Spine surgery outcome

It is clear that individual outcomes of spine surgery can be quite heterogeneous. When consenting a patient for surgery, it is important to be able to offer an individualized prediction regarding the likely outcome. A study used a comprehensive set of data collected over 12 years in an in-house registry to develop a parsimonious model to predict the multidimensional outcome of patients undergoing surgery for degenerative pathologies of the thoracic, lumbar, or cervical spine.

Data from 8374 patients (mean age 63.9 (14.9-96.3) y, 53.4% female) were used to develop a model to predict the 12-month scores for the Core Outcome Measures Index (COMI) and its subdomain scores. The data were split 80:20 into a training and test set. The top predictors were selected by applying recursive feature elimination based on LASSO cross-validation models. Based on the 111 top predictors (contained within 20 variables), Ridge cross-validation models were trained, validated, and tested for each of 9 outcome domains, for patients with either “Back” (thoracic/lumbar spine) or “Neck” (cervical spine) problems (total 18 models).

Among the strongest outcome predictors in most models were: preoperative scores for almost all COMI items (especially axial pain (back or neck) and peripheral pain (leg/buttock or arm/shoulder)), catastrophizing, fear-avoidance beliefs, comorbidity, age, BMI, nationality, previous spine surgery, type and spinal level of intervention, number of affected levels, and surgeon seniority. The R2 of the models on the validation/test sets averaged 0.16/0.13. A preliminary online tool was programmed to present the predicted outcomes for individual patients, based on their presenting characteristics. https://linkup.kws.ch/prognostictool .

The models provided estimates to enable a bespoke prediction of the outcome of surgery for individual patients with varying degenerative pathologies and baseline characteristics. The models form the basis of a simple, freely-available online prognostic tool developed to improve access to and usability of prognostic information in clinical practice. It is hoped that, following confirmation of its validity and practical utility, the tool will ultimately serve to facilitate decision-making and the management of patients' expectations [1)].

As the focus in spine surgery has shifted from radiographic to patient-centric outcomes, patient reported outcomes measures (PROMs) are becoming increasingly important. They are linked to patient satisfaction, and are used to assess healthcare expenditure, determine compensation and evaluate cost-effectiveness. Thus, PROMs are important to various stakeholders, including patients, physicians, payers and healthcare institutions. Thus, it is vital to establish methods to interpret and evaluate these outcome measures.

To evaluate the correlation between Neck Disability Index (NDI), Patient Reported Outcome Measurement Information System Physical Function (PROMIS-PF) and Short Form-12 Physical Health Score (SF-12 PHS) in cervical spine surgery in order to determine the validity of PROMIS-PF in these patients.

Retrospective review of prospectively collected data PATIENT SAMPLE: Consecutive patients who underwent cervical surgery for degenerative spinal pathology with a minimum of 3 months follow-up OUTCOME MEASURES: Self-reported measures i.e. PROMs, including NDI, PROMIS-PF and SF-12 PHS METHODS: No funding was received for this study. The authors report no relevant conflict of interest. PROM collected pre-operatively and at each follow-up were analyzed using Pearson product-moment

correlation.

Of the 121 patients included, 66 underwent ACDF, 42 cervical disc replacement, 13 posterior cervical decompression with or without fusion. A statistically significant improvement was achieved in all PROMs by 6 weeks and maintained at 1 year. Furthermore, the percentage of patients achieving an improvement greater than MCID was similar for NDI and PROMIS-PF, particularly at a follow-up of 3 months or more. A statistically significant negative correlation was seen between NDI and PROMIS-PF, which was moderate pre-operatively and in the early post-operative period (r= - 0.565 to -0.600), and strong at 3 months or longer follow-up (r=-0.622 to -0.705). A statistically significant, negative correlation was also seen between SF-12 PHS and NDI, which was moderate pre-operatively and at 6 weeks (r=-0.5551 to -0.566); and strong at all other time-points (r=-0.678 to -0.749). There was a statistically significant positive correlation between SF-12 PHS and PROMIS-PF, which was strong to very-strong at all time-points (r=0.644 to 0.822), except at 2 weeks (r=0.570).

While NDI and SF-12 have been used for several years, PROMIS is a new outcome measure that is increasingly being implemented. The results of this study demonstrate the convergent and discriminant validity of PROMIS-PF, supported by the strong correlation between SF-12 PHS and PROMIS-PF at all time-points and the moderate correlation between NDI and PROMIS-PF pre-operatively and in the early post-operative period, respectively. Thus, while PROMIS-PF may not be a good surrogate for disease-specific outcome measures, it may extend value as a precise and efficient general health tool [2)].

Recently, strategies aimed at optimizing provider factors have been proposed, including regionalization of surgeries to higher volume centers and adoption of volume standards. With limited literature promoting the regionalization of spine surgeries, Malik et al. undertook a systematic review to investigate the impact of surgeon volume on outcomes in patients undergoing spine surgery.

They performed a systematic review examining the association between surgeon volume and spine surgery outcomes. To be included in the review, the study population had to include patients undergoing a primary or revision spinal procedure. These included anterior cervical discectomy and fusion (ACDF), anterior/posterior cervical fusion, laminectomy/decompression, anterior/posterior lumbar decompression with fusion, discectomy, and spinal deformity surgery (spine arthrodesis).

Studies were variable in defining surgeon volume thresholds. Higher surgeon volume was associated with a significantly lower risk of postoperative complications, a lower length of stay (LOS), lower cost of hospital stay and a lower risk of readmissions and reoperations/revisions.

Findings suggest a trend towards better outcomes for higher volume surgeons; however, further study needs to be carried out to define objective volume thresholds for individual spine surgeries for surgeons to use as a marker of proficiency [3)].

Patient-rated measures are considered the gold standard for assessing the outcome of spine surgery, but there is no consensus on the appropriate timing of follow-up. Journals often demand a minimum 2-year follow-up, but the indiscriminate application of this principle may not be warranted.

Stable group mean Core Outcome Measures Index scores were observed for all patients from 12 months postoperatively onwards. The early postoperative results appeared to herald the longer term outcome. As such, a 'wait and see policy' in patients with a poor initial outcome at 3 months is not

advocated. The insistence on a 2-year follow-up could result in a failure to intervene early to achieve better long-term outcomes. [4].

Variability in the utilization and outcomes of elective spine surgery across different regions in the United States and internationally has become a growing focus of critical evaluation. In 2011, surgeons in Washington State created the Spine Surgical Care and Outcomes Assessment Program to address variability in use, process, and outcome of spine surgery and identified significant variability in the indications, process of care, and outcomes related to spine surgery. This variability indicates the need for continued surveillance initiatives and point to opportunities for quality improvement and research [5].

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