DOES ADDITIONAL UNCI NATE RESECTION INCREASE PSEUDARTHROSIS FOLLOWING ANTERIOR CERVICAL DISCECTOMY AND FUSION?

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Study design: Retrospective comparative study.
Objective: To investigate whether unilateral or bilateral uncinate resection (UR) combined with anterior cervical discectomy and fusion (ACDF) increases the risk of pseudarthrosis at long-term follow-up.

Summary of Background Data: Uncoforaminotomy (or UR), performed along with ACDF, facilitates better and faster improvement of arm pain. As uncovertebral joints are important for maintaining stability, they may affect the fusion process by causing segmental instability if resected during ACDF.

Methods: We retrospectively examined 167 patients (89 men, 78 women; mean age, 58.4±10.5 years) who consecutively underwent single- or double-level ACDF and were followed for >2 years. UR was not performed in 46 patients (N-UR group). UR of at least one foramen was performed in 121 patients (UR group), including unilateral UR in 89 patients (U-UR group) and bilateral UR in 32 patients (B-UR group). Demographic data, fusion rate, visual analog scale (VAS) scores for neck/arm pain, and Neck Disability Index (NDI) scores were compared between the N-UR and UR groups. Moreover, the fusion rates after the single- and double-level procedures were compared among the groups.

Results: There was no difference in gender, age, weight, height, BMI and smoking history between the N-UR and UR groups. The fusion rates after single-level ACDF were not significantly different among the N-UR, U-UR, and B-UR groups (91.4%, 97.8%, and 88.2%; p=0.290). Solid fusion was achieved in all groups after double-level ACDF (72.7%, 95.5%, and 86.7%), although the rates did not significantly differ among the groups (p=0.071). The improvement in the VAS score for arm pain was significantly better in the UR group than in the N-UR group at short-term follow-up (p<0.001).

Conclusion: Unilateral or bilateral UR does not affect the fusion rate after single- or double-level ACDF. Hence, if necessary, additional UR can be performed during ACDF without concern regarding nonunion.

Keywords: cervical; discectomy; fusion; uncinate resection; uncoforaminotomy; pseudarthrosis; fusion rate; clinical outcome; unilateral; bilateral

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THE DISCREPANCY BETWEEN CLINICAL MEASURES AND SELF-REPORTED RATINGS OF HEALTH STATUS: AN INTRODUCTION TO RESPONSE SHIFT
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Introduction: Surgery is increasingly recommended as the preferred treatment strategy for patients with degenerative cervical myelopathy (DCM), as it can halt neurologic deterioration and significantly improve functional impairment, disability and quality of life. Despite these improvements, however, some patients may still be dissatisfied with their outcomes. Discrepancies between clinical measures and self-reported ratings of health status can be due to changes in patients’ internal standards of measurement, values and/or conceptualization of quality of life. This study aims to investigate the presence of response shift in functional outcomes in patients undergoing surgery for DCM.

Methods: 479 DCM patients were prospectively enrolled in the CSM-International study at 16 global sites. Functional impairment, disability and quality of life were evaluated at baseline and 1-year following surgery using a variety of outcome assessment tools. Patients were also asked to complete the SF-36 questionnaire and to rate their general health status compared to one year ago (much better, somewhat better, the same, somewhat worse, much worse). Descriptive analyses were conducted to evaluate the concordance between achieving a clinically important improvement (MCID) in function (modified Japanese Orthopedic Association (mJOA) scale) and self-reported ratings of health status. Concordance was defined as achieving a MCID and reporting general health as somewhat better or much better, whereas discordance was defined as achieving a MCID and reporting general health as the same, somewhat worse or much worse. Logistic regression analysis was used to determine important differences between patients with discrepancies between their clinical measures and self-reported ratings and those without.

Results: A total of 401 patients had complete follow-up data at 1-year and were included in this analysis. Based on patient self-reports, 55 patients were somewhat or much worse than a year ago, 82 patients were the same and 264 patients were somewhat or much better. Thirty-one percent of patients who reported being somewhat or much worse achieved a MCID on the mJOA. In addition, 56% of patients who indicated their health status was the same as one year ago exhibited clinically meaningful improvements in functional impairment. Univariate analyses indicated that there is an increased likelihood of observing a discrepancy between functional outcomes and self-reported ratings if the patient (1) exhibited less improvement in mJOA upper extremity scores (p=0.071), (2) was older (p=0.0073), (3) was a smoker (p=0.082) and (4) achieved lower total mJOA scores at 1-year (p=0.087). Following multivariate analysis, the most important factors were age and improvement in mJOA upper extremity scores.

Conclusions: A response shift in functional outcomes was detected in patients undergoing surgery for DCM. Patients may value an improvement in upper extremity function than other gains.

RELATED FACTORS OF NECK DISABILITY INDEX (NDI) AMONG ELDERLY PEOPLE IN SUBURBAN AREA: SHIRANIWA COHORT STUDY

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Background
Neck pain is one of the most common symptoms that greatly affects the quality of life for elderly people. It is, therefore, crucial to illuminate the etiology and associated factors of neck pain. Although there have been many studies exploring the etiology of neck pain, it remains unclear. We have started a population-based prospective cohort study for elderly residents living in urban areas (Shiraniwa study) since 2016. The purpose of this study is to investigate the prevalence and related factors of neck pain among elderly population living in suburban area, which may help to elucidate the etiology of neck pain.

Materials and Methods
This study was based on the results obtained from cross-sectional measurements of participants who enrolled in the Shiraniwa study. Out of 409 participants, 398 adults (159 male and 239 female) who had no history of cervical spinal surgery were included. Disability due to neck pain was assessed with the Neck disability index (NDI). As candidates for associated factors, trunk muscle mass (BIA methods), back muscle strength, Hospital Anxiety and Depression Scale (HADS), and spinal parameters including C2-7SVA (cSVA), T1 slope (TS), cervical lordosis (CL), thoracic kyphosis (TK), and C7-S1SVA (SVA) measured with standing whole spine radiograph were investigated. As the cut-off value of the NDI was reported to be 15 among Japanese population, participants were divided into two groups; normal group (NDI<15) or disability group (NDI≥15). Univariate and multivariate logistic regression models were used to explore the association between NDI and the candidates. Statistical tests were considered significant at P<0.05.

Results
Among 398 people, 25 men (16.8%) and 51 women (21.3%) reported disability due to neck pain with NDI 15 or more. The disability groups showed older age (male; female = p<0.001; p<0.001), lower trunk muscle mass (p=0.001; p=0.004), lower back muscle strength (p<0.001; p<0.001), higher depression score (p<0.001; p<0.001) and anxiety score (p<0.001; p=0.004) of HADS, and larger cSVA (p=0.01; p=0.003). Multivariate analysis using age, BMI, trunk muscle mass, back muscle strength, depression (HADS≥8), anxiety (HADS≥8), cSVA as an explanatory variable revealed that age(OR; 1.16, 95% CI 1.02-1.31), obesity (OR; 4.79, 95% CI 1.51-15.2), and back muscle strength (OR; 0.97, 95% CI 0.94-0.99) was independent associated factors in male while back muscle strength (OR; 0.97, 95% CI 0.94 - 0.99) was observed in females. Age, trunk muscle mass, anxiety, and cSVA were not significant related factors.

Conclusion
Cervical spine alignment and whole spinal alignment were not clearly related to NDI. On the other hand, back muscle strength was the independent related factor for NDI. The possibility that maintaining the muscular strength leads to the prevention of neck pain or of disability due to neck pain was suggested in a cohort of residents living in suburban areas.

Disclosures:
FACTORS AFFECTING OUTCOMES OF CERVICAL DOUBLE-DOOR LAMINOPLASTY BY MIDSAGITTAL SPLITTING METHOD
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Introduction: Cervical double-door laminoplasty by midsagittal splitting method is a surgical approach in wide used. To examine factors affecting the outcomes of this surgery, we compared surgical outcomes between different age groups and between disease groups.

Materials and Methods: We investigated 360 patients (243 men, 117 women) who underwent cervical double-door laminoplasty at our hospital between 1994 and 2015. Mean age at the time of surgery was 63.7 years and mean postoperative follow-up was 21 months. Patients were divided into the following three age groups for comparison: late older group, ≥75 years old (mean age, 77.5 years; n=69); early older group, 65 to 74 years old (mean age, 69.2 years; n=113), and <65-years-old group (mean age, 54.9 years; n=178). Patients were also divided into different disease types for comparison, including: cervical myelopathy (CM, n=298), cervical disc herniation (CDH, n=16), and ossification of posterior longitudinal ligament of the cervical spine (OPLL, n=46). Postoperative outcomes were evaluated using JOA score and recovery rate (Hirabayashi method).

Results: Mean preoperative score was 8.5 and mean postoperative score was 14.2 (recovery rate, 69.8%) in all patients. Mean preoperative score was 8.8 and mean postoperative score was 14.9 (recovery rate, 76.0%) in the <65-years-old group. Mean preoperative score was 8.3 and mean postoperative score was 13.9 (recovery rate, 67.1%) in the early older group. Mean preoperative score was 7.8 and mean postoperative score was 13.0 (recovery rate, 58.4%) in the late older group. Mean preoperative score was 8.4 and mean postoperative score was 14.1 (recovery rate, 68.8%) in the CM group. Mean preoperative score was 8.7 and mean postoperative score was 15.8 (recovery rate, 87.4%) in the CDH group. Mean preoperative score was 8.4 and mean postoperative score was 14.3 (recovery rate, 70.3%) in the OPLL group.

Discussion: Postoperative outcomes were clearly superior in the <65-years-old group compared to other age groups, likely because the mean preoperative score was higher (8.8) than in other groups, indicating a milder presenting condition in this group. Moreover, comorbidities affected postoperative outcomes. In particular, many patients in the late older group presented with comorbidities such as lumbar spine diseases, affecting postoperative outcomes. Postoperative outcomes were clearly superior in the CDH group compared to other disease groups. This was likely due to the tendency for intervertebral disc herniation to shrink after spinal canal expansion. In fact, shrinkage occurred to the point at which herniation virtually disappeared in some patients.

Conclusions: Postoperative outcomes were superior in the CDH group compared to other disease groups and in the <65-years-old group compared to other age groups, and comorbidities affected postoperative outcomes.

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INFLUENCE OF THE PARAMETERS OF THE LOCAL SAGITTAL BALANCE OF THE CERVICAL SPINE ON THE QUALITY OF LIFE OF PATIENTS OPERATED ON FOR KYPHOTIC DEFORMITIES OF THE CERVICAL SPINE

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Introduction: the most common type of cervical malalignment is cervical kyphosis, generally due to iatrogenic origins such as postlaminectomy kyphosis.

Objective: to study the effect of the parameters of the sagittal balance and the quality of life patients was operated with kyphotic deformity of the cervical spine.

Materials: 20 patients was operated with kyphotic deformities of the cervical spine (40% - women, 60% - men) in ours clinic in 2014-2017. The average age 37.6 ± 20 years. The mean follow-up period was 25.7 ± 12.4 months. The evaluation of the neurological status was performed the scale of the JOA, EMS. The pain was assessed by a VAS, the quality of life, the NDI questionnaire was used. Clinical outcomes were assessed by the modified Macnab criteria. Neuroimaging methods: MRI, CT and X-ray. According to the radiography the evaluation was performed: Sagittal vertical axis (SVA) C2-C7, SVA center gravity of head (CGH) -C7, C1-C2 lordosis, Cobb angle C2-C7, Spino-cranial angle (SCA), Thoracic inlet angle TIA), Neck tilt (NT), T1 slope, C7 slope, Cranial incidence (CI), Cranial slope (CS), Cranial tilt (CT). Statistical analysis was conducted using Welch’s t-test, Mann-Whitney and Fisher’s exact test (R software).

Results: all patients had a positive clinical outcome, VAS scores (p = 0.00012), NDI (p = 9.53E-05), JOA (p = 0.00057), EMS (p = 0.00063) significantly changed in comparison with preoperative results. The relationship between center SVA gravity of head (CGH) -C7 with clinical indices of VAS (p = 0.002), NDI (p = 0.04) and clinical outcomes on the Macnab scale (p = 0.009) was revealed. Cobb angle C2-C7 (p = 0.00782), Spino-cranial angle (SCA) (p = 0.00715), C7 slope (p = 0.05287) in the postoperative period were compared with preoperative values.

Conclusion: the SVA gravity of head (CGH) -C7 parameters of the regional cervical sagittal balance have a correlation with the clinical indices of VAS, NDI, and the clinical outcomes on the Macnab scale.

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Surgical Treatment of Severe Rigid Cervical Kyphosis by Posterior Lateral Osteotomy

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Abstract
Objective The purpose of this study was to introduce technique, evaluate surgical outcomes and conclude the treatment strategy of posterior lateral osteotomy for severe rigid cervical kyphosis. Materials and methods A retrospective analysis was conducted of 14 cases of severe rigid cervical kyphosis from 2010 to 2015 with lateral cervical osteotomy for deformity correction. All patients were male, 38 to 67 years old. Eight cases of ankylosing spondylitis (AS), osteotomy was performed in 6 cases at C7-T1, in 2 cases at C6-C7, C7-T1. Six patients of degenerative cervical kyphosis and cervical spondylotic myelopathy (DK), osteotomy was performed in 3 cases at C5-C6, in 3 cases at C4-C5, C5-C6. All cases received V-shaped osteotomy of bilateral facet joint; spinal cord and nerve root decompression; intra-operative deformity correction by adjusting Mayfield skull clamp, pedicle/lateral mass screw fixation. Intraoperative neuro monitoring was performed. Cervical sagittal alignment parameters and the effect of osteotomy was evaluated by lateral plain films and CT scan. The Visual Analogue Scale (VAS), Japanese Orthopaedic Association Scores (JOA) and Neck Disability Index (NDI) were used to evaluate the clinical efficacy.

Results All patients were followed up for an average of 3.5 years (from 36 to 60 months). There were 2 cases of shoulder pain, 1 cases of left leg weakness after operation, and no vascular injury. Preoperative axial neck pain was relieved. At the last follow-up, VAS, NDI and JOA were improved from (7.2±1.5, 64.5±17.4, 10.5±0.9) to (2.6±1.7, 34.8±21.6, 14.5±1.3) scores (paired T test, P < 14.5). CT showed bone union in the segment of the osteotomy. Segmental kyphosis angle improved from -38.4±10.6° to 3.6±0.6°; AS group C2-C7 SVA (sagittal vertical axis) decreased from 95.6±13.8mm to 41.4±8.2mm; DK group C2-C7 SVA decreased from 39.5±6.4mm improved to 32.6±6.2mm; DK group cervical lordosis improved -10.2 ± 2.1 ° to 5.1 ± 1.4 ° (paired T-test, P < 0.01). Chin-brow vertical angle (CBVA) in all cases was within the normal range.

Conclusions The technique of posterior lateral osteotomy has satisfied clinical outcomes for severe rigid cervical kyphosis. The osteotomy segment of AS cases focused on the cervicothoracic junction can correct the SVA of the cervical spine, but there is no significant change in the C2-C7 lordosis. For DK cases, the overall cervical alignment can be corrected and the trend of the sagittal imbalance is prevented. The complications of neuro defect and vascular injury are highly occurred in cervical posterior lateral osteotomy, so this procedure should be performed by a skilled and cooperated operation team.

Keywords: Cervical Deformity; Kyphosis; posterior lateral osteotomy; Rigid; sagittal alignment
CAN WE DEFINE CLINICALLY RELEVANT DJK IN CERVICAL DEFORMITY SURGERY?

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Summary: Distal junctional kyphosis (DJK) is becoming a more commonly recognized complication of cervical deformity (CD) surgery. DJK can erode corrections and postoperative cervical malalignment has been correlated with poor health outcomes (HRQL). The traditional definition of DJK is arbitrary (DJK angle (DJKA) change<\(-10^\circ\)) and its clinical relevance is unproven. A new „Severe DJK“ definition is explored demonstrating better specificity, precision and accuracy with DJK revisions. Severe DJK patients had the worst cervical alignment by cSVA and C2 Slope (C2S).

Hypothesis: The definition of DJK can be improved for more clinical relevance.

Design: Prospective cohort study.

Introduction: Recently, DJK has been described as a complication of CD correction. However, the current definition of DJK has failed to correlate with HRQL or revision rates.

Methods: A prospective database of operative CD patients was analyzed. Inclusion criteria were cervical kyphosis>10°, cervical scoliosis>10°, cSVA>4cm or CBVA>25°. DJKA was defined as a change from preop to postop kyphosis between LIV to LIV-2. Traditional DJK was defined as DJKA<\(-10^\circ\) at any time point while „Severe DJK“ was defined as DJKA less than one SD of mean DJKA (-20°). Patients without DJK (noDJK) were compared to Traditional and Severe. Cervical alignment was compared between the three groups using ANOVA.

Results: 112 patients were included. The mean maximum DJKA for the whole cohort was -9.00° (SD = 10.0). There were 41 traditional DJK (35.7%) and 11 Severe DJK (9.8%). Traditional DJK was not associated with any preop alignment parameters, but Severe DJK was associated with an increased CTPA, C2S, cSVA and TSCL at baseline (p<0.05). TSCL, C2S, and CTPA were increased in the Traditional and Severe DJK compared to noDJK at 1 year (p<0.05); postop T1S and cSVA was increased in the Severe DJK group only. Severe DJK had more posterior levels fused and more caudal posterior LIV. There was no significant difference in HRQL change at 3months, 6months and 1 year for either DJK group compared to noDJK. The DJK revision surgery rate was 27.3% for Severe DJK and 8.20% for traditional DJK (p=0.041). The Severe DJK criteria had better specificity (0.92 vs 0.63), precision (0.27 vs 0.12) and accuracy (0.86 vs 0.62) for revision surgery. Severe DJK patients had the largest cSVA (61.2, 41.60, 38.56mm, p<.001) and C2S (52.78, 27.70, 24.73°, p<.001). The mean time to revision was 4.72 months for the whole cohort.

Conclusions: The modified Severe DJK definition had better specificity, precision and accuracy for DJK revision surgery. Severe DJK patients had the worst cervical alignment by cSVA and C2 slope with mean alignments well beyond the established thresholds for moderate disability.
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DOES ADDITIONAL BONE GRAFTING OF ATLANTOAXIAL JOINT INCREASE THE BONE FUSION RATE OF ILIAC CREST AUTOGRAGT IN POSTERIOR OCCIPITOCERVICAL FUSION? A RETROSPECTIVE, CONTROLLED STUDY WITH A 2-YEAR FOLLOW-UP

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Background Context: Occipitocervical fusion can be utilized to correct joint instability caused by trauma, rheumatological conditions, infection, neoplasm, or congenital conditions. Bone-graft-related complication was relatively frequent during occipitocervical fusion surgery. In previous studies, the reported fusion rates were ranged from 83.6% to 100%; and the rate of instrumentation failure after nonunion was as high as 7% during occipitocervical fusion.

Objective: To explore whether additional bone grafting of atlantoaxial joint increase the bone fusion rate of iliac crest autograft in posterior occipitocervical fusion surgery.

Patients and Methods: Between January 2014 and January 2016, a total of 48 consecutive patients underwent posterior occipitocervical fusion with a screw-rod fixation system in a tertiary spine center. In the control group, we only placed a piece of autogenous iliac corticocancellous bone between the occipital and C2 vertebral laminae for fusion. In the hybrid fusion group, besides posterior occipitocervical autograft, we additionally pack some granular bone harvested from the iliac crest into bilateral atlantoaxial joint. In the postoperatively follow up, patients underwent computed tomography (CT) scan at every interval until bone fusion was confirmed. The related complications were also recorded.

Results: Only a piece of autogenous iliac corticocancellous bone was placed between the occipital and C2 in 24 patients to perform posterior occipitocervical fusion. In the other 24 cases, besides posterior occipitocervical autograft, we additionally pack some granular bone harvested from the iliac crest into bilateral atlantoaxial joint. All patients were followed for at least 24 months. Only 21 (87.5%) patients in the control group had confirmed posterior bony fusion on CT imaging while 24 (100%) patients in the hybrid fusion group had confirmed posterior bony fusion. There were postoperative implant-related complications in 2 patients; screw loosening was visible in one case, pullout and breakage of internal fixation was observed in another case. All two cases were belong to the control group (8.3%). Mean duration to posterior occipitocervical fusion was 5.5 months in the hybrid fusion group versus 6.1 months in the control group (P = 0.037). Of note, in the hybrid fusion group, the process of atlantoaxial joint fusion was faster than that of posterior occipitocervical fusion (5.1 months vs. 5.5 months, p = 0.103).

Conclusions: Additional bone grafting of atlantoaxial joint could increase the bone fusion rate of iliac crest autograft and promote the process of bone fusion in posterior occipitocervical fusion.

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author 1: none; author 2: none; author 3: none
METASTATIC SPINE DISEASE AND CANCER WITH UNKNOWN PRIMARY - A SURVIVAL ANALYSIS

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Introduction: Metastatic spine disease is a common complication to several malignancies. Selecting surgical or non-surgical treatment for symptomatic patients is a challenge for the clinician and even more in cases of cancer with unknown primary (CUP). The aim of this study was to compare the survival after spinal surgery for known versus unknown primary tumors.

Methods: 315 adult patients (213 men, 102 women, mean age 67.2 years) undergoing spinal surgery at Uppsala University Hospital due to metastatic spine disease 2006-2012 were included. 245 of the patients had known primary tumor and 70 had CUP. Data was collected prospectively for the Swedish Spine Register and retrospectively from the medical records. Actual survival data from the Swedish Population Register was compared for the two groups.

Results: The mean estimated survival time after surgery for patients with known primary tumor was 12.0 months (CI 9.9-14.0) and median 5.7 months (CI 4.2-7.1). For patients with CUP, the mean estimated survival was 19.3 months (CI 12.6-25.9) and median 11.7 (CI 4.6-21.0). Six months after surgery, 52% of the patients in the group with known primary tumor were alive while 67% were alive in the CUP group (p=0.03).

Conclusion: To our knowledge, this is the largest single-center cohort where survival for patients with known and unknown primary tumors before surgery for metastatic spine disease have been compared. Previous studies suggest that survival for the two groups is similar but in our material patients with CUP actually survived longer than those with known primary tumor. This implies that a more active surgical strategy could benefit patients with CUP and metastatic spine disease.

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RECONSTRUCTION OF CERVICAL CORPECTOMY DEFECT WITH EXPANDABLE IMPLANTS IN METASTASIC SPINE DISEASE. DO WE NEED POSTERIOR FIXATION?

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Introduction:
Metastasis of the cervical spine constitutes 10-15 % of all spinal metastasis. The surgical options include Laminectomy and decompression, posterior fixation and cervical corpectomy with or without additional fixation.

The cervical corpectomy provides an adequate spinal canal decompression, good anterior support and resection of most of the tumour. Expandable Vertebral body replacement (VBR) provided good stability with restoration of the sagittal profile.

Posterior fixation can be added through a lateral mass fixation, thus providing increasing stability to the construct, however this requires another approach with prolonged overall operation time, tissue trauma and blood loss with increasing risk of complications. These factors are especially important in patients with bad general condition.

Aim of the work:
to compare the results of treatment of tumours of the cervical and cervicothoracic region with corpectomy and expandable vertebral body replacement with and without additional posterior fixation.

Patients and methods:
We reviewed all patients operated with corpectomy and vertebral body replacement in the cervical and cervicothoracic region in two institutes in the period from 2008 to 2017. Both institutes used the same implant in their cases. Patients with tumours of the upper cervical spine were excluded from this study. The data and the images of the patients were retrieved and analysed, the Cobb angle and the mean vertebral body height and Cobb angle were measured in the pre-operative, post-operative and follow up x-rays using Surgimap. The incidence of complications and the duration of the surgery was assessed. Patients were further subdivided into two groups according to presence or absence of posterior fixation. The obtained data were statistically analysed using SPSS 25.0 and both groups were compared.

Results:
The study included 41 patients (21 males and 22 females), the average age was 60 (13-86) years. 31 patients had 1 level corpectomy, 10 had 2 levels and 2 had 3 level corpectomy. The follow up period averaged 14.8 months. 11 patients died during the follow up period because of the original disease. The patients were divided into two groups, group I with additional posterior fixation (22 patients) and group II without posterior fixation (21 patients). Both groups were compared regarding
the initial correction of the sagittal profile and height, loss of correction during the follow up, duration of surgery, incidence of complications and need for revision.

There was no significant difference between both groups regarding the initial correction of the height or the Cobb angle neither regarding the loss of height or lordosis in the follow up period. There was a significant difference in the operation duration in both groups (Group I 264 minutes, Group II 159 minutes) (p 0.05). Regarding the complications 2 patients from group II had to be revised due to increasing Kyphosis, they received posterior fixation. 1 Patient in group I had proximal junctional kyphosis. 2 Patients showed Tumor recurrence encroaching on the spinal canal, one of them was reoperated with extension of the corpectomy and fixation.

Conclusion:
Anterior cervical corpectomy and reconstruction using expandable cages without posterior fixation provides good results comparable to the result of anterior-posterior fixation, however with minimisation of the operative time and decreasing the risk of tissue damage and increased blood loss because of the posterior approach.

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PERIOPERATIVE COMPLICATIONS AND PROGNOSIS OF TOTAL EN BLOC SPONDYLECTOMY FOR SPINAL METASTASES IN ELDERLY PATIENTS

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Background: Only few studies have focused on the surgical results of total en bloc spondylectomy (TES) in elderly patients with metastatic spinal disease.

Purpose: This study aimed to evaluate the perioperative complications and prognosis in TES for metastatic spinal disease in elderly patients.

Methods: Eighty-seven patients who underwent TES between 2010 and 2015 were retrospectively reviewed and divided into group 1 (27 elderly patients, ≥65 years old) and group 2 (60 nonelderly patients, <65 years old). We evaluated overall survival (OS) after TES by using the Kaplan-Meier method and perioperative complication rate between two groups. In group 1, we evaluated OS between subgroup 1 (renal cell, thyroid, and breast cancer metastasis) and subgroup 2 (other primary tumors).

Results: Significant differences did not exist between the patients in groups 1 and 2 with regard to patient characteristics (sex, body mass index, diabetes, American Society of Anesthesiologists grade, %VC, Frankel grade, type of primary tumor, the presence of organ and bone metastasis, and history of preoperative radiation therapy) or surgical characteristics (operative time, intraoperative bleeding, tumor location, and number of resected vertebrae). The primary tumors were in the kidney (9 and 14 patients), thyroid (5, 4), and breast (5, 9), and in other organs (8, 33) in groups 1 and 2, respectively. With a median postoperative follow-up of 31 months, the OS at 1, 2, 3, and 5 years were respectively 88%, 78%, 72%, and 53% in group 1, and 86%, 68%, 59%, and 52% in group 2. No significant difference in OS was observed between the two groups (p=0.61, log-rank test). In group 1, the OS at 1, 2, 3, and 5 years were respectively 94%, 94%, 94%, and 70% in subgroup 1, and 73%, 37%, 0%, and 0% in subgroup 2. A significant difference in OS was found between subgroups 1 and 2 (p<0.01). No significant differences in postoperative complications were found between group 1 and 2 regarding pleural effusions (26% vs. 14%; p=0.32), proximal DVT or PE (11% vs. 4.5%; p=0.35), intraoperative dural injury (29% vs. 17%; p=0.26), postoperative delirium (11% vs. 2%; p=0.08), surgical site infection (0% vs. 3%; p=0.35), wound dehiscence (14% vs. 6%; p=0.23), pneumocephalus due to postoperative cerebrospinal fluid leakage (3.6% vs. 3.0%; p=0.89), and cerebellar hemorrhage (3.6% vs. 0%; p=0.29). In group 1, 22 patients (88%) maintained or regained their ambulatory capacity at the final follow-up.

Conclusions: The present study demonstrated that elderly patients who underwent TES tended to have more-frequent postoperative complications than nonelderly patients, although the difference was statistically insignificant. TES provided favorable local control for spinal metastases during the patients’ lifetimes. Even in patients with advanced age, TES can provide favorable prognosis, especially in those with spinal metastasis of renal cell carcinoma, thyroid carcinoma, and breast cancer.

TOTAL EN BLOC SPONDYLECTOMY FOR PRIMARY TUMORS OF THE LUMBAR SPINE
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Introduction: Total en bloc spondylectomy (TES) is an aggressive surgical technique that may be employed in the treatment of spinal neoplasms. TES in the lumbar spine is particularly challenging, owing to the unique anatomy of this region. Therefore, the majority of descriptions of TES in the lumbar spine are case reports and small case series.

Purpose: We aimed to evaluate our institution’s experience with TES in patients treated for primary lumbar spine tumors and investigate postoperative clinical outcomes.

Methods: We performed a retrospective chart review of all cases of surgically treated primary malignant or locally aggressive benign spinal tumor at our institution between 1993 and 2015. The patients who underwent TES for treatment of a tumor primarily located in the lumbar spine (L1-L5) were included. We investigated perioperative complications, reoperation rates for instrumentation failure, local recurrence and disease-free survival.

Results: We enrolled 30 patients (13 men and 17 women; median age and follow-up, 38 years and 87 months, respectively). Three, seven, and five cases involved previous radiotherapy, intralesional resection, and chemotherapy, respectively. The most common tumor was giant cell tumor (14 cases) followed by osteosarcoma (4 cases) and plasmacytoma (3 cases). Twenty-four patients (80.0 %) underwent single-level TES, two (6.7 %) underwent 2-level TES, and four (13.3 %) underwent 3-level TES. Twenty-two cases (73.3 %) required a combined anterior-posterior approach and the remaining eight patients underwent TES with a solely posterior approach. The median estimated blood loss was 1450 mL, and the median operative time was 11 hours. Twenty-six patients (86.7 %) developed at least one perioperative complication, with the most common being postoperative muscle weakness (24 patients, 80.0%) followed by surgical site infection and postoperative cerebrospinal fluid leakage (7 patients, respectively; 23.3% each). Of the 24 patients with postoperative muscle weakness, 19 completely recovered within six months postoperatively, and all patients could walk without any support at the last follow-up appointment. Revision surgery for instrumentation failure was required in six patients (20.0 %) at a median of 33 months after the index TES. Local tumor recurrence occurred in four patients (13.3 %), and all had undergone previous intralesional resection. Their 10-year disease-free rate was 75.0 %.

Conclusions: TES is a feasible and effective procedure for the treatment of primary tumors of the lumbar spine, but the risks of perioperative complications and late instrumentation failure should be acknowledged. Although postoperative transient lower extremity muscle weakness is an almost inevitable feature of lumbar spine TES, oncologic outcomes were good, especially in patients who underwent TES as their first surgical treatment. Therefore, being familiar with the indications for TES and the surgical technique is important.
ADVERSE EVENTS PROFILE IN EN BLOC RESECTION AND SURGERY FOR PRIMARY BONE TUMOR
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En bloc resection is uncommonly performed in the spine. The purpose of this study is to determine the AE profile in the population of patients undergoing en bloc resection for spinal metastases or surgery for primary bone tumor of the spine. Aand to investigate if Enneking appropriateness is correlated to the incidence of AE.

MATERIALS AND METHODS
This is a prospective cohort study in a single quaternary care referral center. All consecutive patients who underwent surgery for metastases with a curative intent or surgical excision of a primary tumor of the spine between January 1, 2009 to July 31, 2017 were included. AE were collected on a standardized form (Spine AdVesre Events Severity System, version 2 [SAVES V2] forms) at weekly-dedicated morbidity and mortality rounds. Data collected included patient demographics, primary tumor histology, neurological status, surgical intervention details, marginal status, Enneking appropriateness and all AEs (perioperative and post-operative).

RESULTS
A total of 112 patients (64 female, 40 male, median age 51 years, 116 procedures) met the inclusion criteria and had complete data. Of these, 96 patients had a primary bone tumor and 16 patients had a metastatic lesion. In the primary tumors, surgical resection margins were wide or marginal in 70% and intralesional in 26 %. This was an Enneking appropriate (EA) resection in 73% and Enneking inappropriate (EI) in 27% of procedures.

There was at least 1 AE observed in 70.6% of patients and there was 1 death seen. Intraoperative AEs occurred in 27.7% and common surgical complications seen were dural tear (19.5%), visceral or neuro vascular injury (20.7%) and massive blood loss in excess of 2L (23%). Post operative AE occurred in 65.5 % and usually due to either a systemic infection (UTI/pneumonia) in 39.5 % or a cardiac event (35.5%). Incidence of thromboembolic events (DVT/PE) was 10.5%. Delirium occurred in the postoperative period in 23.6% and there was neurological deterioration recorded in 14% . Implant related complications (malposition, failure) in the intraoperative and postoperative period was seen in 12% of procedures.

We found that slightly more AE occurred in patients who underwent EI resection (75%) than if a EA resection was performed (66%) but similar irrespective of tumour pathology (69% in metastatic lesions and 71% for primary bone tumor). There were wound related complications seen in 22.4 % of the patients but more common in lesions around the occiput or sacrum.

CONCLUSION
Enbloc resection for metastatic tumours and surgery for primary bone tumors is associated with high incidence of AE. This should be of significant consideration when counselling these patients for surgical intervention and should be confronted to the curative intent of the procedure. A better understanding of this AE profile will benefit the surgeon and oncologist in developing preventative strategies in this patient cohort.
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EFFECT OF TRANEXAMIC ACID FOR PERIOPERATIVE BLOOD LOSS IN DECOMPRESSION SPINE SURGERIES: A DOUBLE BLIND PROSPECTIVE RANDOMIZED CONTROLLED STUDY

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Background: Several authors have reported the efficacy of preoperative intravenous injection of tranexamic acid (TXA) that reduced perioperative blood loss in artificial joint replacement surgeries for Japanese patients. However, the number of same reports with high evidence levels in spine surgeries is still very few.

Objective: To evaluate efficacy and safety of TXA administered just before the commencement of decompression spine surgeries in Japanese patients.

Methods: Seventy-nine consecutive Japanese patients who underwent open-door cervical laminoplasty or trumpet-shaped lumbar laminectomy (except for less invasive surgeries including the Love procedure or more invasive spinal instrumentation surgeries) for cervical compressive myelopathy or lumbar spinal canal stenosis during 2017 were prospectively and randomly divided into two groups, TXA and control after exclusion as shown in Results. The anesthesiologist in charge of the surgery tossed a coin and the patient was assigned to either of the two groups so as not to let the surgeons know the result till the end of the surgery. Only patients who were assigned to the TXA group received intravenous injection of 1g of TXA just before the commencement of the surgeries. All the surgeries were performed by 2 surgeons and only 3mm diameter suction drain was used for a patient. Intra- and postoperative blood losses were compared between the two groups. The Paired-t, Mann-Whitney U or chi-square tests were used to compare the two groups and differences were considered significant if the P-values were < 0.05.

Results. After exclusion of 21 patients (1 chronic renal failure; 3 malignancies; 4 dura tears; 13 antiplatelet or anticoagulant takers), 40 patients were assigned to the TXA group (13 females and 27 males; mean age, 67.5 ± 13.2 yrs) and 39 were assigned to the control group (9 females and 30 males; mean age, 66.2 ± 11.4 yrs). There were no statistically significant differences between the two groups in relation to age, gender, body weight, body mass index, rate of the surgeries performed (cervical or lumbar), number of decompressed laminae, hematologic data and operating time. Although intraoperative blood loss in the TXA group (130.8 ± 99.5 mL) was not significantly different from that in the control group (120.4 ± 89.6 mL, P > 0.05), postoperative blood loss until the first postoperative day in the TXA group (138.5 ± 62.5 mL) was significantly less than that in the control group (224.3 ± 92.3 mL, P < 0.001). A patient required hematoma removal in the control group because of palsy. No thromboembolic events occurred in either group.

Conclusion. TXA significantly reduced postoperative blood loss without any detrimental complications in cervical laminoplasty and lumbar laminectomy.

Disclosures:
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SURGICAL TRAINING IN SPINE SURGERY: SAFETY AND PATIENT-RATED OUTCOME

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Background
The surgical education of spine surgery residents (RES) in the operation theatre is a fundamental part of their training. However, patient safety and clinical outcome have the greatest priority and must not be sacrificed in favor of education. This can present a dilemma and inappropriate judgement may result in increased morbidity and less satisfied patients. The aim of this study was to investigate the difference in surgical complication rates and patient reported outcomes between lumbar procedures carried out either by experienced spine surgeons or by supervised spine surgery residents in a large Swiss teaching hospital.

Methods
This was a single-center retrospective analysis of prospectively collected data within the EUROSPINE Spine Tango Registry, using data from our institution between the years 2004-2015. The study included a total of 1415 patients. Patients operated on by board certified spine surgeons (BCS) served as a control group. Patients were divided into three groups based on the surgical procedure: lumbar single level fusion (SLF): RES n=60, BCS n=261, single level decompression for lumbar spinal stenosis (SLD): RES n=72, BCS n=246 and surgery addressing disc hernia, such as microdiscectomy or sequestrectomy (DH): RES n=247, BCS n=529. Patients completed the multidimensional Core Outcome Measures Index (COMI; 0-10 scale) preoperatively and 3 and 12 months postoperatively plus single items concerning satisfaction and global treatment outcome (GTO) at 3 and 12 months. The outcomes of interest were operation time, blood loss, complications, length of hospitalization as well as the patient reported outcome measures. Multiple linear regression models were used to investigate the influence of resident performance on the outcomes of interest.

Results
There were no differences between RES and BCS in the surgical or medical complication rates (p>0.05). Blood loss was found to be significantly higher in RES’ surgeries for SLD only (p<0.05) and operation time was significantly longer only in DH cases (p<0.05). Length of hospitalization was slightly but not significantly higher in the RES group in SLF cases (p=0.178). Baseline status as given by COMI scores was similar preoperatively in patients of RES and BCS. COMI scores significantly improved after all three types of procedure (p<0.0001) without difference between the patients of RES and BCS (p=0.05). There was no difference between RES and BCS patients with regard to satisfaction and GTO.

Conclusion
In the given setting, surgical training of spine surgery residents under guided supervision by board certified spine surgeons was shown to be safe as it was not associated with increased morbidity and mortality. Furthermore, it had no detrimental influence on patient reported outcome.
Disclosures: