CLINICAL AND RADIOLOGICAL OUTCOMES OF CONSERVATIVE TREATMENT FOR UNILATERAL SAGITTALLY SPLIT FRACTURES OF THE C1 LATERAL MASS

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Introduction: Unilateral sagittally split fracture (USSF) of the C1 lateral mass (LM) is a rare variant of C1 atlas fracture. The integrity of the transverse atlantal ligament (TAL) is a critical factor in assessing the stability in cases of C1 atlas fracture. To date, however, specific treatment guidelines for USSF of C1 LM have not been established. In addition, the impact of the TAL injury on treatment outcomes remains controversial in USSF of C1 LM. Therefore, this study aims to investigate clinical and radiological outcomes of USSF of C1 LM conservatively treated and to suggest appropriate treatment guidelines.

Methods: We enrolled 26 consecutive patients (mean age, 52 years) with USSF of C1 LM. The TAL injury group comprised 16 patients (9 patients with type I and 7 with type II by the Dickman’s classification), and the TAL intact group comprised 10 patients. We treated all patients with conservative methods, including skull traction followed by a rigid brace for the TAL intact group and a halo vest for the TAL injury group for 12 weeks. The mean follow-up period was 16 (range, 12-47) months. In addition, three spine surgeons assessed the following radiological parameters at the initial and last follow-up: total LM displacement (LMD), unilateral LMD at the fracture side, atlantodental interval (ADI), clivus canal angle (CCA), atlantooccipital joint axis angle (AOJAA), and basion-dens interval (BDI). We used the averages of three measurements as the final results. The radiological outcomes were evaluated by comparing those measured at the initial presentation with those measured at the last follow-up in both groups. Finally, clinical outcomes were evaluated using the visual analog scale (VAS) and Odom’s criteria.

Results: In the TAL intact group, at the last follow-up, the total LMD, unilateral LMD at the fracture side, ADI, CCA, AOJAA, and BDI were well-maintained compared with at the initial presentation. However, in the TAL injury group, the total LMD, unilateral LMD at the fracture side, ADI, CCA, AOJAA, and BDI were worsened compared with at the initial presentation. The worsening of the total LMD, unilateral LMD at the fracture side, ADI, CCA, and AOJAA were more severe in type I TAL injury than in type II TAL injury. In addition, the worsening of BDI was severe in type I TAL injury, but was not statistically significant. VAS significantly decreased in the TAL intact group but not in the TAL injury group. According to the Odom’s criteria, satisfactory outcomes were higher in the TAL intact group than in the TAL injury group.

Conclusion: Conservative treatment for USSF of C1 LM with TAL injury allows subsidence of the occiput into C2 with the aggravation of LMD of C1, resulting in coronal and sagittal malalignment of the occipitocervical junction and thereby leading to unsatisfactory clinical outcomes. This study suggests that early surgical stabilization should be considered as a treatment of choice for USSF of
C1 LM with TAL injury.

Disclosures:
author 1: none; author 2: none
FUNCTIONAL OUTCOME OF ELDERLY PATIENTS TREATED FOR ODONTOID FRACTURE. A MULTICENTER STUDY

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Background: Treatment of odontoid fractures in the elderly is still debatable since both conservative and surgical options present advantages and disadvantages in terms of functional outcome.

Methods: 147 patients with odontoid fracture underwent a baseline cervical CT scan. Fractures were classified according to the Anderson and D’Alonzo and the Roy-Camille classifications. Philadelphia type cervical collar was always positioned soon after the spine trauma and kept as a treatment whenever acceptable. Halo-vest, anterior odontoid screw fixation, C1-C2 posterior arthrodesis (Harms technique) and occipito-cervical fixation were the other treatment adopted. On admission ASA score, modified Rankin scale (mRS-pre) and Charlson Comorbidity Index (CCI) were assessed. From 12 to 15 months after treatment a second modified Rankin scale (mRS-post) together with Neck Disability Index (NDI) and Smiley Webster Pain Scale (SWPS) were administered to estimate functional outcome. Fracture healing process was evaluated at 12 months through a cervical CT scan. Dynamic cervical spine x-rays were obtained whether necessary. Chi square/Fisher exact test and logistic regression were performed for statistical analysis.

Results: 79.8% of patients showed a good outcome according with NDI (range 0-48). No significant differences were observed between patients of 65-79 years and ≥80 years (p=0.81). CCI greatly correlated with mRS-post, with higher indexes (6-8) reported in 68.8% of cases characterized by good outcomes (p=0.05).
mRS-pre strongly correlated with NDI (p=0.000001) and with mRS-post (p=0.04).
Logistic regression analysis showed that, whatever the fracture type and fragment dislocation, CCI, mRS-pre and all the surgical procedures were associated with worse NDI, while both C1-C2 posterior arthrodesis and occipito-cervical stabilization were associated with worse mRS-post.

Conclusions: mRS-pre and CCI represented two strong independent predictive values respectively for functional outcome and for post-treatment degree of disability regardless of the treatment chosen. Compared to conservative immobilizations, all the surgical techniques for odontoid fractures revealed no advantages in the elderly in terms of functional outcome, with this latter being often unconnected to the fracture healing attitude.

Table 1: Analysis of factors affecting outcome in relation to mRS-post

<table>
<thead>
<tr>
<th>Logistic regression analysis: mRS-post</th>
<th>P</th>
<th>HR</th>
<th>95% C.I. for HR Lower</th>
<th>95% C.I. for HR Upper</th>
</tr>
</thead>
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<tr>
<td>Age ≥80</td>
<td>0.05</td>
<td>3.189</td>
<td>0.998</td>
<td>10.188</td>
</tr>
<tr>
<td>Charlson Comorbidity Index: 6 or 7 or 8</td>
<td>0.184</td>
<td>2.045</td>
<td>0.712</td>
<td>5.872</td>
</tr>
<tr>
<td></td>
<td>ASA 3</td>
<td>ASA 4</td>
<td>mRS-pre: 4 or 5</td>
<td>Anderson D'Alonzo Classification 2</td>
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THE WINDOW OF OPPORTUNITY FOR SURGICAL DECOMPRESSION IN PATIENTS WITH ACUTE TRAUMATIC CERVICAL SPINAL CORD INJURY

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Acute traumatic spinal cord injury (tSCI) is a devastating event often leaving patients with profound and lasting motor, sensory and autonomic disability. Recent clinical practice guidelines for the management of adult patients with tSCI suggest early surgical decompression (SD), i.e. within 24 hours after injury. In this study we aimed to analyse the effect of timing of SD and instrumented fusion within the first 24 h after injury in patients with acute cervical tSCI and persistent spinal cord compression to achieve a significant neurologic recovery. Therefore, the ROC (receiver operating characteristic) curves were used to visualize the quality of the time from injury to SD with respect to the neurological improvement of at least 2 AIS grades and to determine the best theoretical cut-off point for this classifier. Additionally, the association of the degree of spinal canal compromise (SCC) and severity of SCI (complete or incomplete) with neurologic recovery was evaluated and possible interaction between the SCC and timing of SD was examined. Only patients with the American Spinal Injury Association (ASIA) Impairment Scale (AIS) grades of A through C and fracture and/or dislocation of the lower cervical spine with MRI-confirmed spinal cord compression were enrolled. The primary outcome was the change in AIS grade at the 6-month follow-up. Of the 61 enrolled patients, 53 patients concluded the study. Of the 53 patients 34 presented as AIS A, 7 as AIS B and 12 as AIS C injuries. We found that both the time of SD and SCC were statistically significant predictors, i.e. that the longer was the time to decompression or the larger was the SCC, the larger was the probability that AIS will not improve for at least 2 grades (Fig.). The injury severity was a marginally significant predictor of neurologic recovery. The optimal cut-off point to achieve an improvement of at least a 2 AIS grades was at 6 h with a 95% confidence interval from 5 to 11 h after injury. Sensitivity and specificity at optimal cut-off point were 0.92 and 0.5, respectively. Our results show that the effect of SD in the first 24 h after acute cervical tSCI on neurologic recovery is time dependent and suggest that SD should be achieved as soon as possible with the upper limit of the window of opportunity between 5 and 11 h after injury, depending on the degree of SCC and injury severity. In our view, due to heterogeneity of tSCI no uniform cut-off for the timing of SD can be set for all patients and, therefore, different approaches regarding the timing of SD should be tailored to specific SCI patterns and levels of SCI.
Fig. Plot of the predicted probabilities for different times to SD, SCC and injury severity (AIS A vs. AIS B or C). AIS- American Spinal Injury Association (ASIA) Impairment Scale; SCC- spinal canal compromise; SD- surgical decompression.

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EARLY VERSUS DELAYED DECOMPRESSION FOR TRAUMATIC CERVICAL SPINAL CORD INJURY: APPLICATION OF THE AOSPINE SUBAXIAL CERVICAL SPINAL INJURY CLASSIFICATION SYSTEM TO GUIDE SURGICAL TIMING

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Abstract

Purpose: The use of the AOSpine subaxial cervical spinal cord injury classification system (SCSCICS) was used to explore the types of traumatic cervical spinal cord injury (CSCI) that do not require early surgery and to guide the timing of decompression surgery.

Methods: A single-centre prospective cohort study was conducted that included patients with traumatic CSCIs (C3-C7) between February 2015 and October 2016. The time point of 72 hours after the CSCI was identified as a dividing line, and patients were separated into an early group and a late group. Each group was divided into A0, A1-4, B, C/F4 and F1-3 subgroups. The primary outcomes were ordinal changes in the ASIA Impairment Scale (AIS) and the Spinal Cord Independence Measure III (SCIM version 3) at a 12-month follow-up. The secondary outcomes included length of hospital stay, postoperative neurological deterioration, other complications and mortality.

Results: A total of 402 patients were included. Of these, 187 patients underwent early decompression surgery, 215 patients underwent delayed decompression surgery. Statistical results included the following comparisons of the Early vs Late groups: AIS improvement ≥1 grade (combined groups: P=0.000; A0: P=0.554; A1-4: P=0.084; B: P= 0.013; C/F4: P= 0.040; F1-3: P=0.742); AIS improvement ≥2 grades, P=0.003 for all groups; SCIM version 3 (combined groups: P=0.000; A0: P=0.126; A1-4: P=0.912; B: P= 0.006; C/F4: P= 0.111; F1-3: P=0.875).

Conclusions: Type A and F1-3 fractures are not required to undergo aggressive early decompression. Type B and type C/F4 fractures should receive early surgical treatment for better clinical outcomes.

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author 1: none; author 2: none; author 3: none
IN CERVICAL SPONDYLOTIC MYELOPATHY, IN THE EVALUATION OF C2-7 ANGLE, SPINAL CANAL STENOSIS IS UNDERESTIMATED WHEN THE DIFFERENCE BETWEEN MRI AND DCTM EXTENSION POSITION OR XP EXTENSION POSITION IS LARGER THAN 17 DEGREES

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BACKGROUND: CT myelography which is one of the invasive examination is often skipped, and it is often evaluated only by MRI. However, in the Cervical Spondylotic Myelopathy (CSM), since the burrowing of the ligamentum flavum at the extended position becomes an important compression factor, there is concern that the number of canal stenosis may be underestimated depending on the imaging posture of MRI. PURPOSE: It is to examine the measurement value which is not underestimated by MRI for cervical myelopathy compared with DCTM and cervical X-ray dynamic imaging. MATERIAL AND METHODS: Sixty of the 138 patients who underwent DCTM were included. Excluded patients were cervical ossification of posterior longitudinal ligament, kyphosis, reoperation. There were 35 males and 25 females. C2-7 angle was measured in cervical spine XP lateral image of neutral (NXP), flexion (FXP) and extension position (EXP), and cervical MRI T1WI sagittal, cervical spine DCTM of maximum flexion position (FDCTM) and maximum extension position (EDCTM). Spinal canal stenosis was measured by MRI T2 weighted image sagittal and EDCTM sagittal. The spinal canal stenosis was positive with indentations in the spinal cord due to thickening of ligaments and those with stenosis due to direct compression. In addition, the number of spinal canal stenosis was compared with MRI and DCTM, and the above items were compared between the group having the same number of stenosis (S group) and DCTM group having the larger number of stenosis (D group) investigated. RESULTS: There were 31 cases in the S group and 29 cases in the D group. The C2-7 angle of MRI was 12.6 ° in the S group and 8.7 ° in the D group. The C2-7 angle of NXP was 16.5 ° in the S group and 15.7 ° in the D group. The C2-7 angle of the EDCTM was 20.1 ° in the S group and 23.7 ° in the D group. The C2-7 angle of the EXP was 19.7 ° in the S group and 24.3 ° in the D group. There was no statistically significant difference between the two groups. The differences in C2-7 angle between EXP and MRI (EXP-MRI) were 12.64 ° for the S group and 16.92 ° for D group. The difference between the C2-7 angle of EDCTM and MRI (EDCTM-MRI) was 9.38 ° for the S group and 16.55 ° for the D group. Statistically significant differences were observed between the two groups, respectively (p = 0.046, 0.011). With respect to the above, the cut-off value was obtained using the ROC curve, and both EXP-MRI, and EDCTM-MRI were 17.0 degrees. DISCUSSION: In outpatient clinical practice, it is mostly only XP and MRI. Therefore, the difference between C2-7 angle between EXP and MRI was considered particularly important. CONCLUSION: If the C2-7 angle difference between XP and MRI is 17 ° or more, it is suggested that the number of canal stenosis may increase further, and attention is required.
Disclosures:
PREDICTORS OF KYPHOTIC DEFORMITY AFTER POSTERIOR FIXATION FOR THORACOLUMBAR BURST FRACTURE
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Objective: Posterior spinal instrumentation with pedicle screw fixation is a standard procedure for unstable thoracolumbar burst fracture. Segmental kyphotic deformity is a common occurrence, especially after implant removal, but predictive factors for this complication are not understood. In this retrospective case-control study, factors associated with kyphotic deformity after posterior fixation for thoracolumbar burst fracture were investigated.

Study design: Retrospective case series

Methods: Of 164 patients receiving posterior fixation for thoracolumbar burst fracture (T10-L4) from December 2008 to June 2016, 60 (male/female 29/31; age 53.24±13.82 years) who were followed for more than 6 months and underwent implant removal after fracture union were included in the study. None of these patients underwent anterior fixation, and patients with two or more burst fractures were excluded. The primary outcome was kyphotic deformity, which was defined as a bisegmental kyphotic end plate angle (sagittal Cobb angle) of ≥25° on thoracolumbar lateral X-ray or computed tomography (CT) at the final observation. The secondary outcome was recurrence of kyphosis, which was defined as an increase in the sagittal Cobb angle of ≥15° at the final observation compared to the angle at the time of implant removal surgery. Age (≥60 years), gender, kyphotic deformity (≥25°) at the time of injury, and a vacuum phenomenon at the cranial disk of the fractured vertebra before removal of the implant were examined as factors with a potential relationship with kyphotic deformity. Multivariate logistic regression analysis was performed with these factors as explanatory variables and kyphotic deformity as the objective variable. A similar analysis was performed for recurrence of kyphosis.

Result: Kyphotic deformity at the final observation was found in 17 cases (28%). Multivariate logistic regression analysis showed significant positive associations of kyphotic deformity at the time of injury (odds ratio (OR) 9.0, 95% confidence interval (CI) 1.6-49.2, P = 0.01) and a vacuum phenomenon (OR 4.8, 95% CI 1.1-20.9, P = 0.04) with kyphotic deformity at the final observation. Recurrence of kyphosis occurred in 35 cases (58%) and was significantly associated with a vacuum phenomenon (OR 3.4, 95% CI 1.1-10.4, P = 0.03).

Conclusion: In patients with thoracolumbar burst fracture, those with kyphotic deformity of ≥25° at the time of injury and a vacuum phenomenon before removal of the implant were significantly more likely to have kyphotic deformity of ≥25° at final observation. A vacuum phenomenon before removal of the implant was also significantly associated with recurrence of kyphosis.

Disclosures:
author 1: none; author 2: none; author 3: none
Chronic axial neck and low back pain due to degenerative disease is extremely common. However, identifying the primary pain generator is notoriously difficult. The CT-SPECT is emerging as a new diagnostic modality for this purpose. Single-photon emission computed tomography (SPECT) uses detection of 99mTc-Technetium bound to osteoblasts to gain information on the amount of bone remodeling activity in the spinal axis. Using imaging merging software between the SPECT and CT, we can thus identify with a high degree of anatomic precision which parts of the spine exhibit increased osteoblastic activity. This activity has been shown to be indicative of pain generation.

We evaluated a total of 400 patients with chronic neck and/or low back pain, refractory to maximal conservative treatment, in which the source could not be identified by the traditional imaging techniques (dynamic X-rays, CT, and MRI). These patients were evaluated by CT-SPECT of the cervical and/or lumbar spine. The results were negative in 175 patients. Of the remaining 225 patients, 121 exhibited multiple areas of increased uptake and were considered non-operative. In the remainder of patients, 63 demonstrated increased uptake in one or two (adjacent) cervical levels and were treated by either an anterior cervical discectomy and fusion or a minimally invasive posterior cervical fusion, whereas 38 showed increased uptake in one or two (adjacent) lumbar levels and were treated by a minimally invasive interbody fusion. 92% of the cervical and 89% of the lumbar surgical patients exhibited significant pain relief at the 3- and 6-month follow-up visits, confirming that the operation addressed the primary pain generator in most cases. We conclude that CT-SPECT may provide a unique diagnostic advantage over the current modalities in identifying the primary pain generator in patients with pain of degenerative spinal origin.

Figure: Sagittal T2-weighted MRI, CT, and CT-SPECT of the lumbar spine showing disproportionately increased Technetium uptake at L1-2, suggesting a single major pain generator. The patient underwent a minimally invasive lateral L1-2 fusion, with 95% improvement in pain level.
Disclosures:
author 1: none; author 2: none; author 3: none
MULTIFIDUS MUSCLE MORPHOLOGY, FUNCTION AND BODY COMPOSITION IN UNIVERSITY LEVEL
ICE HOCKEY PLAYERS WITH AND WITHOUT LOW BACK PAIN

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Introduction: There is a growing body of evidence in spine research suggesting a link between low back pain (LBP) and paraspinal muscle morphology and function. Imaging studies of both athletic and non-athletic populations with LBP have reported paraspinal muscle degenerative changes including atrophy, side-to-side asymmetry and functional deficits of the lumbar multifidus (LM) muscle. Despite the high incidence of LBP in ice hockey players, no study has examined LM characteristics in this group of athletes. While body composition is recognized to influence muscle size and quality, the relationship between accurate measures of body composition and LM characteristics in athletes also deserve further attention. Therefore, the primary aim of this study was to examine the relationships between LM muscle morphology, function, echo-intensity (EI) and body composition among a group of university level ice hockey players. A secondary aim was to compare multifidus muscle characteristics among players with and without LBP.

Methods: LM muscle ultrasound examinations were performed 32 ice hockey players (18 female and 14 male). LM cross-sectional area (CSA) measurements were obtained at the L5-S1 level, bilaterally, in a prone and standing position. LM thickness (TK) at rest and during submaximal contraction (e.g. contralateral arm lift) in both positions was also obtained to assess muscle function. The % change in TK during submaximal contraction was calculated using the following formula: [(TK contracted-TK rest)/TK rest *100]. LM muscle EI was obtained using a standard histogram function in order to assess the amount of intramuscular fat and connection tissue. Body composition measures were acquired using dual-energy xray absorptiometry (DEXA). Self-reported questionnaires were used to obtain LBP history data.

Results: LM CSA was significantly associated with height, weight, total bone mass and total lean body mass (p<0.01). Body mass index (BMI) was not associated with LM CSA or EI. EI was strongly associated with total % body fat, total lean mass and total fat mass (p<0.001) and significantly greater in female (p<0.001). EI was not associated with LM function (e.g. % TK change). LM CSA in prone and TK at rest was significantly smaller in players reporting the presence of LBP in the previous 4 weeks (p=0.004, p=0.04, respectively). LM CSA side-to-side asymmetry in the standing position was also significantly greater in players who reported LBP in the previous 3 months (p=0.03). There were no significant differences LM EI or % TK change in prone or standing between players with and without a history of LBP.

Conclusion: DEXA body composition measurements were significantly associated with LM morphology. Hockey players with LBP showed specific deficits in resting LM CSA and TK, as well as greater side-to-side asymmetry compared to those without LBP. Preseason screening assessment of LM could be useful and incorporated in injury prevention programs.
Disclosures:
author 1: none; author 2: none; author 3: none; author 4: not indicated; author 5: none
3D MODELING IN THE PLANNING OF SPINAL DEFORMITY SURGERIES
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Introduction
Modern additive technologies allow reproducing an object of surgical intervention with high accuracy to facilitate visualization, more accurate preoperative planning and reduce the risk of postoperative complications in patients. In modern spinal surgery, of particular importance is the use of 3D modeling, which allows for better spatial understanding of the deformity, leading to better surgical results.

Purpose
To evaluate the effectiveness of 3D modeling of the spine in facilitating diagnosis and preoperative planning, as well as surgical technique.

Materials and methods
Prospective case series study of 38 surgically treated patients with complex anatomy of the spine. The treated spinal pathology included mixed developmental anomalies, angular kyphotic deformities, as well as patients after multiple surgical interventions. In 16 patients there were complex unclassifiable developmental spine anomalies. In 9 patients aplasia of the structures of the spinal column was noted. In 13 cases, 3D modeling was used in patients after multiple surgical intervention with severely altered vertebral anatomy. The models were based on the CT data of the spine.

Results
38 patients underwent surgical treatment using preoperative 3D modeling. To assess the effectiveness of preoperative modeling in planning the correction of the spine a survey was conducted with the participation of 7 spinal surgeons. For planning the type and extent of surgical intervention, several criteria were used. The questioning was conducted based on X-ray, CT and MRI studies. The second stage of the survey was conducted with the addition of the 3D model of the patient's spine to the imaging data. The data of the questionnaire showed that in 31% of cases during the second stage of the survey, after studying the 3D model, the surgical tactic was significantly modified. An assessment of the rate of implant malposition with and without 3D modeling was also performed. When inserting pedicle screws without 3D modeling, using the free-hand technique, the rate of screw malposition was 13%. In patients with preoperative 3D modeling, the rate of malposition was 3% according to postoperative CT scan data.

Conclusion
The use of preoperative 3D modeling makes it possible to improve the results of surgical intervention in complex spine pathology. 3D modeling allows to increase the accuracy and speed of insertion of pedicle screws, reduce the risk of screw malposition, and reduce the risk of damage to the neural structures of the spinal canal. Preoperative 3D modeling allows for accurate assessment of the length of fixation, zone of osteotomy and possibility of screw insertion.

Disclosures:
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THE CORRELATION ANALYSIS OF RADIOLOGIC PARAMETERS OF PELVIS WITH THE PELVIC INCIDENCE
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Introduction
The exact measurement of PI has been emphasized due to its clinical importance. Although PI is
known to be unchanged radiological parameters, recent studies demonstrated PI can be changed.
Several literatures showed PI was related with age, sex, and posture. Pelvis is the three-
dimensional anatomical structures and have various morphological parameters. In terms of
previously introduced clinical parameters related with PI, we analyzed to the accuracy of pelvic
parameters the relationship between PI and the various radiological parameters of pelvis.

Methods
We analyzed in total 31 patients who had taken both supine pelvis computerized tomogram (CT)
and standing whole spine anteroposterior (AP) and lateral radiograph (LAT). We obtained pelvic
parameters including PI from both whole spinal radiographs and CT. The radiological parameters of
pelvis were 1. the width-of-pelvis related parameters (distance between both femoral head centers,
anterior ends of both sacroiliac joints, and medial borders of both posterosuperior iliac spines; DFH,
DSIJ, and DPSIS, respectively), 2. the depth-of-pelvis related parameters (AP diameters of femoral
heads and S1 upper endplate, and distance between midpoint of both femoral head centers and
midpoint of upper endplate of S1 in sagittal image; FHAPD, S1UED, and FSD, respectively), 3. the
sacroiliac (SI) joints related parameters (diverging angle of SI joints at S1 articular surface and
indentation angle of SI joints; SIJA and SIIDA) and 4. the pelvic obliquity (PO) as shown in Figure 1.
Correlation analysis and multiple regression analysis were performed to reveal the factor related
with pelvic incidence.

Results
Nineteenth males and 12 females were included. Mean age was 54.4±18.1 years (range: 18-83
years). PI was positively correlated with female sex (r=0.422, p<0.018) and age (r=0.6, p<0.001). PI
was negatively correlated with FSD (mean 113.0±11.1mm, r=0.408, p=0.023) and positively with
DPSIS (mean 64.2±8.9mm, r=0.507, p=0.004). FSD was negatively correlated with age (r=-0.434,
p=0.015). DPSIS was positively correlated with female sex (r=0.567, p<0.001). In multiple
regression model, age and DPSIS were the best predictors of PI (R=0.689, adjusted R
square=0.627, p<0.001). SI joints related parameters were not significantly correlated with PI.

Conclusions
Female sex was positively correlated with PI and DPSIS. Age was positively correlated with PI and
negatively with FSD. As shown in other literatures, PI was related with sex and age.
Disclosures:
author 1: none; author 2: none; author 3: none
DOES PARASPINAL FATTY MUSCULAR DEGENERATION INFLUENCE SURGICAL INDICATION IN DEGENERATIVE LUMBAR LISTHESIS?

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Introduction:
Fatty degeneration of the paraspinal muscles is an important factor for lumbar sagittal dysbalance and for the development of lower back pain. To our knowledge there are no published data, which analyse the influence of fatty muscular degeneration on decision making for or against an operative or non-operative treatment in degenerative listhesis of lumbar spine.

Materials and methods:
Records, radiographs and MRI scans of symptomatic and degenerative lumbar listhesis patients were analysed retrospectively in our high volume spine centre. The probands were divided into two groups: one received non-operative (NONOP) treatment whereas the other underwent spinal surgery (OP).

Data gathered, were age, sex, lower back or leg pain and neurological deficit. MRI and CT scans of lumbar spine were performed before surgical or non-operative treatment and the grade of fatty degeneration of the multifidus muscle (MF) and the erector spinae muscle (ES) were documented. For this purpose the Goutallier classification was performed. In addition, the perpendicular distance of the multifidus muscle to lamina (MLD) was measured. Additional radiological analysis included the size of the neuroforamen as an indicator for nerve root compression. The grade of the listhesis was documented in accordance to the Meyerding classification. A statistical analysis evaluated a potential influence of these parameters on the medical decision making for or against a treatment regimen.

Results:
100 patients were enrolled, 50 underwent a TLIF spondylodesis and 50 were treated non-operatively. 80% of all individuals were female, while 20% were male.

In the OP group 4% showed only low back pain, while 96% had a combined sciatic pain and low back pain. In the NONOP group 14% had lower back pain, 4% an isolated sciatic pain and 82% a combination of leg and back pain.

In the NONOP group 46 cases were classified as Meyerding I° and 4 probands as Meyerding II°. In the OP group there were 14 cases classified Meyerding II-III° and 36 cases with Meyerding I°. MRI and CT scans showed especially in patients aged > 80 years a high grade of fatty degeneration (Goutallier 3 and 4). Corresponding we found on average a higher grade of fatty degeneration in the OP group than in the NONOP group. In addition, females showed on average a higher grade of muscular degeneration (Goutallier 4 was only found in the female group).

An analysis of the perpendicular distance of the multifidus muscle to lamina showed no difference between the OP group (11.44 mm, SD 594) and the NONOP group (12.52 mm, SD 5.70) with p > 0.05.

The neuroforaminal height was significant lower in the OP group (5.16 mm, SD 1.48) than in the NONOP group (6.53, SD 1.45) with p < 0.001)

Conclusion:
Our data show a significant correlation between fatty degeneration, the height of the neuroforamen
and the choice of the treatment for degenerative listhesis. We found no influence on the MLD distance. However, further clinical trials are required investigating the influence of paraspinal muscular strengthening.

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