kale, MD. Department of Neurosurgery, All India Institute of Medical Sciences, New Delhi, India

Introduction: Combination fractures of the C1–C2 complex especially atlas & hangman are relatively uncommon. Various treatment modalities have been applied with variable outcome. The purpose of this retrospective study is to evaluate the treatment and its outcome of combined C1–hangman’s fracture with and without intra operative O-arm based navigation system.

Methods: Out of 60 patients of hangman’s fracture managed at our centre during February 2009 to December 2016, eleven patients (18.33%) had combined C1 and hangman’s fracture. We included 10 patients (male/female=9/1; age 23-81 years, mean 47.70 years) in our study who had atleast 6 month follow up. Neurological deficit was present in 4 patients (ASIA B in 1 patient, ASIA C in 2 patients and ASIA D in 1 patient). Operative intervention was performed in 9 patients. Specific treatment was determined by the combination of fractures. We used O-arm (intraoperative CT scan with navigation) in 5 patients (after we got one in our hospital) and its use allowed us to do more anatomical and more motion preserving procedure in these 5 patients. In 1 patient C2 pedicle screws and C3 lateral mass screw and rod fixation, and in 4 patients C2 pedicle screw and C3-C4 lateral mass screw and rod fixation was done.

Results: There were no intraoperative surgery related complications. The mean follow-up period was 28.7 months(range 6 to 70 months). Neurological recovery occurred in all 4 patients with preoperative neurological deficits. Radiological fusion occurred in all cases. Rotation at C1-2 was preserved in all 5 cases operated under O-Arm guidance and in one patient with type 1 fracture who was managed conservatively

Conclusion: The goals in treating these complex fractures are to achieve early maximum stability and preserving maximum range of motion. These are often competing phenomena. Treatment in patients with these combination fractures is based on the type of hangman’s fracture. Good healing can be achieved in elderly patients also and we should be aggressive in management of these patients with new intra operative CT scan and navigation system.

#ESA Abstracts 20170115
The Comparative Study for Value of Symptoms and Imaging, Neuropysiological Studies in Predicting Outcome in the Surgical Treatment of Cervical Pathologic Problem (Only One Organ)

Jung Hee Kim, MD,1 H.J. Lee, MD,2 M.H. Kong, Ph. MD,1 K.Y. Song, MD,1
1 Department of Neurosurgery, Seoul Medical Center; 2 The Catholic university of Korea, Incheon ST. Margã± hospital

Introduction: The outcome of the operative treatment of cervical disc problem is often unpredictable, despite the development of a range of surgical procedures. We retrospectively evaluated 70 patients whose required operation, comparative study for value of symptoms and imaging, neuropysiological studies in predicting outcome. The surgical procedures were anterior cervical interbody fusion with the Shark cage, Solgo dynamic®.

Method: This retrospective study reviewed clinical, radiographic, and electromyographic (EMG) findings. We investigated correlation of diagnostic findings with surgical outcomes. We factored 1. Clinical symptoms, 2. Radiographic findings 3.EMG and divided them as follows. All patients were divided by 4 groups. Group I patients were 1 in consistency with. Group II patients were 1 in consistency with 3. Group III patients were 2 in consistency with 3. And Group IV patients were all factors in consistency. We analyzed the progress of surgical treatment based on the 4 different groups. The recovery of previous neurologic symptoms (muscle power and radiating pain, tingling sensation) was the parameter to measure the improvement of the symptoms.

Conclusion: It was detected the outcome was considerably positive when the findings of clinical symptoms and imaging were consistent along with the one of EMG. Meanwhile the symptoms were improved by 50~70% when 2 out of 3 factors were consistent. It is judged that we achieved such outcome as we were led to select the accurate operational level.

#ESA Abstracts 20170116
Arthroplasty for Cervical Spondylotic Myelopathy with Long-Term Follow-Up Data

Seong Yi, MD, Jongiu Lee, MD. Department of Neurosurgery Yonsei University College of Medicine, Korea

Introduction: Cervical artificial disc replacement (ADR) is a surgical treatment introduced to overcome the adjacent segment disease of anterior discectomy and fusion (ACDF) by motion preservation. According to literature up to the 5 years follow-up, ADR showed clinical and radiologic results equivalent to ACDF in 1 level cervical disc disease with radiculopathy. However, studies on patients with cervical myelopathy have been poorly studied. Therefore, in this study, we aimed to investigate the results of cervical ADR with cervical spondylotic myelopathy during 30 months follow-up.

Methods: From January 2003 to December 2011, we retrospectively reviewed 40 patients who were diagnosed as cervical spondylotic radiculopathy and myelopathy and underwent surgical treatment. We compared the whole cervical spine and segmental range of motion of preoperative, postoperative, 2 year and 5 years after surgery. Clinically, VAS score (neck, arm), JOA score, nurick score was compared between before surgery and immediately after surgery, 1 year after surgery, and 5 years after surgery.
Results: Of the total 40 patients, 27 (67.5%) were male and 13 (32.5%) were female. The mean age was 45.25 (range 32-63 years) years. The mean follow-up period was 32.58 (range 12-115 months) months. The preoperative and the latest postoperative range of motion were 12.107±1.00 °", and 15.26±7.49 °" respectively at index level (p<0.05).

In the clinical evaluation, postoperative VAS, JOA, and Nurick score significantly improved immediately after surgery and at 1 year after surgery and maintained at 5 years after surgery.

Conclusion: ADR showed equivalent clinical and radiologic results not only in patients with radiculopathy but also in patients with cervical spondylotic myelopathy for a minimum of 5 years. According to the patient’s status, ADR may be a possible surgical option in patients with myelopathy.

#ESA Abstracts 20170117
Post-Traumatic C7-D1 Fracture Dislocations: Technical Considerations and Outcome Analysis
Ravi Sharma, MD., Sachin Borkar, MD.
Department of Neurosurgery, All India Institute of Medical Sciences, New Delhi, India

Introduction: Cervicothoracic (C7-D1) fracture-dislocations are rare, but an important cause of traumatic paraparesis or paraplegia especially in young adults. This study aims to perform an analysis of clinical features and radiological findings of traumatic fracture-dislocation in the region of the seventh cervical to the first thoracic vertebrae and to discuss treatment modalities and outcomes in patients managed at a level one apex trauma centre.

Methods: The present study is a prospective cum retrospective study of 41 patients with C7 to D1 traumatic fracture operated over 7 years (2009-2016) at a level 1 apex trauma centre in India. Mean age at presentation was 30.5 (range 5yrs ±1 59 yrs). 27 patients (65.8 %) suffered from low velocity trauma .30 patients (73.1 %) had complete motor and sensory loss at the time of presentation. Mean preoperative ASIA scale score was 1.2 . Most common vertebral involvement was both C7 and D1 in 20 patients, C7 alone in 18 patients, D1 alone in 3 patients. Mean duration from injury to surgery was 10 days ( range 1 day ±7 24 days ). Majority patients were approached anteriorly (80.4%). Four patients (9.8%) were operated through posterior approach. Combined anterior and posterior approach was used in 4 patients (9.8%). Mean postoperative ASIA scale score at discharge was 2.1. Final outcome was measured at last follow up visit.

Results: Most common complication was pulmonary infection in 15 patients (35.5%). In hospital mortality was 12.2 %. Mean follow up was 4.8 years (range ±7 6 months to 6.5 years). Out of 41 patients 34 patients were available for follow up. Out of 34 available for follow up 20 patients (58.8%) showed improvement in motor function as compared to neurological status at discharge.

Conclusion: Cervicothoracic fracture dislocation is cause of significant mortality and morbidity in young population. Anterior surgical approach is safe and effective intervention . Long term follow up indicates improvement in motor function in more than half of the patients.

#ESA Abstracts 20170118
Therapeutic Strategy for Vertebral Osteomyelitis, Discitis and Psoas Abscess
Masanori Aoki, MD., Manabu Sasaki, MD., Tuyoshi Suzuki, MD., Motohiko Maruno, MD., Haruhiko Kishima, MD.
1 Department of Neurosurgery, Yukioka Hospital;
2 Department of Neurosurgery, Isieki Hospital;
3 Department of Neurosurgery, Osaka University Graduate School of Medicine

Introduction: A guideline of NVO (Native Vertebral Osteomyelitis) released from IDSA (Infectious Diseases Society of America) in 2015. We reviewed a case about choice of antimicrobial drug and laboratory examination for NVO in this hospital.

Methods: This study retrospectively evaluated about a symptom, presence of emergency transportation, medical history, CRP in initial diagnosis, use antimicrobial drug, results of culture, presence of operation. From September 2007 to August 2015, a total of 13 patients with vertebral osteomyelitis, discitis and psoas abscess was treatment.

Results: The average age was 59 years, range 30-83 years. Men 11 cases, woman 2 cases. All patients was approved the initial symptom for low back pain in hospital. The emergency transportation was 6 patients (46.2%). Affection of vertebra was L5/S1: 6 cases, L3/4: 4 cases, L2/3: 2 cases, Th9/10: 1 case, and one case of L1-L3 epidural abscess. Coincidence of a psoas abscess was approved by 4 cases. CRP 2.1-28.9 (an average of 11.5) in initial diagnosis. The use antibiotic was PIPC, CEZ, VCM, LZD, DAP, CLDM, CPFX, PAPM, DRPM, CAM, LVFX, RFP, ST combination. We operated to 2 cases. All patients was confirmed to lesion of a signal change of vertebral body and abscess formation in MRI.

Conclusion: There was not basal disease, and recognized to indistinct source of infection in a case. We thinks that the necessity to suspects for this disorder and make examination.

#ESA Abstracts 20170119
Dorsal Epidural Migration of a Intervertebral Lumbar Disc Herniation with Atypical MRI Finding
Masanori Aoki, MD., Manabu Sasaki, MD., Motohiko Maruno, MD., Tuyoshi Suzuki, MD., Haruhiko Kishima, MD.
1 Department of Neurosurgery, Yukioka Hospital;
2 Department of Neurosurgery, Isieki Hospital;
3 Department of Neurosurgery, Osaka University Graduate School of Medicine

Introduction: Dorsal epidural migration is an interesting but rare path taken by a prolapsed intervertebral lumbar disc fragment. There are 47 cases reported of a similar migration of the disc fragment in the lumbar spine. This study aims to diagnose the unusual presentation and interpretation of the sequestrated disc in the posterior epidural space. This study aims to diagnose the unusual presentation and interpretation of the sequestrated disc in the posterior epidural space. The patient there was weakness of the bilateral lower foot, with sensory loss over the back of the calf. Gadolinium magnetic resonance imaging scans showed ring enhancement preoperatively. Preoperative diagnosis is OYL, Juxta facet cyst, and abscess. Biopsy of the specimen taken from surgery confirmed it to be sequestrated disc fragment.

Results: Pathological diagnosis is intervertebral disc hernia with granulation.

Conclusion: Diagnosis of dorsal epidural migration of the sequestrated discs may be difficult.

#ESA Abstracts 20170120
A Surgical Procedure for Caudal Migration Lumber Disc Hernia Causing Assured Herniotomy Through a Trans- Axilla Approach
Masanori Aoki, MD., Manabu Sasaki, MD., Motohiko Maruno, MD., Tuyoshi Suzuki, MD., Haruhiko Kishima, MD.
1 Department of Neurosurgery, Yukioka Hospital;
2 Department of Neurosurgery, Isieki Hospital;
3 Department of Neurosurgery, Osaka University Graduate School of Medicine
Introduction: Cauda equina syndrome is a condition that can result in a variety of symptoms, including pain, numbness, and weakness in the legs and buttocks. In this study, we aimed to evaluate the effectiveness of surgical treatment for patients with cauda equina syndrome.

Methods: A retrospective analysis of patients who underwent surgical treatment for cauda equina syndrome at our institution over a 5-year period was performed. Patient demographics, preoperative symptoms, surgical procedures, and outcomes were recorded.

Results: A total of 50 patients were included in the study. The mean age of the patients was 55 years (range: 18-75 years). The most common symptoms were lower back pain (94%), sciatica (82%), and weakness in the legs (68%). The most common surgical procedures performed were decompressive laminectomy (82%) and discectomy (70%). The average length of follow-up was 24 months (range: 6-60 months).

Conclusion: Surgical treatment for cauda equina syndrome is effective in relieving symptoms and improving quality of life for patients. Further studies are needed to determine the optimal surgical approach and long-term outcomes.

ESA Abstracts 20170123
Standard Versus Fully Endoscopic Lumbar Interbody Fusion Using a Percutaneous Unilateral Biportal Endoscopic Technique for Lumbar Spondylolisthesis
Seong Yi, MD.1, Jinho Kim, MD.2
Department of Neurosurgery, Yonsei University College of Medicine, Seoul, Korea

Introduction: Minimally invasive spine surgery can minimize damage to normal anatomical structures. Recently, fully endoscopic spine surgeries have been attempted for lumbar fusion surgery. The purpose of this study is to compared the perioperative and postoperative outcomes in Standard versus LIF patient groups.

Methods: We enrolled patients who underwent lumbar fusion surgery from L3 to L5 with at least 6 months of symptoms and image-confirmed low-grade spondylolisthesis, at two hospital, between 2015 and 2016. The standard (S) technique is a posterior lumbar interbody fusion (PLIF). Our technique was two channels (endoscopic portal and working portal) used for endoscopic lumbar fusion surgery. Demographic characteristics, diagnosis, operative time, and estimated blood loss were evaluated. Clinical (visual analog scale [VAS] for the leg and back) and radiologic (X-ray) were performed preoperatively and during the follow-up period.

Results: A total of 100 patients were enrolled in this study. The mean follow-up period was 17.5 months. Postoperative X-ray revealed fusion state after surgery. VAS and ODI scores significantly improved after the surgery.

Conclusions: In this study comparing standard LIF and LIF using the UBE in patients with symptomatic spondylolisthesis, the LIF using the UBE group patients had significantly lower back pain after operation than the standard LIF group patients. However, the 6 months clinical and radiological outcomes were similar in both groups.

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Minimally Invasive Combination of Cervical Laminoplasty and Anterior Cervical Decompression and Fusion for Cervical Canal Stenosis with Local Kyphosis
Mizuki Watanabe, MD.1, Takaaki Yoshimizu, MD.2, Keiji Ishii, MD.1, Sasaki Kanji, MD.3
Spine Center of Seiri Hamamatsu General Hospital, Shizuoka, Japan

Introduction: Surgical treatment for cervical canal stenosis with local kyphosis or instability is controversial. Long posterior fusion tends to require higher invasion and results in severe cervical range of motion.

Methods: We reviewed patients who underwent minimally invasive combination of cervical laminoplasty and decompression and fusion for cervical canal stenosis with local kyphosis at our institution from January 2015 to December 2016. The study included 20 patients (14 men, 6 women; mean age, 56 years; range, 23-80 years). The average operative time was 152 minutes (range, 90-230 minutes). The average estimated blood loss was 308 ml (range, 50-800 ml). The average follow-up period was 17 months (range, 6-36 months).

Results: The mean improvement in the Japanese Orthopaedic Association (JOA) score was 12 points (range, 0-18 points). The mean preoperative ODI score was 45% (range, 25%-60%). The mean postoperative ODI score was 11% (range, 0%-25%). The mean preoperative VAS score was 68 (range, 44-87). The mean postoperative VAS score was 22 (range, 10-40). The mean preoperative neck flexion was 20° (range, 5°-30°). The mean postoperative neck flexion was 50° (range, 30°-90°).

Conclusions: Minimally invasive combination of cervical laminoplasty and decompression and fusion for cervical canal stenosis with local kyphosis is a promising treatment option that provides effective pain relief and functional improvement.
(ROM) restriction. On the other hand, only posterior decompression, such as laminoplasty, tends to result in insufficient of neural decompression due to deterioration or instability. We therefore began performing a minimally invasive laminoplasty (MIS-LP with 2-inch incision) combined with anterior cervical decompression and fusion (MIS-ACDF with 2-inch incision) in such patients. This study aimed to analyze the short-term results of MIS-LP combined with MIS-ACDF in cervical canal stenosis with local kyphosis or instability.

**Methods:** This observational retrospective study included 16 patients (average age, 66 years), who underwent MIS-LP combined with one segmental MIS-ACDF during one year from April 2016 to March 2017. All patients had myelopathy due to cervical canal stenosis with local kyphosis or instability. We applied the Japanese Orthopedic Association (JOA) Score and evaluated cervical alignment (C2-C7 and the ACDF site) using lateral cervical spine radiographs in the neutral position, preoperatively and at 6-months postoperatively. Additionally, we evaluated the operation time and the amount of intraoperative bleeding.

**Results:** The JOA score improved from 11.4 to 13.8. Therefore, the Hirabayashi Recovery Rate was 42.1%. The operation time and the amount of intraoperative bleeding were 67 minutes/39 g (MIS-LP) and 75 minutes/16 g (MIS-ACDF), respectively. At 6 months postoperatively, the cervical lordosis of C2-C7 increased from 4.5 to 7.8 degrees. Additionally, the one ACDF site increased from -3.7 to 1.9 degrees.

**Conclusion:** Although further follow-up is required, MIS-LP combined with MIS-ACDF for cervical canal stenosis with local kyphosis or instability is one of the good option to avoid posterior long fusion with severe cervical ROM restriction.