Patient-Reported Outcomes Following Primary Total Hip Arthroplasty in Patients with Scoliosis: A Propensity Matched Study

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INTRODUCTION: The prevalence of scoliosis among patients undergoing total hip arthroplasty (THA) has been reported to be approximately 19%. Previous studies suggest that scoliosis may contribute to complications following THA, mainly due to altered biomechanics. However, the potential influence of spinopelvic alignment on these outcomes remains poorly understood. There is a paucity of literature investigating Patient-Reported Outcome Measures (PROMs) in this patient cohort. Therefore, this study aims to examine patient-reported outcomes following primary THA in patients with scoliosis using propensity score matching.

METHODS: A retrospective cohort study was performed at a single institution to evaluate PROMs following primary THA in patients diagnosed with scoliosis following IRB approval. A total of 8,085 consecutive primary THA procedures were reviewed. Patients with scoliosis who underwent primary THA (n = 141) were matched in a 1:3 ratio to patients without scoliosis (n = 423) using nearest-neighbor propensity score matching. Matching was based on age, sex, body mass index, diabetes status, chronic kidney disease, heart failure, osteoporosis, and American Society of Anesthesiologists (ASA) classification. The PROMs evaluated included the Short Form-10 Physical Function (SF-10a), PROMIS Global Physical Health, PROMIS Global Mental Health, and the Hip disability and Osteoarthritis Outcome Score–Physical Function Short Form (HOOS-PS). Delta scores were computed as the difference between postoperative and preoperative values. Minimal clinically important difference (MCID) thresholds were determined as one-half of the standard deviation of the respective delta score distributions. Based on these thresholds, patients were categorized as improved (MCID-I), worsened (MCID-W), or unchanged. Ninety-day medical and one- and two-year surgical complications were recorded for each group postoperatively.

RESULTS SECTION: No demographic differences were observed between cohorts ($p>0.05$). Patients with scoliosis had higher rates of 90-day readmission than those without scoliosis (4.5% vs 11.3%, $p = 0.007$). All other 90-day, one-year, and two-year complications were equal between groups ($p>0.05$). Scoliosis patients had lower preoperative SF10-a (36.18 vs 34.58, $p = 0.0074$), PROMIS Mental (50.78 vs 47.24, $p = 0.0002$), and PROMIS Physical (41.10 vs 38.20, $p = 0.0002$) scores than patients without scoliosis. Postoperative scores in the SF10-a (45.05 vs 41.48, $p = 0.0001$), PROMIS Mental (52.93 vs 49.71, $p = 0.0007$), PROMIS Physical (48.44 vs 44.66, $p = 0.0001$), and HOOS-PS (81.38 vs 77.54, $p = 0.0146$) were lower in the scoliosis group. Patients without scoliosis had higher delta scores than scoliosis patients in the SF10-a (8.86 vs 6.90, $p = 0.0203$). However, proportions of clinically significant improvement, no change, and worsening were equal between groups for all PROMs ($p>0.05$).

DISCUSSION: Our findings suggest that scoliosis has a significant influence on non-hip-specific PROMs. Worse preoperative scores in the SF10-a and PROMIS Physical and Mental indicate that scoliosis patients have worse patient-perceived general physical and mental health prior to surgery. Patients with scoliosis also have worse patient-perceived outcomes postoperatively, scoring significantly worse in PROM. A lower mean delta score in the SF10-a suggests that in addition to having worse perceived outcomes postoperatively, the amount of improvement was also inferior to patients without scoliosis. However, although scoliosis was associated with worse postoperative scores in HOOS-PS, similar improvement proportions and delta scores indicate that THA facilitated hip-specific improvement in this population. Patients with scoliosis should be counseled on their expectations prior to undergoing THA.

SIGNIFICANCE/CLINICAL RELEVANCE: Although scoliosis may be associated with worse general patient-perceived health outcomes following primary total hip arthroplasty, proportions of clinically significant improvement, no change, and worsening were equal between scoliosis and non-scoliosis patients.

Variable	No Scoliosis (N = 423)	Scoliosis (N = 141)	P-value
Age (years)	67.2 ± 10.0	67.8 ± 11.1	0.17
Body mass index (kg/m^2)	27.3 ± 5.2	27.4 ± 5.5	0.921
Female	312 (73.8%)	106 (75.2%)	0.824
Diabetes	64 (15.1%)	25 (17.7%)	0.548
Chronic kidney disease	33 (7.8%)	11 (7.8%)	1.000
Heart failure	33 (7.8%)	12 (8.5%)	0.929
Osteoporosis	130 (30.7%)	45 (31.9%)	0.875
ASA score distribution			0.694

Table 1. Propensity-matched demographics between patients with and without scoliosis that underwent primary total hip arthroplasty.

Patient-Reported Outcome Measure	No Scoliosis	Scoliosis	P-value
SF10-a	N = 394	N =131	
Preoperative score	36.18 ± 5.40	34.58 ± 5.01	0.0074
Postoperative score	45.05 ± 9.11	41.48 ± 8.03	0.0001
Delta score	8.86 ± 8.82	6.90 ± 6.93	0.0203
PROMIS Mental	N = 401	N = 133	
Preoperative score	50.78 ± 9.48	47.24 ± 8.98	0.0002
Postoperative score	52.93 ± 8.95	49.71 ± 9.67	0.0007
Delta score	2.15 ± 7.19	2.47 ± 6.58	0.8076
PROMIS Physical	N = 400	N = 133	
Preoperative score	41.10 ± 7.68	38.20 ± 7.76	0.0002
Postoperative score	48.44 ± 9.08	44.66 ± 9.43	0.0001
Delta score	7.34 ± 8.60	6.46 ± 7.42	0.3019
HOOS-PS	N = 318	N = 104	
Preoperative score	56.82 ± 16.74	55.55 ± 15.35	0.3855
Postoperative score	81.38 ± 16.52	77.54 ± 15.58	0.0146
Delta score	24.55 ± 19.12	21.98 ± 16.16	0.2158

Table 2. Patient-Reported Outcome Measures for patients with and without scoliosis prior to undergoing primary total hip replacement.