

surveys.

**Materials and Methods:** Pre- and postop data were pooled from 3 prospective studies with systematically and identically collected data assessing expectations and fulfillment of expectations of lumbar surgery. During preop interviews patients completed the 18-item Lumbar Surgery Expectations Survey assessing amount of improvement expected for symptoms, physical function, and mental well-being; possible score range 0-100, higher=greater expectations. During interviews 2 years after surgery patients were asked how much improvement they received for each item. The proportion of postop improvement received divided by preop improvement expected was a measure of fulfillment of expectation; range 0 (no expectations fulfilled) to >1 (expectations surpassed). Preop information included work status, depressive symptoms, prior TJA, prior lumbar surgery, and ODI. Postop information included number of vertebrae operated on, surgical complications (fracture, infection), and ODI. Proportion of expectations fulfilled was the dependent variable in multivariable linear regression models.

**Results:** For 1137 patients, mean age was 59, 49% were women, 34% had stenosis, 26% spondylolisthesis, 15% herniated disc, 9% degenerative disc, and 7% scoliosis. 144 patients (13%) had a prior TJA. Patients who had TJA were older (58 vs 68, <.0001) and were less likely to be working (40% vs 21%, p<.0001), but did not differ by gender, expectations, preop depressive symptoms, and ODI. Mean time to follow-up was 2.6 yrs (range 2-3); 14% had a postop surgical complication. The proportion of expectations fulfilled was .75 (range 0-3) and was less for patients with prior TJA (.69 vs .76, p=.03). In multivariable analysis controlling for preop expectations and complications, the following were associated with less fulfillment of expectations: more preop depressive symptoms (coef 7, 95%CI 3-10, p=.0002), not working (coef 7, CI 4-10, p<.0001), prior lumbar surgery (coef 8, CI 4-12, p<.0001), more vertebrae operated on (coef 6, CI 2-10, p=.007), less pre- to postop improvement in ODI (coef 1, CI .9-1.1, p<.0001), and having a prior TJA (coef 5, CI 1-9, p=.03). R squared for the model was .50.

**Conclusion:** In addition to surgical and psychosocial variables, prior TJA was associated with more unfulfilled expectations. Possible reasons include comparison to favorable TJA outcomes, more complex lumbar symptomatology with coexisting hip/knee pathology, and progression of an underlying propensity for general arthritis. Regardless of etiology, surgeons should be aware that a prior TJA may impact patients' assessment of lumbar surgery outcomes.

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RISK FOR CHRONICITY IN YOUNGER AND OLDER ADULTS WITH SPINE PAIN

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**Introduction:** As the population ages, clinicians are seeing more patients over 65 years old than ever before. Older adults may differ from the populations that evidence-based guidelines have been based on. This may have implications for treatment. For instance, psychological risk factors, or yellow flags, have been associated with risk for chronicity in the general population. However, studies show that older adults tend to cope better with adverse life events such as medical issues. This study compares the results of a screening tool for chronicity in younger and older adults presenting at an outpatient physical therapy clinic for the treatment of spine pain. The purpose of the study is to compare the risk for chronicity in younger and older adults with spine pain.

**Materials and Methods:** In this retrospective observational study, patients presenting to an outpatient physical therapy clinic in a large metropolitan area completed intake questionnaires, including the Keele STarT MSK Back Screening Tool psychological subscale. This tool includes 5 items that ask about psychological predictors of poor outcomes. They include fear of activity, anxiety, catastrophizing, depressed mood and bothersomeness associated with pain. Each item is scored either 0 or 1. A total score equal to or less than 3 indicates a low or moderate risk for chronicity, while a total score 4 or 5 indicates a high risk. Data was extracted from January 2012 to December 2022. Total subscale and

individual item scores were reported for patients <65 and for those >65.

**Results:** Four thousand nine hundred ninety-seven (4997) subjects were extracted from the database. Among these subjects, 3617 (72,4%) were <65 and 1380 (27,6%) >65. Based on the total score of the STarT Back psychological subscale, 14,4% of subjects <65 were at high risk for developing chronicity compared to 12,4% >65. Findings were similar for individual STarT Back items; (fear: 17,3% of subjects <65 vs 17,7% of subjects >65, anxiety: 59,2% of subjects <65 vs 54,8% of patients >65, catastrophizing: 17,1% of subjects <65 vs 16,4% of subjects >65, depressed mood: 35,3% of subjects <65 vs 34,1% of subjects >65, bothersomeness: 49,3% of subjects <65 vs 47% of subjects >65).

**Conclusion:** This is the first study to compare the risk for chronicity in older and younger adults with spine pain. The results indicate that both cohorts have similar risk profiles at baseline. This was somewhat surprising given the literature on coping and adjustment in older adults which shows that older individuals are better copers than younger ones. The STarT Back Tool is a brief screening instrument and may be reflective of a psychological state at the time of evaluation instead of more stable coping characteristics and emotional responses to spine problems. Further study is needed to explore these relationships.

This study indicates that older and younger patients with spine pain have similar risk profiles. Thus, it is equally important to collect this information and address yellow flags in both groups.

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CONSERVATIVE OR SURGICAL TREATMENT OF PYOGENIC SPINAL INFECTION. A RETROSPECTIVE MULTICENTER BINATIONAL RETROSPECTIVE COHORT STUDY

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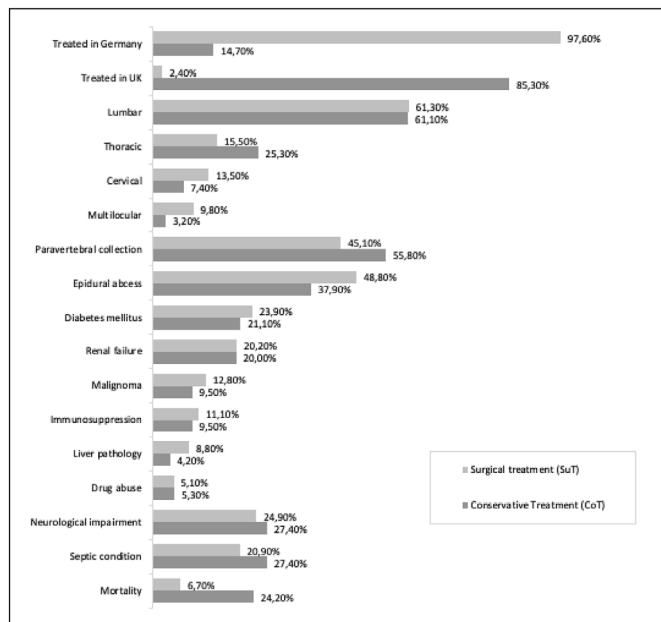
**Introduction:** The optimal treatment of patients with spinal infections remains a controversial topic. Within Europe, fundamentally different therapeutic concepts are found. Therefore, the aim of this study was to compare the outcome of patients who received surgical vs. antibiotic treatment alone for primary pyogenic spondylodiscitis in an international cohort analysis.

**Materials and Methods:** The retrospectively compiled databases of tertiary high-volume spine centers served as the baseline for this study. All documented cases of primary spondylodiscitis treated surgically and conservatively in the period of 2017-2022 were included and grouped according to the therapeutic concept: conservative vs. surgical treatment. Independent investigators collected the relevant clinical and radiological data. The primary endpoint of this study was mortality rate; secondary endpoints were relapse rate and persisting neurological deficit.

**Results:** A total of 392 patients were included in the analysis (155 females with a mean age of 68 years). Of these, 95 cases were treated conservatively (CoT) and 297 cases were treated surgically (SuT). There was no significant difference (p<0.01) related to patient's disease characteristics: Lumbar was the main location (n=240, CoT 58/ SuT 182, p=0.97) followed by thoracic (n=70, CoT 24/ SuT 46, p=0,03) and cervical (n=47, CoT 7/ SuT 40, p=0.11) region. A multilocular spinal infection was present in 32 patients (CoT 3/ SuT 29, p=0.04). 181 cases (CoT 36/ SuT 145, p=0.06) presented with an epidural abscess. Neurological deficits were recorded in 100 cases (CoT 26/ SuT 74, p=0.63), and septic conditions in 88 cases (CoT 26/ SuT 62, p=0.19). Pre-existing conditions like Diabetes (p=0.57), renal failure (p= 0.97), hepatopathy (p= 0.15), malignoma (p=0.39) or i.v. drug abuse (p=0.93) did also not differ between the groups. The mortality rate of all conservatively treated was 24.2% (23 cases) and

6.7% (20 cases) in all surgically treated patients ( $p < 0.001$ ). A follow-up of  $\geq 6$  weeks was available in 289 cases (CoT 83, SuT 206). In this subset of patients relapse of infection occurred in six (7.2%) and 23 (11.2%) cases in the conservative and early surgical treatment group, respectively ( $p = 0.69$ ). Persisting neurological deficit was recorded in 21 (25.3%) of conservatively treated and 51 (24.8%) of surgically treated cases ( $p = 0.92$ ).

**Conclusion:** Whereas relapse rates and persisting neurological deficit were not found to differ significantly, the results of this international data analyses, with their respective limitations, clearly support the growing evidence of a significantly reduced mortality rate after surgical therapy for primary pyogenic spondylodiscitis when compared to conservative treatment regimen.



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#### WHETHER INTRAOPERATIVE HYDROGEN PEROXIDE IRRIGATION REDUCES BLOOD LOSS AND SURGICAL SITE INFECTION AFTER MULTILEVEL POSTERIOR LUMBAR SURGERY: A PROSPECTIVE CASE-CONTROL STUDY OF 2400 PATIENTS

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**Introduction:** Despite the use of prophylactic systemic antibiotics, surgical site infection (SSI) after spinal surgery is a significant surgery-related complication, which is associated with substantial mortality and morbidity and imposes severe burdens on healthcare resources. Due to the overuse of antibiotics, vancomycin-resistant bacteria also pose great challenges in the management of postoperative SSI. The study is aim to explore whether intraoperative hydrogen peroxide irrigation reduces SSI and blood loss after multilevel posterior lumbar surgery.

**Materials and Methods:** A total of 2400 patients who had undergone multi-segmental lumbar spinal surgery from January 2020 to January 2022 were prospectively included in the present study. Stratified by the use of hydrogen peroxide irrigation, they were divided into 2 groups: the control group ( $n = 1200$ ) and the experimental group ( $n = 1200$ ). The demographic parameters, laboratory examination results, and surgery-related information (e.g., operative time, number of operated levels, intraoperative blood loss, postoperative drainage, postoperative SSI, extubation time), and perioperative complications were recorded.

**Results:** No significant differences were seen regarding the demographic parameters, laboratory examination results, comorbidities, and surgery-related information. The extubation time and postoperative drainage collection were lower in the experimental group ( $3.8 \pm 0.5$  vs.  $4.3 \pm 0.6$

days,  $P = 0.337$ ;  $255.4 \pm 69.1$  vs.  $293.8 \pm 64.9$  mL,  $P = 0.027$ ). In the control group, the rate of SSI was 2.5% (30 of 1200) and included 18 superficial wound infections and 12 deep wound infections. In the experimental group, the SSI rate was 1.25% (15 of 1200; 13 with a superficial wound infection and 2 with a deep wound infection). Staphylococcus aureus was the most common organism, especially in the experimental group (76.5% vs. 60.0%). No statistically significant difference was found between the 2 groups in the perioperative complications, including hematencephalon, deep vein thrombosis, pulmonary embolism, and myocardial infarction ( $P > 0.05$ ). Pneumocephalus was not observed in either group.

**Conclusion:** For multilevel posterior lumbar surgery, intraoperative hydrogen peroxide irrigation does reduce the incidence of SSI, especially deep wound infection. In addition, it has a positive effect on reducing postoperative drainage volume and accelerating postoperative recovery.

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#### VALIDATION OF ARTIFICIAL INTELLIGENCE ALGORITHM FOR PRE- AND POSTOPERATIVE CORONAL PARAMETERS IN ADOLESCENT IDIOPATHIC SCOLIOSIS PATIENTS

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**Introduction:** The precise and accurate measurement of coronal parameters of adolescent idiopathic scoliosis (AIS) patients is important for the therapeutic decision-making process, preoperative planning and postoperative evaluation of the patient's outcome. Current routine spinal parameter determination suffers from a time-consuming and observer-dependent measurement process. An automated computation of essential parameters could support surgeons in clinical routine.

**Materials and Methods:** In a retrospective, monocentric research study with 100 patients (mean age: 14.5yrs, BMI: 20.4 kg/m<sup>2</sup>, female/male: 80/20), the algorithm's determination of coronal parameters on pre- and postoperative anteroposterior (AP) full spine X-rays is evaluated against those of two experienced surgeons.

The following coronal parameters were computed fully automatically, based on anatomical entities (clavicles, vertebrae, sacrum and implants), which are detected by a trained Artificial Intelligence (AI) algorithm: Clavicle angle, T1-tilt, coronal balance, and Cobb angles in the proximal thoracic (PT), thoracic (T) and thoracolumbar (TL) regions in pre- and postoperative cases; lumbar modifier (LM) on preoperative and upper (UIV) and lower instrumented vertebrae (LIV) on postoperative X-rays. To assess intra- and inter-rater reliability, two surgeons independently measured 100 pre- and 100 postoperative AP spine X-rays isolated from the training data and one surgeon performed the measurements twice. The mean error, standard deviation as well as single measure Intraclass Correlation Coefficients (ICC, absolute agreement) for numerical values and Cohen's Kappa Coefficients (CK) with quadratic weighting for categorical parameters were used for the reliability analysis. ICC or CK  $> 0.75$  were considered excellent (Cicchetti et al. 1994).

**Results:** ICC values for intra- (PreOP: 0.98-1; PostOP: 0.94-1) and inter-rater (PreOP: 0.85-0.99; PostOP: 0.72-0.98) reliability between humans resulted in excellent agreement, except for Cobb PT and Cobb T. CK values for LM, UIV and LIV ranged from 0.94-1 for intra- and 0.84-0.99 for inter-rater-reliability. The comparison between AI and human raters ranged between 0.75-0.99 (PreOP) and 0.65-0.99 (PostOP) and demonstrates high to excellent agreement. Consistently, the lowest ICC belonged to Cobb PT and highest to clavicle angles. The mean error was smallest for clavicle angle ( $0.1^\circ$  PreOP,  $0.0^\circ$  PostOP) and largest for Cobb T ( $5.0^\circ$  PreOP) and Cobb PT ( $4.3^\circ$  PostOP). CK ranged from 0.84 (Lumbar mod.) to 0.98 (UIV).

**Conclusion:** To our knowledge, these results are the first to demonstrate that the AI algorithm is able to accurately determine multiple coronal spine parameters for pre- and postoperative X-rays when compared to human experts. It could contribute to the objective, reliable and accurate determination of coronal parameters in AIS patients and enables a time efficient analysis of large datasets (e.g., registry studies) for research purposes.