

academic center. **Methods:** Data from 6 patients with acute traumatic SCI were included. A lumbar intrathecal catheter was used to monitor ITP and volume of CSFD. CSFD was performed and recorded hourly. ITP recordings were collected hourly and the change in ITP was calculated (hour after minus before CSFD). 369 data points were collected and change in ITP was plotted against volume of CSFD. **Results:** Data across all patients showed variability in the ITP over time without a significant trend (slope=0.016). We found no significant change in ITP with varying amounts of CSFD (slope=0.007, $r^2=0.00$, $p=0.88$). Changes in ITP were not significantly different across groups of CSFD but the variation in the data decreased with increasing levels of CSFD. **Conclusions:** We present the first known data on changes in ITP with varying degrees of CSFD in patients with acute traumatic SCI. These results may provide insight into the complexity of ITP changes in patients post-injury and help inform future SCI management.

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Pre-operative Surrogates Markers of Frailty and Metastatic Spine Disease: Systematic Review

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Background: Despite the inherent importance of physical reserve and ability to tolerate surgery, pre-operative patient-specific surrogate markers of frailty that may improve accuracy of outcome prognostication following surgery for SMD are not well described. **Methods:** A systematic review was performed according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. MEDLINE, Scopus, EMBASE, Cochrane Registry of Controlled Trials, CINAHL, and Web of Science were searched. Quality of evidence was scored using the Oxford CEBM Scoring Tool. **Results:** Forty studies accounted for 8,364 patients. Surgical indications included neurological dysfunction, intractable pain, and spinal instability. Tumor histology varied across and within studies. Age, gender, performance status, neurologic function, comorbidities, and biochemical abnormalities were the most frequently analyzed pre-operative surrogate markers of frailty. The most commonly assessed outcomes were overall and progression-free survival; few studies examined health-related quality of life, peri-operative adverse events, and post-operative complications. **Conclusions:** This study highlights the need for objective measures of frailty in order to improve risk stratification and outcome prognostication among patients receiving surgery for metastatic spinal disease. Future studies should address identified knowledge gaps pertaining to peri-operative adverse events, post-operative complications, and health-related quality of life outcomes.

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Epidemiology and Outcomes of Neck Pain Following Surgery for Degenerative Cervical Radiculopathy

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Background: Many studies have demonstrated improved arm pain (AP) following surgery for degenerative cervical radiculopathy (DCR); however, axial neck pain (NP) is generally not felt to improve. The purpose of this study was to determine whether surgery for DCR improves NP. **Methods:** A ambispective cohort study of the Canadian Spine Outcomes Research Network (CSORN) registry for patients

who received 1-level, 2-level, 3-level ADCF (anterior cervical discectomy and fusion) or cervical disc arthroplasty (CDA) for DCR. Outcomes: 12-month post-operative Visual Analogue Scale for NP (VAS-NP), Neck Disability Index (NDI), VAS for AP (VAS-AP), Short-Form Physical Health Composite Scale (SF36-PCS), and Mental Health Composite Scale (SF36-MCS). **Results:** We identified 603 patients with DCR. CDA patients were the youngest (ANOVA; $p<0.001$). Patients reported similar pre-operative AP, NP, disability, and health-related quality of life, regardless of procedure (ANOVA; all $P>0.05$). All procedures offered a statistically significant reduction in VAS-NP, VAS-AP, and NDI (ANOVA; all $P<0.001$). Mean change from baseline in NP, AP, and disability, were similar across procedures. At 12 months, mean reduction in VAS-AP, VAS-NP, and NDI exceeded minimal clinically important differences for nearly all procedures. **Conclusions:** Patients undergoing surgery for DCR can expect a clinically significant, approximate 50% reduction in NP, AP, and neck-related disability.

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Modic changes and clinical outcomes in patients undergoing lumbar surgery for disc herniation

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Background: Lumbar disc herniation (LDH) is a risk factor for Modic change (MC) development on spinal MRI. MC has been associated with worse pre- and post-operative pain, disability, and health-related quality of life (HRQoL). We examined the relationship between pre-operative MC and post-operative assessment scores for patients receiving discectomy (LD) or transforaminal interbody fusion (TLIF) for LDH. **Methods:** We reviewed 285 primary single-level surgeries. Pre-operative and 12-month post-operative assessment scores: Visual Analog Scale Leg-Pain (VAS-LP), Oswestry Disability Index (ODI), and

Short-Form-36 Physical Component Summary (SF-36-PCS). MC subgroup on pre-operative MRI was recorded by a single neuro-radiologist. **Results:** 179 patients were included. The sample prevalence of MC on pre-operative MRI was 62%; MC2 was most common (35%). No differences in pre-operative scores were identified, regardless of present or absent MC. For the overall cohort, improvement in assessment scores were observed: SF-36 improved an average of 8.2 points (95% CI: [5.8, 10.7]), ODI by 11.3 points (95% CI: [8.7, 14.0]), and VAS by 2.8 points (95% CI: [2.1, 3.5]). In nearly all cases, MCID values were met. **Conclusions:** Clinically significant improvement in post-operative pain, disability, and HRQoL was observed for both procedures. Modic change on pre-operative MRI was not associated with worse clinical assessment scores.

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A Quantitative Degenerative Lumbar Spondylolisthesis Instability Classification (DSIC) System to Reduce Variation in Surgical Treatment

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Background: The Degenerative lumbar Spondylolisthesis Instability Classification (DSIC) system categorizes spondylolisthesis (stable, potentially unstable, unstable) based on surgeon impression. It does not contain objective criteria. **Objective-1:** Develop a quantitative-DSIC system from predetermined radiographic/clinical variables. **Objective-2:** Compare qualitative (surgeon-assigned) and quantitative (objective) DSIC Types. **Objective-3:** Determine proportion of patients receiving more invasive surgery than warranted based on the objective system. **Methods:** Patients from 8 centers were enrolled prospectively (2015–2020). Radiographic/clinical variables were collected and included/excluded from the quantitative DSIC system based on prior systematic review. Scores were converted to DSIC Types: 0-2 points (“Stable”; Type 1), 3 points (“Potentially Unstable”; Type 2), 4-5 points (“Unstable”; Type 3). Surgical procedures performed were compared to those suggested by the objective system. **Results:** Quantitative DSIC scores were calculated (309 patients). The score includes five variables: facet effusion, disc height, translation, disc angle, and low back pain. Quantitatively, 57% were stable, 34% potentially unstable, and 9% unstable patients. Qualitatively, 30% were stable, 53% potentially unstable, and 17% unstable patients. Surgeons assigned more instability than the objective scoring system in 42% of cases. More invasive surgery was performed in 57% of cases. **Conclusions:** Surgeons are more likely to categorize greater degrees of spinal instability than what is objectively scored.

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Motor Recovery after Early Surgical Decompression in Cervical ASIA A Spinal Cord Injury Patients

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Background: Despite growing evidence for early surgical decompression for traumatic cervical spinal cord injury (tCSCI) patients, controversy surrounds the efficacy of early surgical decompression on patients with a complete (ASIA A) cervical injury. **Methods:** Patients with ASIA A cervical tCSCI were isolated from 4 prospective, multi-center datasets. Patients who had a Glasgow coma scale of less than 13, were over the age of 70 or under 16 were excluded. Significant gain was defined to include those that recovered more than two muscle groups (greater than 3/5 power) below their level of injury. Analysis of variance (ANOVA) was then done to compare significant gain over the 1 year follow-up period for patients with and without early decompressive surgery (<24hrs). **Results:** We identified 420 cervical ASIA A tCSCI patients. The mean number of muscle groups gained was 2.69 (SD 2.3.12) for those who had early surgery compared to 2.37 (SD 3.38) for those with late surgery. Of those patients who had early surgery 39.67% had a significant improvement vs. 28.76% of those who did not have early surgery (P = 0.030). **Conclusions:** For the first time, we have shown a clear therapeutic benefit of early surgical decompression within 24 hrs in ASIA A tCSCI patients.

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Implementation of an Enhanced Recovery After Surgery (ERAS) Protocol for Scheduled Spine Surgery

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Background: Enhanced Recovery After Surgery (ERAS) Protocols improve post-surgical outcomes through decreased length of hospital stay, reduced readmission rates, decreased post-operative pain, and greater patient satisfaction. ERAS also has significant benefits to the healthcare system through reduced cost of post-operative care. While ERAS protocols are well established in many surgical fields, a complete guideline for spine surgery is lacking. Early ERAS studies in spine surgery suggest up to a 50% reduction in length of stay (LOS) and decreased cost of care. **Methods:** Primary literature review followed by multidisciplinary critical appraisal for optimization and redesign of our current system of care for scheduled spine