

Labral Hypoplasia Predicts Higher Revision and Arthroplasty Risk after Hip Arthroscopy for Femoroacetabular Impingement: A 10-Year Follow Up Study

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INTRODUCTION:

Femoroacetabular impingement syndrome (FAIS) is a leading cause of hip pain and osteoarthritis, with labral damage playing a critical role in symptom development and disease progression. The acetabular labrum is essential for joint stability, load distribution, and maintaining the suction seal that preserves intra-articular fluid pressurization. While intraoperative decision-making often considers labral morphology, the long-term prognostic value of preoperative labral width remains unclear. The purpose of this study was to determine the association between labral width, as measured on preoperative magnetic resonance imaging (MRI), and patient-reported outcomes (PROs), achievement of clinically significant thresholds, and reoperation rates in patients undergoing hip arthroscopy for FAIS at a minimum 10-year follow-up.

METHODS: A retrospective review was conducted using a prospectively collected institutional hip arthroscopy registry. Patients aged ≥ 18 years with radiographic evidence of FAIS who underwent primary labral repair between 2012 and 2014 and had ≥ 10 -year follow-up were included. Labral width was measured preoperatively by two fellowship-trained musculoskeletal radiologists blinded to patient outcomes, using validated techniques at three standardized clockface positions (11:30, 1:30, and 3:00). Patients were categorized as hypoplastic if their labral width fell below the cohort mean on ≥ 2 views. Outcomes were assessed using the modified Harris Hip Score (mHHS) and Non-Arthritic Hip Score (NAHS). Achievement of minimal clinically important difference (MCID) and patient acceptable symptom state (PASS) was determined. Reoperation rates, including revision arthroscopy and conversion to total hip arthroplasty (THA), were also recorded and compared between groups.

RESULTS: A total of 83 patients (mean age: 42.9 ± 13.7 years; BMI: 25.2 ± 4.5 kg/m²; 68.7% female) were included. Forty-two patients were classified as hypoplastic and 41 as non-hypoplastic. Baseline demographics and intraoperative procedures were similar between groups. Both groups demonstrated significant and sustained improvements in mHHS and NAHS at 5 and 10 years ($p < .001$), with no intergroup differences in raw scores, change from baseline, or achievement of MCID or PASS. However, the hypoplastic group had significantly higher rates of revision arthroscopy (28.6% vs. 9.8%, $p = 0.030$), conversion to THA (21.4% vs. 4.9%, $p = 0.026$), and overall reoperation (42.9% vs. 14.6%, $p = 0.005$). In multivariable Cox regression models, hypoplastic labra were independently associated with increased risk of revision arthroscopy (HR: 4.81, $p = 0.014$) and THA (HR: 4.92, $p = 0.048$), after controlling for age, lateral center-edge angle (LCEA), and crossover sign. Labral width itself was not a significant predictor of 10-year PROs on multivariate linear regression, while older age, male sex, and higher BMI were associated with worse outcomes.

DISCUSSION AND CONCLUSION: Hypoplastic labral morphology on preoperative MRI is associated with an elevated risk of revision surgery and conversion to THA by 10 years following hip arthroscopy for FAIS. Labral hypoplasia may indicate limited tissue durability and warrants careful consideration in surgical planning and long-term counseling.



Figure 3. Axial and coronal proton density MRI image shows measurement of the labral width (white line) at 11:30 clockface position of the acetabulum (white reference of the midline) and of the other clockface positions (red, blue, and yellow lines). Red, blue, and yellow lines represent the labral width (white line) at 1:30, 3:00, and 11:30 clockface positions of the acetabulum, respectively. A yellow line represents the measurement of the labral width (white line) at 11:30 clockface position. A red line represents the measurement of the labral width (white line) at 1:30 clockface position. A blue line represents the measurement of the labral width (white line) at 3:00 clockface position.

Demographics	Non-Hypoplastic (n=41)	Hypoplastic (n=42)	P Value
Age, years	40.51 ± 12.37	43.29 ± 13.36	0.114
Sex	27 (65.9%)	30 (71.4%)	0.364
Female	14 (34.1%)	12 (28.6%)	
Male	13 (31.8%)	18 (42.8%)	
Body Mass Index (BMI)	25.61 ± 4.68	24.63 ± 4.44	0.486
Lateral Center-Edge Angle (LCEA)	18.64 (°)	19.08 (°)	0.940
Right	18.64 (°)	19.08 (°)	
Left	18.64 (°)	19.08 (°)	
Crossover Sign	17 (41.5%)	17 (40.5%)	0.982
< 1 year	17 (41.5%)	17 (40.5%)	
> 1 year	2 (4.9%)	2 (4.8%)	
Follow-up Time, years	11.78 ± 1.49	11.38 ± 1.85	0.521
Operative Findings			
Chondral Grade			0.330
I-II	22 (53.7%)	22 (52.4%)	
III-IV	19 (46.3%)	20 (47.6%)	
Labral Tear	41 (100.0%)	42 (100.0%)	1.000
Chemical Denudation	41 (100.0%)	42 (100.0%)	1.000
Cartilage Impingement	33 (80.5%)	38 (90.5%)	0.156
Other Type Impingement	4 (9.5%)	4 (9.5%)	0.960
Labral Impingement	32 (78.0%)	38 (90.5%)	0.110
Labral Denudation	11 (26.8%)	12 (28.6%)	0.700

Table 2: Comparison of the Modified Harris Hip Score and Non-Arthritic Hip Score Between Groups	Non-Hypoplastic (n=41)	Hypoplastic (n=42)	P Value
mHHS	50.76 ± 10.76	44.44 ± 12.32	0.014
< 2000	15 (36.6%)	15 (35.7%)	0.750
> 2000	26 (63.4%)	27 (64.3%)	
NAHS	37.71 ± 12.70	33.38 ± 10.18	0.072
< 1000	15 (36.6%)	15 (35.7%)	0.926
> 1000	26 (63.4%)	27 (64.3%)	
NAHS	38.26 ± 11.75	34.12 ± 11.35	0.085
< 1000	11 (26.8%)	10 (23.8%)	0.520
> 1000	30 (73.2%)	34 (80.2%)	
NAHS	35.22 ± 10.26	33.78 ± 11.33	0.560
< 1000	15 (36.6%)	13 (31.0%)	0.450
> 1000	26 (63.4%)	27 (64.3%)	
NAHS	36.03 ± 10.82	34.20 ± 10.63	0.070
< 1000	15 (36.6%)	16 (38.1%)	0.610
> 1000	26 (63.4%)	27 (64.3%)	

Table 3: Comparison of Reoperation Rates Between Groups	Non-Hypoplastic (n=41)	Hypoplastic (n=42)	P Value
Revision	1 (2.4%)	12 (28.6%)	0.030
Time to revision	2.86 ± 3.01	2.57 ± 2.11	0.751
THA	1 (2.4%)	9 (21.4%)	0.026
Time to THA	3.71 ± 3.71	1.81 ± 2.51	0.260
Reoperation	11 (26.8%)	18 (42.9%)	0.005
Time to reoperation	3.22 ± 3.26	1.12 ± 2.41	0.410

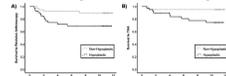


Figure 4. A) Kaplan-Meier survival curve to revision arthroscopy for the hypoplastic and non-hypoplastic groups. B) Kaplan-Meier survival curve to total hip arthroplasty (THA) for the hypoplastic and non-hypoplastic groups.