Chondrolabral Junction Breakdown Predicts Conversion to Total Hip Arthroplasty after Hip Arthroscopy for Symptomatic Labral Tears: Mean 11-Year Follow Up

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INTRODUCTION:
Arthroscopic treatment of symptomatic labral tears and/or femoroacetabular impingement (FAI) confers short- to mid-term benefits, yet long-term evidence is scarce. Moreover, despite emerging research revealing important anatomical roles of the chondrolabral junction (CLJ), the relationship between its degeneration and clinical outcomes remains understudied. The purpose of this study was to 1) report long-term survivorship and patient-reported outcome measures (PROMs) following arthroscopic labral repair or debridement and 2) characterize associations between these outcomes and patient demographics, pathological parameters, and procedures performed.
METHODS: This retrospective cohort study included patients who underwent primary hip arthroscopy for symptomatic labral tears (with or without concomitant FAI) by a single surgeon from 2002-2013. All patients were ≥18 years, had minimum 8-year follow up and preoperative radiographs, and lacked radiographic evidence of hip dysplasia. The primary outcome was conversion to total hip arthroplasty (THA), and secondary outcomes included revision arthroscopy, PROMs, and patient satisfaction. Kaplan-Meier estimates and weighted Cox regression were used to estimate 10-year survivorship and identify risk factors associated with conversion to THA.
RESULTS: In this study of 174 hips (50.6% female; mean age: 37.8 ± 11.2) with a mean follow up of 11.1 ± 2.5 years, the 10-year survivorship rate was 81.6% (95% CI: 75.9-87.7%) (**Table 1**). On average, conversion to THA occurred 4.7 ± 3.8 years postoperatively. Unadjusted analyses revealed several variables significantly associated with THA conversion, including older age, higher body mass index, higher Tönnis grade, labral debridement, and advanced damage to the CLJ, labrum, or articular cartilage ($p<0.05$ for all). Survivorship at 10 years was strikingly inferior in patients exhibiting severe (43.6%; 95% CI: 31.9-59.7%) versus mild (97.9%; 95% CI: 95.1-100%) degeneration of the CLJ ($p<0.001$) (**Figure 1**). Multivariable analysis identified worse CLJ breakdown (weighted hazard ratio, per 1-unit increase: 6.41; 95% CI: 3.11-13.24), older age (1.09; 95% CI: 1.04-1.14), and higher Tönnis grade (4.59; 95% CI: 2.13-9.90) as independent negative prognosticators ($p<0.001$ for all) (**Table 2**).
DISCUSSION AND CONCLUSION: Although most patients achieved favorable long-term outcomes, several pre- and intraoperative factors portended THA conversion, with CLJ breakdown emerging as the strongest indicator. Future advancements in preoperative imaging, CLJ-preserving techniques, and regenerative therapies could potentially transform the management and prognosis of patients undergoing hip arthroscopy.

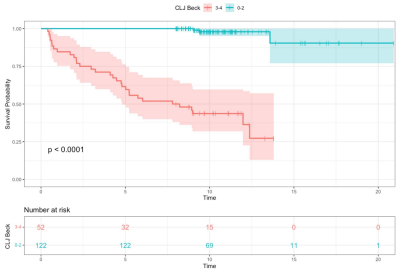

Figure 1. Unadjusted survival (Kaplan-Meier) curves and risk table for patients exhibiting severe versus mild breakdown of the chondrolabral junction.

Severity of chondrolabral junction (CLJ) breakdown assessed using the Beck classification of transition zone cartilage injury. Grade 3-4: severe; grade 0-2: mild.

Table 1. Baseline patient demographics and radiographic findings*

	Total	Conversion to THA	No Conversion to THA	P value
	n = 174	n = 34	n = 140	
Age	37.8 ± 11.2	47.2 ± 9.3	35.5 ± 10.4	**<0.001**
Body mass index (kg/m²)	26.3 ± 4.5	27.9 ± 4.7	25.9 ± 4.4	**0.023**
Sex				0.80
Female	88 (50.6)	16 (47.1)	72 (51.4)	
Male	86 (49.4)	18 (52.9)	68 (48.6)	
Race				0.09
Asian	2 (1.1)	2 (5.9)	0 (0.0)	
Black	2 (1.1)	0 (0.0)	2 (1.4)	
White	167 (96.0)	32 (94.1)	135 (96.4)	
Other or not reported	3 (1.7)	0 (0.0)	3 (2.1)	
Ethnicity				0.58
Hispanic	5 (2.9)	0 (0.0)	5 (3.6)	
Not Hispanic	169 (97.1)	34 (100.0)	135 (96.4)	
Laterality				0.35
Left	72 (41.4)	17 (50.0)	55 (39.3)	
Right	102 (58.6)	17 (50.0)	85 (60.7)	
Tönnis classification				**<0.001**
Grade 0	21 (12.1)	0 (0.0)	21 (15.0)	
Grade 1	115 (66.1)	11 (32.4)	104 (74.3)	
Grade 2	35 (20.1)	20 (58.8)	15 (10.7)	
Grade 3	3 (1.7)	3 (8.8)	0 (0.0)	
Tönnis angle (degrees)	6.9 ± 5.5	10.6 ± 6.2	6.1 ± 4.9	**<0.001**
LCEa (degrees)	35.5 ± 5.9	35.8 ± 5.3	35.4 ± 6.0	0.76
Alpha angle (degrees)	57.9 ± 18.4	68.7 ± 20.2	55.3 ± 17.0	**<0.001**
Average joint space (mm)	4.0 ± 0.7	3.6 ± 0.9	4.1 ± 0.7	**<0.001**
Type of FAI				0.056
Isolated pincer	17 (9.8)	2 (5.9)	15 (10.7)	
Isolated cam	72 (41.4)	19 (55.9)	53 (37.9)	
Combined	20 (11.5)	6 (17.6)	14 (10.0)	
None	65 (37.4)	7 (20.6)	58 (41.4)	

*Data are reported as mean ± standard deviation or No. of patients (%). Boldface denotes statistical significance ($p<0.05$).
Abbreviations: THA, total hip arthroplasty; LCEa, lateral center-edge angle; FAI, femoroacetabular impingement.

Table 2. Weighted Cox regression adjusting for patient characteristics and variable follow-up

Variable	Hazard ratio (95% CI)	P Value
Age, per 1-year increase	1.09 (1.04, 1.14)	**<0.001**
Tönnis grade, per 1-unit increase	4.59 (2.13, 9.90)	**<0.001**
Labral repair (relative to debridement)	1.67 (0.66, 4.23)	0.28
Beck classification of CLJ injury, per 1-unit increase	6.41 (3.11, 13.24)	**<0.001**
Beck classification of labral damage, per 1-unit increase	1.28 (0.81, 2.03)	0.29
Outerbridge grade, per 1-unit increase*	0.46 (0.14, 1.51)	0.20

*Worst degree of change between the acetabulum and femoral head. Boldface denotes statistical significance. CI, confidence interval; CLJ, chondrolabral junction.