

# Impact of Acetabular Labral Tear Location on Patient-Reported Outcomes and Conversion to Total Hip Arthroplasty Following Hip Arthroscopy with an 8-Year Minimum Follow-Up

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**INTRODUCTION:** Acetabular labral tears are a common cause of hip pain, with definitive surgical management typically consisting of hip arthroscopy. While previous studies have shown that larger labral tear size is an independent predictor of worse patient-reported outcome measures (PROMs), the influence of labral tear location remains incompletely understood. This study investigates how tear location impacts conversion to total hip arthroplasty (THA), PROMs, and overall satisfaction following hip arthroscopy.

**METHODS:** A retrospective analysis of patients who underwent primary arthroscopic hip surgery from September 2013 to May 2021 at a single, high-volume orthopedic center was performed. Patients were sent online surveys at a minimum of 8 years following their initial surgery. Patients who underwent primary hip arthroscopy,  $\geq 18$  years of age, and completed surveys at 8 years after surgery were included. Patients with hip dysplasia, BMI  $\geq 35$  kg/m<sup>2</sup>, Tönnis grade 2 or higher, and those with missing or incomplete surveys were excluded. Tear locations were categorized as superior, anterosuperior, and posterosuperior based on the operative note (Figure 1). Outcomes included conversion to THA, Harris Hip Score (mHHS), Hip-Outcome Score Activities of Daily Living (HOS-ADL), Non-Arthritic Hip Score (NAHS), international Hip Outcome Tool (iHOT), Patient Acceptable Symptom State (PASS) improvement values for the above PROMs, and overall patient satisfaction based on asking patients if they would undergo the same procedure again. Statistical analysis of continuous variables was performed with t-tests while categorical variables were analyzed with Fisher's exact tests. For THA conversion analysis, both unadjusted and adjusted logistic regression models were performed, with the adjusted model accounting for age, sex, BMI, tear size, and Tönnis grade. Propensity score matching was performed separately using nearest neighbor matching to create balanced cohorts for analysis of treatment effects.

## RESULTS:

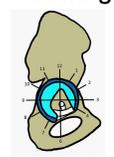
138 patients met inclusion criteria with a mean follow-up time of 11.1 years. Superior tears also showed improved functional outcomes with significantly increased mHHS scores ( $89.4 \pm 13.2$  vs  $83.3 \pm 13.1$ ,  $p = 0.039$ ), NAHS scores ( $88.3$  vs  $81.6$ ,  $p = 0.050$ ), iHOT scores ( $79.8$  vs  $67.7$ ,  $p = 0.015$ ), and HOS-ADL scores ( $92.1$  vs  $86.8$ ,  $p = 0.033$ ) compared to anterosuperior tears. Patients with superior tears also achieved patient acceptable symptom state (PASS) values in mHHS ( $72.3\%$  vs  $55.3\%$ ,  $p = 0.034$ ) and iHOT ( $51.8\%$  vs  $29.2\%$ ,  $p = 0.017$ ) compared to anterosuperior tears. Overall patient satisfaction rates were similar between superior ( $83.1\%$ ) and anterosuperior ( $77.1\%$ ) tear locations ( $p = 0.398$ ), however patients with posterosuperior tears demonstrated significantly lower satisfaction rates ( $28.6\%$ ,  $p = 0.005$ ) with a 92% lower chance of being satisfied compared to superior tears (OR 0.08, 95% CI 0.01-0.42). The overall THA conversion rate was 20.3% (28/138) at an average of 6.1 years after initial hip arthroscopy. THA conversion rates varied by tear location with superior tears at 12.0% (10/83), anterosuperior tears at 35.4% (17/48,  $p < 0.001$  vs superior), and posterosuperior tears at 14.3% (1/7,  $p = 0.89$  vs superior). While superior tears demonstrated lower THA conversion rates, this association was no longer significant after adjusting for age, sex, BMI, tear size, and Tönnis grade (adjusted OR 1.83, 95% CI 0.55-6.08,  $p = 0.319$ ). Age was found to be the primary predictor of THA conversion (OR 1.10 per year, 95% CI 1.05-1.17,  $p < 0.001$ ).

**DISCUSSION AND CONCLUSION:** This long-term study demonstrates that acetabular labral tear location is a significant predictor of outcomes following hip arthroscopy while age is the primary predictor of subsequent conversion to THA. These findings suggest that tear location and other demographic factors should be considered when counseling patients

regarding expected outcomes and subsequent surgeries following hip arthroscopy.

Superior				Anterosuperior				Posterosuperior				
Age (years), mean $\pm$ SD	30.1 (10.4)	30.5 (11.9)	31.1 (13.1)	30.5 (10.4)	30.5 (11.9)	31.1 (13.1)	30.5 (10.4)	30.5 (11.9)	31.1 (13.1)	31.1 (13.1)	0.075	
Sex, n (%)	34 (41.0%)	31 (38.0%)	41 (50.0%)	0.833*	34 (41.0%)	31 (38.0%)	41 (50.0%)	0.833*	34 (41.0%)	31 (38.0%)	41 (50.0%)	0.833*
Female	29 (70.5%)	26 (64.6%)	34 (83.0%)	0.002*	29 (70.5%)	26 (64.6%)	34 (83.0%)	0.002*	29 (70.5%)	26 (64.6%)	34 (83.0%)	0.002*
Male	5 (12.5%)	5 (12.5%)	7 (17.0%)	0.206	5 (12.5%)	5 (12.5%)	7 (17.0%)	0.206	5 (12.5%)	5 (12.5%)	7 (17.0%)	0.206
Body Mass Index (BMI), mean $\pm$ SD	25.3 (4.8)	26.2 (5.3)	26.2 (5.8)	0.042	25.3 (4.8)	26.2 (5.3)	26.2 (5.8)	0.042	25.3 (4.8)	26.2 (5.3)	26.2 (5.8)	0.042
Sex, n (%)	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042
Male	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Female	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Other	2 (5.0%)	0 (0.0%)	0 (0.0%)	—	2 (5.0%)	0 (0.0%)	0 (0.0%)	—	2 (5.0%)	0 (0.0%)	0 (0.0%)	—
Blacks, n (%)	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042
Whites, n (%)	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Hispanics, n (%)	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Others, n (%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	—	0 (0.0%)	0 (0.0%)	0 (0.0%)	—	0 (0.0%)	0 (0.0%)	0 (0.0%)	—
Unilateral Labral	1 (2.5%)	1 (2.5%)	0 (0.0%)	0.044	1 (2.5%)	1 (2.5%)	0 (0.0%)	0.044	1 (2.5%)	1 (2.5%)	0 (0.0%)	0.044
Bilateral Labral	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Unilateral CAM	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044
Bilateral CAM	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Unilateral Pincer	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044
Bilateral Pincer	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Unilateral	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044
Bilateral	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—

**Table 1. Demographic Characteristics of Study Population Based on Labral Tear Location**  
 Statistical significance was performed with a chi-square test (p < 0.05). \* indicates statistical significance of p < 0.05.



**Figure 1. A schematic of labral tears.** Labral tear locations were categorized into superior, anterosuperior, and posterosuperior regions using a clock face naming convention. Superior tears were from the 12 to 2 o'clock position, anterosuperior tears were from the 2 to 4 o'clock position, and posterosuperior tears were from the 4 to 6 o'clock position. The same naming convention was used for both left and right labral tears.

Superior				Anterosuperior				Posterosuperior				
Age (years), mean $\pm$ SD	30.1 (10.4)	30.5 (11.9)	31.1 (13.1)	30.5 (10.4)	30.5 (11.9)	31.1 (13.1)	30.5 (10.4)	30.5 (11.9)	31.1 (13.1)	31.1 (13.1)	0.075	
Sex, n (%)	34 (41.0%)	31 (38.0%)	41 (50.0%)	0.833*	34 (41.0%)	31 (38.0%)	41 (50.0%)	0.833*	34 (41.0%)	31 (38.0%)	41 (50.0%)	0.833*
Female	29 (70.5%)	26 (64.6%)	34 (83.0%)	0.002*	29 (70.5%)	26 (64.6%)	34 (83.0%)	0.002*	29 (70.5%)	26 (64.6%)	34 (83.0%)	0.002*
Male	5 (12.5%)	5 (12.5%)	7 (17.0%)	0.206	5 (12.5%)	5 (12.5%)	7 (17.0%)	0.206	5 (12.5%)	5 (12.5%)	7 (17.0%)	0.206
Body Mass Index (BMI), mean $\pm$ SD	25.3 (4.8)	26.2 (5.3)	26.2 (5.8)	0.042	25.3 (4.8)	26.2 (5.3)	26.2 (5.8)	0.042	25.3 (4.8)	26.2 (5.3)	26.2 (5.8)	0.042
Sex, n (%)	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042
Male	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Female	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Other	2 (5.0%)	0 (0.0%)	0 (0.0%)	—	2 (5.0%)	0 (0.0%)	0 (0.0%)	—	2 (5.0%)	0 (0.0%)	0 (0.0%)	—
Blacks, n (%)	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042	79 (95.2%)	48 (100.0%)	5 (10.0%)	0.042
Whites, n (%)	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Hispanics, n (%)	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Others, n (%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	—	0 (0.0%)	0 (0.0%)	0 (0.0%)	—	0 (0.0%)	0 (0.0%)	0 (0.0%)	—
Unilateral Labral	1 (2.5%)	1 (2.5%)	0 (0.0%)	0.044	1 (2.5%)	1 (2.5%)	0 (0.0%)	0.044	1 (2.5%)	1 (2.5%)	0 (0.0%)	0.044
Bilateral Labral	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Unilateral CAM	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044
Bilateral CAM	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Unilateral Pincer	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044
Bilateral Pincer	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—
Unilateral	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044	1 (2.5%)	0 (0.0%)	0 (0.0%)	0.044
Bilateral	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—	1 (2.5%)	0 (0.0%)	0 (0.0%)	—

Outcome	Superior	Anterosuperior	P-value	Posterosuperior	P-value
mHHS	89.4 (13.2)	83.3 (13.1)	0.039*	81.6 (16.5)	0.002*
NAHS	88.3 (13.2)	81.6 (16.5)	0.050*	77.1 (16.5)	0.002*
iHOT	79.8 (13.2)	67.7 (13.1)	0.015*	67.7 (16.5)	0.002*
HOS-ADL	92.1 (13.2)	86.8 (13.1)	0.033*	86.8 (16.5)	0.002*
PASS	72.3 (13.2)	55.3 (13.1)	0.034*	55.3 (16.5)	0.002*
THA Conversion	12.0%	35.4%	<0.001*	14.3%	0.89
Adjusted OR	1.83	1.83	0.319	1.83	0.319

**Table 2. Clinical and Radiographic Characteristics of Study Population Based on Labral Tear Location**  
 Statistical significance was performed with a chi-square test (p < 0.05). \* indicates statistical significance of p < 0.05.