How Does Concurrent Knee Arthritis Affect Patient-reported Outcomes in Patients Undergoing Surgery for Lumbar Degenerative Spine Disease?

Harrison Kay BS; Silky Chotai MD; Joseph Wick; David P Stonko; Matthew J. McGirt MD; Clinton J. Devin MD

Vanderbilt University Medical Center, Nashville, TN 37232

Introduction

Several studies have demonstrated that degenerative lumbar spine pathology has a negative impact on outcomes following total knee arthroplasty, but very few have investigated the reverse concept, the effect of knee arthritis on outcomes following spine surgery. This study evaluates patient-reported outcomes (PROs) following surgery for lumbar degenerative disease, comparing patients with concurrent knee arthritis and those without.

Methods

Patients undergoing laminectomy or laminectomy with fusion for degenerative lumbar spine disease were enrolled into a prospective registry over a two-year period. Baseline and 12-month PRO values were prospectively recorded: ODI, SF-12 PCS and MCS, VAS-Back and Leg Pain (BP, LP), and EQ-5D. Diagnosis of concurrent knee arthritis, as well as clinical ("mild", "moderate", "severe") and imaging (Kellgren-Lawrence grading) were retrospectively obtained from the electronic medical record and imaging analysis. Mean absolute scores and change-scores between groups were compared using Student's t-test. Multivariable linear regression was used to determine the effect of knee arthritis on 12-month ODI% change score.

Table 1: Baseline demographics and clinical characteristics

Table 2: 12-month absolute and change scores for patient-reported outcomes

Patient-reported outcome measure	12-month absolute scores			12-month change scores		
	Concurrent Knee OA	No OA	P-value	Concurrent Knee OA	No OA	P-value
ODI%	27.8 ± 18.2	27.9 ± 15.8	0.981	19.5 ± 19.8	22.1 ± 15.5	0.451
EQ-5D	0.75 ± 0.21	0.76 ± 0.18	0.679	0.14 ± 0.24	0.21 ± 0.23	0.143
SF-12 PCS	39.1 ± 12.0	35.7 ± 12.2	0.156	12.1 ± 13.3	10.7 ± 13.5	0.586
SF-12 MCS	51.5 ± 11.6	52.8 ± 9.38	0.542	2.06 ± 10.6	2.25 ± 10.2	0.928
NRS-BP	3.73 ± 3.10	3.53 ± 2.60	0.730	2.84 ± 3.60	3.00 ± 3.27	0.818
NRS-LP	2.92 ± 3.38	3.18 ± 3.24	0.695	3.78 ± 4.71	3.33 ± 4.09	0.607

All scores given as mean ± SD
OA = Osteoarthritis
ODI = Oswestry Disability Index
SF-12 PCS = Short-Form 12 Physical Component Score
SF-12 MCS = Short-Form 12 Mental Component Score
NRS-BP = Numeric Rating Scale, Back Pain
NRS-LP = Numeric Rating Scale, Leg Pain

Neither 12-month absolute nor change scores were affected by concurrent knee osteoarthritis at the time of surgery.

Results

102 patients (51 with concurrent knee arthritis at time of surgery, 51 matched controls) were evaluated. Mean 12-month absolute scores were statistically similar in knee arthritis patients for all PROs except VAS-LP: ODI% (P = 0.981), EQ-5D (P=0.679), SF-12 PCS (P=0.156), SF-12 MCS (P=0.542), VAS-BP (P=0.730), VAS-LP (P=0.009). Mean 12-month change scores were statistically similar for all PROs. Comparison of clinically graded "severe" knee arthritis patients to their matched controls yielded similar results. Multivariable linear regression demonstrated concurrent knee arthritis was not a significant predictor for ODI% 12-month change score.

Conclusions

Outside of leg pain, patients with concurrent knee arthritis do not have significantly worse pain, disability, or quality of life following lumbar spine surgery. Knee arthritis should not be a limiting factor when selecting patients for operative management. Future studies should investigate the relationship between hip arthritis and spine surgery outcomes.

Table 3: Multivariable linear regression analysis of independent preoperative predictors for 12-month postoperative ODI% change score following lumbar spine surgery

Variable	Coefficient	P-value
Age at time of surgery	-0.455	0.014
Gender (0=female, 1 = male)	3.63	0.266
BMI	10.2	0.011
Employment status	-8.57	0.018
History of smoking	1.09	0.731
Preoperative narcotic use	-0.619	0.844
History of diabetes mellitus	0.193	0.958
ASA grade	4.27	0.167
Preoperative ODI%	-0.640	<0.001
90-day complications	-5.48	0.368
Revision surgery	2.12	0.522
Concurrent knee osteoarthritis	2.63	0.361

Age, BMI, employment status, and preoperative ODI% were significant predictors for 12-month postoperative ODI% change score. Concurrent knee arthritis was not a significant predictor.

References

1. Grimm et al. Mimickers of Lumbar Radiculopathy. J Am Acad Orthop Surg. 2015 Jan;23(1):7-17.

2. Ayers et al. Patient-reported outcomes after total knee replacement vary on the basis of preoperative coexisting disease in the lumbar spine and other nonoperatively treated joints: the need for a musculoskeletal comorbidity index. J Bone Joint Surg Am. 2013 Oct 16;95(20):1833-7.

3. Prather et al. Impact of coexistent lumbar spine disorders on clinical outcomes and physician charges associated with total hip arthroplasty. Spine J. 2012 May;12(5):363-9.

Learning Objectives

By the conclusion of this session, participants should be able to: 1) Describe the relationship between concurrent knee arthritis and patient-reported outcomes following lumbar spine surgery, 2) Discuss the implications of this relationship in selection of patients for spine surgery, 3) Identify future studies evaluating the relationship between hip arthritis and outcomes following lumbar spine surgery.