Improved Mid-Term Outcomes in Patients with Slipped Capital Femoral Epiphysis Related Femoroacetabular Impingement

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INTRODUCTION:

Slipped Capital Femoral Epiphysis (SCFE) of the hip is a potentially devastating injury that can occur in the developing hip. In-situ pinning is considered the current standard of care; however, even with prompt surgical fixation, there remains a risk of post-operative disability as a result of metaphyseal CAM deformity. This deformity can lead to subsequent femoroacetabular impingement resulting in labral and articular cartilage damage. Hip arthroscopy with labral repair and femoral osteochondroplasty has increasingly been utilized in these patients to correct the underlying deformity and improve hip mechanics.

Short-term follow-up has demonstrated excellent outcomes in patients treated for SCFE with subsequent hip arthroscopy. Mid-term follow-up of these patients is sparse and limited to studies with small sample sizes. These studies primarily evaluate radiographic and physical examination findings rather than patient reported outcomes (PROs). The purpose of this study is to evaluate the mid-term clinical and functional patient reported outcomes of a large population of patients undergoing hip arthroscopy after SCFE in-situ fixation.

METHODS: SCFE patients that underwent subsequent hip arthroscopy for FAI were recruited for this prospective study. Patients were recruited from a single surgeon practice. Patients were sent a survey which included a single assessment numeric evaluation (SANE) prompt, subjective Likert-style questions assessing disability and satisfaction, and PROMIS Physical Function and iHOT-12 questionnaires. Patient charts were retrospectively reviewed for patient demographics, visual analogue scale (VAS) pain scores, and a modified Harris Hip Score (mHHS) from the post-pinning and pre-arthroscopy period. Descriptive statistics were utilized to assess overall patient outcomes.

RESULTS: In total, forty patients met inclusion criteria and thirty-three completed the mid-term follow up survey for an 82.5% response rate. Mean age at the time of arthroscopy was 18.5 years and mean duration of follow up was 5.85 years (Table 1). Patient subjective outcomes are reported in Table 2; notably, 33 of 33 patients (100%) were neutral, satisfied, or very satisfied with surgery. No patients reported that if given the choice again, they would choose to not have surgery. mHHS pre-operatively was 67.43, which was interpreted as poor functional status. Mean mid-term follow-up PROMIS-PF t-score was 51.19, indicating that the functional status of the included patients was at or above the average functional status of the overall population. Mean VAS pain score at rest was 4.78 pre-operatively and 1.94 at mid-term follow up. The average post-operative iHOT-12 score was 65.64 (Table 3).

DISCUSSION AND CONCLUSION:

The results of the first mid-term, large-sample sized comprehensive follow-up of patients undergoing hip arthroscopy following surgical pinning of SCFE demonstrate that these patients have excellent functional and clinical outcomes. Subjectively, these patients report improved satisfaction with the operation and overall improvement in functional status. Objectively, the studied patients are performing at the level of the average non-surgical population as measured by PRO scoring systems. These findings suggest that the excellent outcomes reported at short-term follow-up persist at mid-term follow-up. This study demonstrates that hip arthroscopy for FAI in the setting of a prior in-situ pinning of a SCFE is a viable surgical treatment and reliably improves patient's pain and physical function at mid-term follow up.

Table 1: Demographic Characteristics of Study Population

Variables*	Value
Age	23.61 (6.04)
Age at hip arthroscopy	18.45 (5.15)
Follow-up time (years)	5.85 (3.12)
Sex	
Male	17 (51.5%)
Female	16 (48.5%)
Laterality	
Left	8 (24.2%)
Right	15 (45.5%)
Bilateral	10 (30.3%)

*Variables represented as N (%) and mean (standard deviation) where appropriate.

Table 2: 12 Month Postoperative Survey Results – Subjective Measures

Survey Question	Response
Hip rated as a percent of normal	80.10% (15.15)
Overall satisfaction with surgery	
Very satisfied	18 (54.5%)
Satisfied	11 (33.3%)
Neutral	4 (12.1%)
Unsatisfied	0 (0%)
Very unsatisfied	0 (0%)
Would do it all over again?	
Definitely yes	25 (75.8%)
Yes	3 (9.1%)
Neutral	5 (15.2%)
No	0 (0%)
Definitely no	0 (0%)
Physical Function Compared to Before Surgery	
Much Improved	17 (51.5%)
Improved	9 (27.3%)
No Change	3 (9.1%)
Worse	4 (12.1%)
Much Worse	0 (0%)
Physical Ability Compared to Before Surgery	
Much Improved	18 (54.5%)
Improved	10 (30.3%)
No Change	2 (6.1%)
Worse	3 (9.1%)
Much Worse	0 (0%)
Hip Strength Compared to Before Surgery	
Much Improved	16 (48.5%)
Improved	8 (24.2%)
No Change	5 (15.2%)
Worse	3 (9.1%)
Much Worse	1 (3.0%)
Pain Level Compared to Before Surgery	
Much Improved	18 (54.5%)
Improved	6 (18.2%)
No Change	4 (12.1%)
Worse	3 (9.1%)
Much Worse	0 (0%)
Perceived Relief Experienced as a Result of Treatment	
Great Relief/Improvement	22 (66.7%)
Some Relief/Improvement	5 (15.2%)
Little Relief/Improvement	5 (15.2%)
No Relief/Improvement	1 (3.0%)

*Variables represented as N (%) and mean (standard deviation) where appropriate.

Table 3: 12 Month Postoperative Survey Results – Objective Measures

Variables*	Pre-Operative	Follow-up
HOS – Activities of Daily Living	70.46 (19.62)	
HOS – During Sports	53.09 (28.26)	
mHHS	67.43 (14.04)	
VAS Pain**		
At Rest	4.78 (3.27)	1.94 (2.37)
ADLs		2.64 (2.60)
During sport		3.70 (2.76)
PROMIS PF T-score		51.19 (10.00)
iHOT 12 Score		65.64 (25.54)

*Variables represented as N (%) and mean (standard deviation) where appropriate.

** n=10 patients were found to have preoperative VAS pain scores at rest.