

# Patients with Low-Back Pain have Worse Hip-Specific and General Functional Recovery Following Total Hip Arthroplasty

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**INTRODUCTION:** Low back pain is a leading cause of global disability and morbidity. Among patients undergoing total hip arthroplasty (THA), pre-operative back pain is common, with approximately 55% of patients reporting back pain before surgery. This overlap of back and hip pain in patients with spine or hip conditions is commonly referred to as Hip-Spine syndrome. For patients undergoing THA, most back pain resolves post-operatively. However, 10-20% of the back pain does not resolve following surgery. Crucially, the etiology of the back pain (i.e. non-specific vs. structural, hip vs spine primary) affects surgical management and outcomes. For example, when there is coexisting hip osteoarthritis and structural spine pathology, performing THA before spine surgery is associated with fewer subsequent spinal surgeries and hip dislocations. Few studies have reported on symptomatic hip recovery among patients with a history of low back pain undergoing THA. The purpose of this study is to compare longitudinal patient-reported outcomes tracking hip and general function following THA between those with and without pre-existing back pain. We hypothesize that patients with pre-existing back pain will have worse symptomatic recovery compared to patients without a history of back pain.

**METHODS:** Patients undergoing primary THA were selected using CPT procedure codes to query the electronic health record at a single institution from 2010 to 2015. Prior history of low back pain was determined using ICD-9 and ICD-10 codes for a list of various back disorders, pathologies, syndromes, and generalized pain in consultation with expert opinion. Individuals were deemed to have back pain if they had a given low back pain diagnosis from this list within the 5-years prior to the index THA surgery. Longitudinal patient reported outcomes (PRO) were measured from a patient outcome tracking database via a third-party organization (CODE Technology™). In particular, the Hip Osteoarthritis Outcomes Score for Joint Replacement (HOOS-JR) and the Veterans RAND 12-item Health Survey (VR-12) were compared pre-operatively and post-operatively at 6-months and 1-year. Demographic variables such as sex, age, BMI, smoking history, mental health history were also compared. Secondary outcomes such as post-operative discharge disposition and hospital length of stay were also compared. This study was approved by the IRB.

**RESULTS SECTION:** 4208 patients were included in the study. Of these patients, 2315 (55%) were female, with a mean age of 63.0 years (SD = 13.0) and mean BMI of 27.7 (SD = 5.7). Additionally, 712 (17%) and 690 (16%) patients reported some history of smoking or mental health diagnosis, respectively. 354 (8.4%) patients reported low back pain within the 5 years prior to THA surgery. Patients with LBP were 2.5 years older than those without LBP (65.3 vs 62.8; p < 0.001). No significant differences were observed across other demographic variables. However, there were significant differences in discharge disposition, where a larger proportion of individuals without LBP were discharged home after THA (33% vs 23%) but a greater proportion were discharged to skilled nursing facilities among those with LBP (19% vs 10%). At pre-op, patients with LBP reported 9.6% (42.9 vs 47.5; p < 0.001) lower hip-specific (HOOS-JR) function and 6.1% (25.8 vs 27.5; p = 0.008) lower general function (VR-12 Physical Component Score). At 6 months, those with LBP reported 9.4% (36.7 vs 40.5; p < 0.001) lower physical function on average. At 1 year following THA, individuals with LBP reported 9.5% (78.9 vs 87.2; p < 0.001) lower hip-specific functional scores and 12% (38.8 vs 44.1, p < 0.001) lower general functional scores. Longitudinally, patients with LBP had 4.8 points less improvement in hip-function and 2.8 points less improvement in general function on average from pre-op to one year after THA (33.5 vs 38.3, p = 0.021; 13.3 vs 16.1, p = 0.033). No significant differences were observed for mental health scores (VR-12 Mental Component Score) at any interval.

**DISCUSSION:** Patients with a history of LBP have lower general physical function at baseline, at 6 months and at 1 year following THA surgery compared to those without LBP. Additionally, patients with low back pain exhibit *slower* general physical function recovery compared to those patients without LBP. A limitation that may be noted here is that patients with LBP undergoing THA are also older on average than those without LBP. Indeed, further investigation into confounding factors (including age) on the relationship between LBP and functional recovery beyond the preliminary univariate associations explored here is necessary. However, it is also noteworthy that while patients with a history of LBP exhibited lower baseline and 1-year post-operative hip-specific function as well as slower recovery at 1 year from baseline, there is no significant difference in average physical function at 6 months or in the recovery to 6 months from baseline between patients with and without LBP. This may suggest that any protective benefit for hip function observed from THA in the first 6 months is lost by 1-year after surgery for patients with LBP. In addition to accounting for confounding and interacting variables, further investigation into the various (i.e. structural vs. non-specific) etiologies and characteristics of LBP may more appropriately capture a range of recovery trajectories in this heterogeneous syndrome.

**SIGNIFICANCE/CLINICAL RELEVANCE:** A history of LBP within the 5 years prior to having a THA is associated with worse hip-specific and general physical functional recovery at 1 year following surgery.

**Table 1.** Summary of clinical and demographic variables by LBP status.

	N	LBP N = 354 <sup>1</sup>	Non-LBP N = 3,854 <sup>1</sup>	p-value <sup>2</sup>	Overall N = 4,208 <sup>1</sup>
Age (years)	4,208	65.3 (12.0)	62.8 (13.1)	<0.001	63.0 (13.0)
Sex	4,208			0.617	
Female		201 (57%)	2,114 (55%)		2,315 (55%)
Male		153 (43%)	1,737 (45%)		1,890 (45%)
Missing		0 (0%)	3 (<0.1%)		3 (<0.1%)
BMI (kg/m <sup>2</sup> )	4,074	28.1 (5.6)	27.6 (5.7)	0.074	27.7 (5.7)
Missing		8	126		134
Smoking history	4,208	65 (18%)	647 (17%)	0.463	712 (17%)
Mental health history	4,208	66 (19%)	624 (16%)	0.260	690 (16%)
Discharge Disposition	4,208			<0.001	
Home Health		183 (52%)	2,049 (53%)		2,232 (53%)
Inpatient Rehab Facility		18 (5.1%)	121 (3.1%)		139 (3.3%)
Home or Self Care		81 (23%)	1,268 (33%)		1,349 (32%)
Skilled Nursing Facility		69 (19%)	388 (10%)		457 (11%)
Other		3 (0.8%)	28 (0.7%)		31 (0.7%)
Length of Stay (Hours)	4,208	65.2 (55.4)	58.2 (73.6)	<0.001	58.8 (72.3)

<sup>1</sup>Mean (SD); n (%)

<sup>2</sup>Wilcoxon rank sum test; Pearson's Chi-squared test with simulated p-value (based on 5000 replicates)

**Table 2.** Change in Patient Reported Outcome Scores in patients with LBP and without LBP

Measure	Contrast	LBP Mean Δ (SD)	non-LBP Mean Δ (SD)	p-value <sup>1</sup>
HOOS-JR	1 Year - 6 Month	1.1 (9.8)	2.7 (13.3)	0.340
	1 Year - Pre-Op	33.5 (19.9)	38.3 (18.4)	<b>0.021</b>
VR.12.MCS	6 Month - Pre-Op	34.0 (18.2)	35.6 (19.9)	0.493
	1 Year - 6 Month	-0.0 (7.7)	-1.3 (9.1)	0.320
VR.12.PCS	1 Year - Pre-Op	3.1 (12.0)	2.6 (10.8)	0.699
	6 Month - Pre-Op	3.7 (12.2)	4.9 (11.3)	0.442
VR.12.PCS	1 Year - 6 Month	2.2 (7.6)	1.2 (8.3)	0.367
	1 Year - Pre-Op	13.3 (12.7)	16.1 (11.4)	<b>0.033</b>
VR.12.PCS	6 Month - Pre-Op	10.8 (10.7)	13.5 (11.1)	0.061

<sup>1</sup>Wilcoxon rank sum test

Average survey trajectories (Pre-Op, 6 Month, 1 Year)

