ANALYSIS OF DYNAMIC FACTORS IN PATIENTS WITH THORACIC SPONDYLOTIC MYELOPATHY
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Background: Thoracic spondylotic myelopathy (TSM) without any type of ossification or disc disorder is associated with dynamic factors in the thoracic spinal column, but a detailed investigation of this issue has not been reported yet. This study was conducted to investigate the influence of thoracic dynamic factors on patients with TSM and specific underlying factors in comparison with non-TSM subjects.

Methods: Patients treated for TSM from 2013 to 2016 were eligible for this study. A control group was developed with sex- and age-adjusted patients with spinal disorders other than TSM, and two controls per TSM case were selected from the database. Items surveyed included each segmental mobility from T10 to L1, as measured by a multidetector-row computed tomography scan in passive maximum flexion and extension after myelography; the sagittal Cobb angles of Th10-L1 and L1-L5 were measured in the supine position. The mobility of each segment was set as the difference of the angles in the flexion and extension positions.

Results: Ten patients (8 males and 2 females, mean age 65.8 years) and 20 healthy controls (16 males and 4 females, mean age 64.5 years) were enrolled in this study. The most severe spinal canal stenosis was seen at Th10/11 in four cases and Th11/12 in six cases, and caused lower extremity myelopathy. The angular mobility of the most stenotic level in the TSM group (5.8°) was significantly greater than that of the same segment in the control group (2.1°; p < 0.001). Although the Cobb angles of Th10-L1 and L1-L5 were specified as 8° kyphosis and 2.3° lordosis in the TSM group; these were 17.4° and 32.2°, respectively, in the control group; these between-group differences were significant (p < 0.001 and p = 0.001, respectively).

Discussion: Angular mobility at the most stenotic level in TSM was significantly greater than that at the same level in the control group. This hypermobility of the thoracic spine may be attributed to the decrease in lumbar spinal lordosis or thoracolumbar kyphosis.

Conclusions: Greater angular segment mobility at the most stenotic level induced by thoracolumbar kyphosis could be a main factor in the pathophysiology of TSM.

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CONSTRUCT VALIDITY AND TEST-RETEST RELIABILITY OF THE SPINE ONCOLOGY STUDY GROUP OUTCOME QUESTIONNAIRE (SOSGOQ)


AOSpine Knowledge Forum Tumor

Introduction: The main treatment goal for patients with spinal metastases is to improve or maintain their quality of life. Evaluation of health related quality of life (HRQOL) is therefore essential to optimize treatment strategies for metastatic disease of the spine. The Spine Oncology Study Group Outcome Questionnaire (SOSGOQ) was developed in response to the absence of a spine oncology specific outcome measure and subsequently content and face validity of the SOSGOQ was confirmed. The next step in the development process is to assess construct validity and test-retest reliability of the SOSGOQ.

Methods: The AOSpine Knowledge Forum Tumour conducted an international prospective observational study at 10 spine centers across Europe and North America. Patients who underwent surgery and/or radiotherapy for the treatment of spinal metastases were eligible for inclusion. Patient demographic, tumour, treatment and HRQOL were collected. Construct validity of the SOSGOQ was evaluated using the data from the North-American centers by correlation (Spearman’s Rank) of the SOSGOQ subdomains to the SF-36 subdomains or the NRS pain score. The total score of the SOSGOQ and SF-36 are inversely related. The test-retest reliability (Intraclass correlation coefficient (ICC)) was evaluated in two of the participating centers at 12 weeks post-treatment followed by the re-test 4-9 days later. The Cronbach’s alpha statistic was used to evaluate the internal consistency of the SOSGOQ.

Results: A total of 238 patients were enrolled in the observational study in nine centers across North America. 153 patients had data available at 12 weeks post-treatment for evaluation of construct validity, where 79 patients underwent surgical treatment with or without additional post-operative radiotherapy and 74 patients underwent only radiotherapy. A total of 36 of these patients also participated in the sub study to evaluate test-retest reliability. Correlation of the SOSGOQ subdomains to the relevant SF-36 subdomains and NRS pain score showed strong to very strong correlation coefficients (Spearman’s rank 0.61 - 0.83). The test-retest reliability of the SOSGOQ demonstrated to be excellent (ICC 0.85).

Conclusion: Correlation of the SOSGOQ domains to the SF-36 and the NRS pain score confirmed construct validity of the SOSGOQ. The SOSGOQ is a valid and reliable tool to evaluate HRQOL among patients with spinal metastases.

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Sponsored or reimbursed travel (for yourself only)
SOURCES OF PATIENTS: EXPECTATIONS OF LUMBAR SURGERY
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Sources of Patients’ Expectations of Lumbar Surgery

Background Context: Patients have multiple expectations of lumbar surgery that include improvement in symptoms, function and psychological well-being. How patients come to espouse these expectations is not known. Patients may actively seek or be passively influenced about expectations from other sources, such as other physicians, their social network, other patients, their own prior medical experiences, and the media. It is important to learn where patients obtain their expectations and to optimize the influence of modifiable sources.

Purpose: To query a large cohort of patients undergoing diverse lumbar surgeries about sources of their expectations.

Study Design/Setting: Cross-sectional qualitative study, tertiary spine center

Patient Sample: 428 patients interviewed several days before surgery

Outcome Measures: Grounded theory qualitative analysis

Methods: Consecutive patients were interviewed preop with the following open-ended questions: “How did you come to have your expectations of surgery? How did you come to know these are potential results of surgery?” Probes included “did someone tell you?” Are your expectations based on your own prior experiences, experiences of others, or sources like the internet?” Replies were then analyzed through an iterative process in which responses were grouped into larger themes hierarchically. Frequencies of themes were calculated and compared in a descriptive fashion according to clinical characteristics.

Results: Mean age was 55, 54% men, 50% working, 15% on disability, 69% college graduates, 85% reported frequent social support, 31% had a positive screen for depression, mean ODI score was 53, 80% degenerative diagnosis, and 24% previous lumbar spine surgery. Patients volunteered a median of 3 sources of expectations (range 1-9), the most prevalent were: spine surgeon 83%, internet 55%, social network 26%, another physician 22%, and past non-spine orthopedic surgery 8%. Of the 103 patients who had prior lumbar surgery, 67 (65%) cited this experience as a source of current expectations. Of the 64 patients who cited only one source, 37 (58%) cited surgeon. Only the internet was a modifiable source. Patients who cited the internet were more likely to be younger (OR 1.6, 95% CI 1.1-2.4; p=.01), to be working (OR 2.2, CI 1.5-3.3; p<.0001), and not to have a positive screen for depression (OR 1.8, CI 1.2-2.8; p=.004). 49% specifically cited hospital web-based resources as sources of expectations.

Conclusions: Aside from expectations obtained from surgeons, most patients cited the internet as their major source of expectations for lumbar surgery. There currently are no standard internet sources that address outcome expectations. Web-based sources addressing expectations should
be developed by multidisciplinary health care providers and offered to patients to reinforce surgeons’ advice.

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DOES STANDARD SURGICAL PREPARATION IN SPINE SURGERY ERADICATE PROПIONIBACTERIUM SPECIES DWELLING IN SKIN?

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Background: Surgical site infections (SSI) are considered rare but of significant concern in spine surgery. Since it is believed that organisms are introduced at time of surgery, pre- and peri-operative antibiotics and skin preparation are performed on all patients undergoing surgery. One of the most common organisms associated with postoperative infections in orthopedic surgery is Propionibacterium acnes (P. acnes), a constituent of normal, human microbiota identified in 70-95% of healthy human skin, with high concentrations found in sebaceous glands in the upper neck and back. We hypothesized that bacteria such as P. acnes is present within the skin and deeper tissues, which may lead to poor surgical outcomes for its failure at being detectable during routine pre-operative testing, regardless of pre- and peri-operative prevention. Understanding the prevalence and location of occult pathogens will alter our surgical preparation methods, intra-operative wound management, surgical techniques, and the design and manufacturing of implants.

Purpose: The purpose of this study was to identify the presence of colonized bacteria in the skin, subcutaneous fat, ligamentum flavum, and the cancellous bone of the vertebral body utilizing anaerobic long cultures in primary lumbar spine surgery procedures.

Methods: Under IRB approval, 26 males and 26 females underwent primary spine fusions. Participants took Ancef antibiotics prior to surgery and underwent standard surgical prep, using either Betadine or Chloraprep at the incision site. During surgery, culture swabs were taken of: the skin prior to the incision, the dermal layer of the skin, subcutaneous fat, ligamentum flavum, and cancellous bone after drilling but prior to pedicle screw instrumentation. All culture samples were sent for aerobic and anaerobic long cultures up to 14 days. Undecalcified histological samples were embedded and stained for corroboration of microbiology results. Data was analyzed using Binary logistic regression to estimate the incidence of bacteria in the area of procedure.

Results: Occult adherent bacteria were found in 26% of patients undergoing primary spine surgery. P. acnes was the most prevalent but other bacteria found included Staphylococcus simulans, Staphylococcus epidermidis, and Staphylococcus capitis were. Although positive cultures were found in the dermal layer of skin, positive cultures were mostly found in the samples of subcutaneous fat and bone, before and after the pedicle were prepared.

Discussion: The results have shown that preoperative skin preparation is unable to eradicate P.acnes at the surgical site. With this data, more studies can be done in order to see how bacteria such as P.acnes can be eradicated from the body prior to surgery. Findings from these future studies can possibly change surgical prep methods, intra-operative wound management, and surgical techniques, to create the potential of decreasing incidences of post-surgical infections.

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OCTENIDINE DEMONSTRATES A SIGNIFICANTLY HIGHER EFFECTIVENESS AGAINST A SPINE-SPECIFIC MICROBIOME

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Introduction:
The local microbiome of the back is highly specific and differs from other areas of the human body. As the predominant bacterial strains are not covered by European Standard Specifications, little data exist regarding the efficacy of routine antiseptics for spinal surgical procedures. Aim of the presented study is to evaluate the efficacy of different antiseptics in a spine-specific in vitro and in vivo setting.

Materials & Methods:
The bacterial spectrum causing SSI in our department was analysed. Representative bacterial cultures were harvested from wound swabs. PVP-Iodine, Hexetidin Propanol/Biphenylol and Octenidin were tested. Bacterial proliferation was monitored by measuring optical density of the culture medium prior to disinfection, immediately after and after 1 and 3 hours to simulate the time course of a surgical procedure. Additionally, swabs were taken in the OR from skin incision and the surgical blade after routine antisepsis with Propanol/Biphenylol (n=152) and after changing pre-operative skin preparation to Octenidin (n=281).

Results:
Staph. epidermidis was responsible for 37% of the SSIs, followed by P. acnes (17%), E. faecalis (14%), and P. mirabilis respectively Staph. aureus accounting for 6% each. Koagulase-negative Staphylococci incl. Staph. epidermidis, E. faecalis, P. mirabilis and Staph. aureus could be cultivated from wound swabs and were used for the subsequent evaluation.

The efficacy of the antispectic solutions tested varied significantly: Octenidin demonstrated a significantly higher efficacy (p<0,01) in vitro and was able to completely eradicate our test bacteria except for P. mirabilis, which was still reduced to 1% of the initial bacterial load. In contrast, 9% (Propanol/Biphenylol) resp. 2% (PVP-Iodine), resp. 10% (Hexetidin) of the initial koagulase-negative Staphlococci were still present after disinfection. Hexitidin showed the lowest remanent effect with koagulase-negative Staphlococci increasing to 21 % of the initial load after 3 hours.

Following skin preparation with Propanol/Biphenylol in the OR, 38% of the wound swabs resulted in positive bacterial testing. According to our in vitro results, pre-operative antiseptic routine was changed to Octenidin. Subsequently, the number of positive swabs was reduced to 22%. Most of the positive swabs derived from the surgical blade and contained Staph. epidermidis and P acnes.

Conclusion:
Antisepsis does not automatically mean a complete eradication of the local microbiome. Even under standardized in vitro conditions, a relevant bacterial load could be detected after disinfection. Octenidin demonstrated a significantly higher effectiveness against spinal surgery specific bacterial strains in vitro and in vivo. While the test strains were reduced beyond the level of detection during in vitro evaluation, deeper layers of the skin may act as reservoir in vivo. The efficacy to reduce the incidence of SSI is under current evaluation.
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INCIDENCE AND RISK FACTORS FOR FACET JOINT VIOLATION IN OPEN VERSUS MINIMAL-INVASIVE PROCEDURE DURING PEDICLE SCREW PLACEMENT IN TRAUMA PATIENTS

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Introduction
A possible risk factor for facet joint arthrosis or adjacent segment disease after operative treatment of spine fractures is facet joint violation (FV) during insertion procedure of pedicle screws (PS). During open positioning the facet joint is typically visualized but minimal-invasive screw insertion (MIS) render a direct sight on the facet joint impossible. The purpose of this study is to determine patient-dependent risk factors for FV in thoracic and lumbar spine.

Materials
All patients with spine fractures requiring posterior stabilisation by MIS or open instrumentation were included. First we determined the PS-placement according to the classification of Zdichavsky.[1] Then we used an own computed tomography scoring system that represents progressively increasing grades of FV (0-4 in lumbar spine / 0-2 in thoracic spine). Patients were stratified in thoracic and lumbar group. Patient and surgical factors such as age, body-mass-index (BMI), segmental facet joint angle and used pedicle screw/rod system (sideloading (SL) vs. toploading (TL)-system) were considered to determine predictors for FV. Logistic regression method was used for statistical analysis.

Results and Conclusion
This study included 58 patients who underwent MIS/open posterior stabilisation in thoracic or lumbar spine. Median age at time of surgery was 52.33 years (range: 16-97 years). 49 patients showed a thoracic spine fracture and 9 patients had a fracture within the lumbar spine. Overall, 169 thoracic and 120 lumbar pedicle screws were evaluated. Open posterior procedure was used in 67.24% and a SL-system was inserted in 61.3% of our cohort. Of all inserted PS a FV (score 1-4) was identified in 124 cases (42.91%). Both, in thoracic (OR 0.42 [CI-95 0.20 - 0.88], p=0.022) and lumbar (OR 0.27 [CI-95 0.10 - 0.73], p=0.010) spine, open instrumentation procedure had a lower risk for FV. The analysis showed a significantly greater violation rate by the use of a SL-system within the lumbar spine (OR 2.79 [CI-95 1.14 - 6.80], p=0.024). Overall, a pedicle screw placement with FV was significantly higher within the thoracic spine (p=0.028, r=0.17).

These findings suggest that open posterior pedicle screw placement is not associated with higher rates of FV in thoracic and lumbar spine. However, higher BMI was a risk factor for higher FV rates.


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IS SALVAGED BLOOD TRANSFUSION APPROPRIATE IN METASTATIC SPINE TUMOUR SURGERY? A PROSPECTIVE CLINICAL STUDY
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Introduction
Salvaged blood transfusion has not found wide application in metastatic spine tumour surgery (MSTS) due to the theoretical concern of reinfusing tumour cells resulting in tumour dissemination; despite its routine use in spinal surgeries for degenerative conditions and deformity. We have previously reported our laboratory studies on the safety of the blood salvaged during MSTS. Spine surgeons, however, remain reluctant to employ intraoperative cell salvaged (IOCS) because of the lack of clinical data addressing the concerns of tumor dissemination. We aimed to evaluate the safety of salvaged blood in actual clinical application of patients undergoing MSTS.

Methods
We prospectively analyzed 42 patients who underwent MSTS between January 2014 and January 2016. Patients were divided into three groups depending on transfusion history: (i) no blood transfusion (NBT) group, (ii) salvaged blood transfusion (SBT) group and (iii) allogeneic blood transfusion (ABT) group. Primary outcome measure was progression-free survival (PFS) rates comparing between the three groups. Overall survival (OS), postoperative complication rates and length of hospital stay (LOS) were also studied as secondary outcomes.

Results
Of 42 patients, 16 (38%) patients did not receive blood transfusion (NBT group), 8 (19%) received salvaged blood transfusion (SBT group) and 18 (43%) received allogeneic blood transfusion (ABT group). The median PFS was 2 months (range: 1.5-20 months) in NBT group, 4.5 months (2-34 months) in SBT group and 3 months (8 days-12 months) in ABT group. Log rank test revealed that the difference in the PFS rates between the groups, however, was not significant (P=0.19). Univariate and multivariate Cox regression analyses revealed that primary tumour type and ECOG performance status were the factors significantly influencing PFS. Transfusion status did not increase the risk of tumour progression. Regarding OS, there was a trend towards better OS rates in SBT group compared to ABT or NBT group though the differences were not significant. Postoperative complication rates and length of stay were also favourable in SBT group compared to ABT and NBT group.

Conclusion
Patients who received salvaged blood transfusion had comparable outcomes in terms of tumour progression and survival to those who received allogeneic blood. Our study paves a path for larger cohort or randomized study where salvaged blood transfusion can be evaluated for its appropriateness and efficacy in patient blood management for oncological surgeries.

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INFLUENCE OF METASTASECTOMY, PALLIATIVE DECOMPRESSION AND TARGET THERAPY ON OUTCOME OF PATIENTS WITH SPINAL METASTASES OF RENAL CELL CARCINOMA

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Introduction.
Renal cell carcinoma (RCC) is an aggressive malignant disease that frequently metastasizes to the spine. Neural decompression and stabilization is a standard of oncologic management of metastatic vertebral lesions, which are at risk of spinal cord compression. Adjuvant control by target therapy has been proven effective to treat metastasis of RCC. Metastasectomy of spinal lesions from RCC is a promising strategy. However, its clinical outcome after spinal metastasectomy is unknown owing to the difficulty of curative surgical resection.

Purpose of the study.
We evaluated complete and incomplete surgical resection of RCC metastasis as well as influence of target therapy on survival and outcome.

Materials and Methods.
The 100 patients (76 men and 24 women with a mean age of 58.4 years [range 41-79 years]) had spinal surgeries for metastatic RCC. We performed metastasectomy (en bloc resection) in 39 cases. Palliative decompression and stabilization was performed in 61 cases. Only 26 patients had adjuvant target therapy (7 with metastasectomy, 19 with palliative decompression). We evaluated pain (VAS back pain), neurological status (Frankel scale) at baseline and end of hospitalization period. Survival time (months) from spinal surgery to death or last follow-up was the main endpoint. Likelihood ratio, Kaplan-Meier survival analysis and log-rank test in univariate analysis were performed with R 3.3.2.

Results.
All patients demonstrated neurological recovery and reported significant pain relief. Surprisingly, no significant difference in survival was seen for patients with metastasectomy and palliative decompression (p=0.25). There was a statistically significant difference in survival benefit observed for patients receiving target therapy (p=0.0008).

Conclusion.
Target therapy can potentially prolong survival for patients with spinal metastases arising from RCC. Metastasectomy may have benefit with additional target therapy.

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LOW-GRADE INFECTION IN SPINAL INSTRUMENTATION: IS THIS THE REAL CAUSE OF SCREW LOOSENING?

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Introduction
We investigated the hypothesis that many aseptic screw-loosening revisions in spinal instrumentations are in fact low-grade infections (LGI) and not due to mechanical screw overload.

Methods
A prospective observational study was performed. All patients undergoing spinal instrumentation revision surgery between August 2015 and June 2016 were screened. In the study group all patients with an indication for revision due to screw loosening on CT-scan were included. In the control group those needing revision for adjacent disc disease were included. The rate of LGI using a sonification fluid culture was analyzed.

Results
46 patients met all inclusion criteria. 44 patients were enrolled. Median age was 72 years (range 41-83). 46% of patients were female. There were 24 (55%) and 20 (45%) patients in the study and control group, respectively. A LGI was identified in 10 (42%) and 4 (20%) cases in the study and control group, respectively. All patients with positive cultures received postoperative antibiotic treatment.

Conclusion
A low-grade infection was found in almost half of all cases with screw-loosening. However, a low-grade infection was also found in every fifth patients without screw loosening. So far, there is no clear evidence supporting the hypothesis that a low-grade infection is the cause of screw loosening.

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QUALITY OF LIFE AND UTILITY SCORES AMONG CANADIAN TRAUMATIC SPINAL CORD INJURY PATIENTS: A NATIONAL CROSS-SECTIONAL STUDY
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Background
Traumatic spinal cord injury (SCI) is a leading cause of disability. Underlying medical and physical interventions is the assumption that maximizing neurological function will improve long-term quality of life (QOL).

Objective
The goal of this study was to provide overall QOL and health utility (HU) values for patients with traumatic SCI stratified by injury level and neurological status.

Methods
The Canadian SCI Community Survey was sent to Canadians living in the community following SCI. The impact of demographics, complications and SCI classification on QOL was assessed using ANOVA, multiple linear regressions and ordinal logistic regression analyses.

Results
There were 1109 respondents with traumatic SCI. ASIA Impairment Scale (AIS) grade was cervical A or B in 20%, cervical C or D in 28%, thoracolumbar A or B in 32%, thoracolumbar C or D in 16% and E (any level) in 1%. Injury level or AIS grade had no impact on either HU or QOL. The physical component of HRQOL was significantly affected by the neurological level, but not the social or mental components. With a mean health utility score of 0.64 ± 0.12, SCI patients living in the community reported having HRQOL similar to patients with total knee arthroplasty and operated lumbar spinal stenosis.

Conclusion
HRQOL or HU measured by generic HRQOL outcome tools should not be used as outcomes to assess the effectiveness of interventions targeting neurological function and autonomy in traumatic SCI. A disease-specific instrument that captures the nuances specific to spinal cord injury patients is required.

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SURGEONS’ PREOPERATIVE EXPECTATIONS PREDICT FULFILLMENT OF PATIENTS’ EXPECTATIONS TWO YEAR AFTER LUMBAR SURGERY

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Surgeons’ Preoperative Expectations Predict Fulfillment of Patients’ Expectations Two Year After Lumbar Surgery

Background: Patients and surgeons may not have the same preop expectations of lumbar surgery; thus their assessment of fulfillment of expectations also may vary.

Purpose: To compare preop concordance (agreement) within the patient-surgeon pair regarding expectations of surgery and then to determine postop if fulfillment of expectations more closely matched patients’ or surgeons’ expectations.

Study Design/Setting: Prospective 2-year longitudinal study, tertiary spine center

Patient Sample: 164 lumbar surgery patients and their surgeons

Outcome Measures: HSS Lumbar Spine Surgery Expectations Survey

Methods: Patients were interviewed preop with the Expectations Survey, a valid 20-item survey addressing symptoms, physical function, and psychological well-being. The survey asks how much improvement is expected for each item with response options of complete to no improvement, a score (range 0-100, higher=greater expectations). Surgeons completed an identical survey asking them to rate expected improvement for each item for each patient. Concordance within the patient-surgeon pair was measured with the intraclass correlation coefficient (ICC) (range 0=agreement no better than chance to 1=perfect agreement). Two years postop patients completed the survey again asking how much improvement they actually received for each item. A “patient proportion” reflecting expectations fulfilled was calculated as the total improvement received (numerator) divided by the total improvement expected (denominator); range 0 (no improvement for any item) to 1 (improved as expected) to >1 (improved more than expected); the minimum clinically important (MCI) proportion was previously shown to be .60. A similar “surgeon proportion” was calculated using surgeons’ improvement expected as the denominator. Proportions were then compared using paired t-tests.

Results: Mean age 54, 52% men, 84% had degenerative conditions. Patients completed the postop survey after 2.1 years. The mean preop survey score was 74 for patients, 58 for surgeons (p<.0001), and the ICC was .36 (ie fair agreement). 86% of patients had higher scores than their surgeons. The proportion of expectations fulfilled was .75±.37 for patients and .94±.41 for surgeons (p<.0001). The proportion was perfect (≥1) for 27% of patients’ and 53% of surgeons’ ratings, and was greater than an MCI (ie ≥.60) for 67% and 79%, respectively (p<.0001 for both comparisons).

Conclusions: Surgeons’ expectations more closely approximated actual improvement with surgeons successfully predicting 2-year fulfillment of expectations more often. Implications for
clinical practice including: ensuring patients retain surgeons’ counsel about expectations throughout the preop process and considering whether surgeons’ accurate predictions of patient-reported outcomes are potential measures of quality of care.

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