

## ORIGINAL ARTICLE

# Arthroscopic treatment of femoroacetabular impingement: minimum five-year follow-up

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**Purpose:** To evaluate the clinical outcomes of an arthroscopic treatment of femoroacetabular impingement at a minimum of a five-year follow-up.

**Methods:** A case series with 24 subjects (26 hips) was conducted. Subjects that were submitted to an arthroscopic procedure for the treatment of femoroacetabular impingement, at a minimum of five years, were evaluated. Subjects completed the modified Harris Hip Score (mHHS), the pain numeric rating scale and a general questionnaire accessing sports practice and satisfaction.

**Results:** Twenty-one of the 24 subjects (87.5%) were male and the average age at the time of surgery was  $34.6 \pm 9.5$  years old (range 13-51). Of the 27 subjects submitted to hip arthroscopy, three (11.1%) could not be contacted. Follow-up was  $6.1 \pm 0.8$  years, and at this time the average mHHS was  $90.6 \pm 11.6$ . Pain numeric rating scale was  $2.6 \pm 1.9$  and 11 hips (42.3%) reported no pain. Of the 14 subjects that complained of hip pain during sports activities prior to surgery, 10 (71.4%) returned to normal sports activities while four (28.6%) subjects could not return to preoperative activities. Three patients had to be submitted to a new surgical procedure. All 24 subjects were satisfied with their procedure and would repeat it if necessary.

**Conclusions:** Arthroscopic treatment of femoroacetabular impingement, at five years follow-up, revealed good results in terms of improved function, pain relief and satisfaction.

**Keywords:** Femoroacetabular impingement; Arthroscopy; Return to sports

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## INTRODUCTION

Femoroacetabular impingement (FAI) is a predisposing factor for hip osteoarthritis (OA) (1-5). It encompasses a complex pathological mechanism with morphological and biochemical alterations (6). This condition can lead to hip pain in young physically active people and has imaging characteristics similar to hip OA. Initial treatment of FAI consisted of open surgery with the goal of preventing joint degeneration (7-9) and has now evolved into arthroscopic treatment (10).

In spite of the growing experience in the treatment of FAI, it is still unknown if the current procedures lead to

long-term good results with functional recovery and hip OA prevention. There are few studies that report mid- or long-term results of open or arthroscopic procedures and, in addition to this, these studies include different pathologies (11-13). Byrd (11) has shown good long-term results, after 10 years, in patients treated for labrum lesions while Naal (12) and Palmer (13) have reported good mid-term results for open and arthroscopic procedures, respectively.

Some authors (14-18) have shown good short-term results for arthroscopic treatment of FAI. The objective of this study is to evaluate mid-term outcomes of an arthroscopic treatment of FAI.

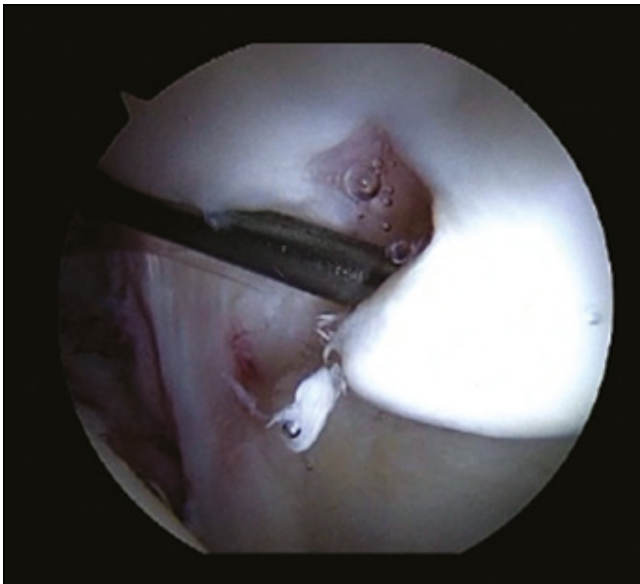


Fig. 1 - Carpet type chondrolabral transition lesion, a characteristic lesion of CAM type FAI.

## METHODS

A case series was conducted in an outpatient hip clinic. Initially 32 patients who had hip arthroscopy for the treatment of FAI were identified. Patients were operated on between August 2002 and July 2007. Of these 32 patients, five were excluded as they presented with hip osteoarthritis diagnosed during the arthroscopic procedure. This left 27 patients (29 hips) for inclusion in this study. All procedures were performed by the same surgeon (GCP). This study was approved by the Ethics committee of our institution, and all patients gave informed consent.

After the 27 patients had been selected, their demographic data was retrieved from the medical charts as well as the preoperative Modified Harris Hip Score (mHHS) (19, 20) and the characteristics of the surgical procedure. Subjects were contacted, and an independent investigator conducted an interview. We were not able to contact three patients. During the period evaluated, three different surgical techniques were used. The first two techniques were an osteochondroplasty with or without labral debridement. With the continuous development of surgical techniques (21-24) the last technique included labral refixation. With this, the three techniques performed were: osteochondroplasty; osteochondroplasty and labral debridement (for patients that presented with a relevant labral lesion - Fig. 1); and osteo-

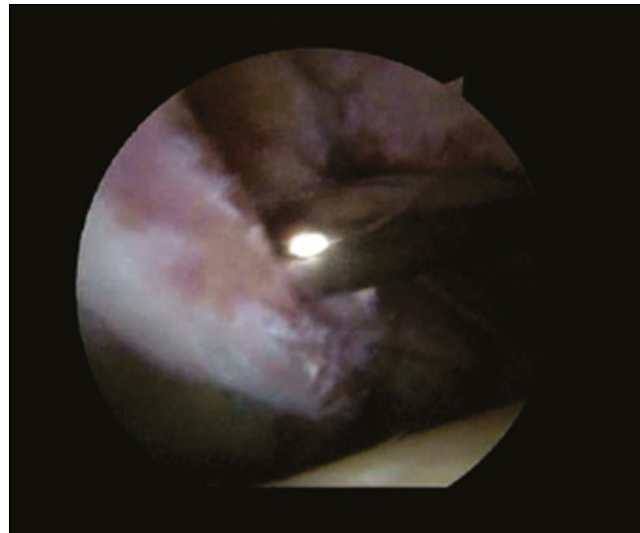


Fig. 2 - Linear lesion caused by pincer type FAI.

chondroplasty with labral refixation. The portals used followed the descriptions by Philippon and Schenker (25). In general, two portals were sufficient: anterolateral and mid-anterior portals. Alternative portals were used as needed. A 70° arthroscope was used in all cases. Initially, the central compartment was addressed to diagnose and treat articular cartilage and labral lesions. The acetabular labrum was debrided or repaired depending on the aspect and position of the labral tissue and the presence of Pincer type deformity (Fig. 2) and was preserved whenever possible. There is still no consensus on the best care for labral lesions but, in recent studies, labral repair seems to have better results, both for the open and arthroscopic techniques (26-31). After this, traction was removed and the peripheral compartment was addressed allowing the scope to reach the peripheral region of the femoral head - neck transition. CAM type impact was defined as a local anatomical variation and an osteochondroplasty was performed. The procedure was considered complete when 90° of flexion, adduction and 30° internal rotation was achieved and no conflict of the neck against the acetabular rim was observed.

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**TABLE I - MODIFIED HARRIS HIP SCORES**

	Pre-op mHHS				Post-op mHHS			
	Average	SD	Min	Max	Average	SD	Min	Max
Osteochondroplasty	60.45	16.15	22	82	90	12.78	68	100
Osteochondroplasty and labral debridement	63.80	15.50	43	85	95.70	8.03	78	100
Osteochondroplasty and labral repair	63.80	7.05	47	70	87.03	12.38	64	100
Total	62.68	12.90	22	85	90.91	11.06	64	100

mHHS = Modified Harris Hip Score; SD = standard deviation; Min = minimum; Max = maximum.

no conflict of the neck against the acetabular rim was observed.

All 24 subjects answered the Modified Harris Hip Score (19, 20, 32), the pain numerical rating scale (NRS10: 1 without pain and 10 worst pain experienced) (33) and a general questionnaire about sports activities and satisfaction with the surgical treatment. The results of the mHHS were divided into categories: mHHS <70: poor outcome; mHHS 70-79: fair outcome; mHHS 80-89: good outcome and mHHS 90-100: excellent outcome (34).

### Statistical analysis

Data is presented as means  $\pm$  standard deviations. Repeated measure ANOVA was used to estimate the differences between the three surgical techniques performed. Wilcoxon test for repeated measures was used to evaluate pre- and post-op mHHS. Statistical analysis was performed with SPSS version 16 (SPSS, Chicago, IL).

## RESULTS

Of the 24 subjects, 87.5% were male. Average age at the time of surgery was  $34.6 \pm 9.5$  years old (range 13-51 years old), and the average age at the time of follow-up was  $40.7 \pm 9.8$  years old (range 21-58). Mean follow-up was  $6.1 \pm 0.8$  years (range 5-8 years).

The preoperative mHHS was  $62.4 \pm 13.4$  (range 22-85) and the postoperative mHHS was  $90.6 \pm 11.6$  (range 64-100) ( $P < 0.001$ ). The postoperative stratified mHHS results were: 2 (7.7%) poor results; four (15.4%) fair results; two (7.7%) good results; and 18 (69.2%) excellent results for the 26

hips. The postoperative pain numerical rating scale was  $2.6 \pm 1.9$  (range 1-8).

Eleven hips (42.3%) were submitted to osteochondroplasty, seven (26.9%) to osteochondroplasty and labral debridement and eight (30.8%) to osteochondroplasty and labral refixation. The mHHSs relative to each surgery are shown in Table I. The average behavior of mHHS in the three types of surgery performed is the same at the times assessed ( $p = 0.799$ ), with no statistically significant difference between surgeries ( $p = 0.382$ ), but with a difference between pre and postoperative mHHS ( $P < 0.001$ ).

Fourteen patients (58.3%) referred hip pain during sporting activities in the preoperative phase. Of these, ten (71.4%) returned to normal sporting activities (one professional athlete) at the same level. Of the four subjects that did not return to sports, one was submitted to total hip arthroplasty due to hip OA, one reported pain during activities and other two reported personal reasons, not related to the hip. Of the subjects that did not perform physical activity prior to surgery, four began after surgery. Three subjects (11.5%) were submitted to a second surgery: two total hip arthroplasties and one gluteus medius tendon procedure. All 24 subjects (26 hips) stated that they were satisfied with the surgical results (including the three that were submitted to a second surgery) and that they would have the surgical procedure again.

## DISCUSSION

Arthroscopic treatment for FAI is well established (13-18), and results are similar to the open procedure (35, 36).

In spite of this, long-term results are still warranted to confirm these good results. This study has shown good midterm results (75.2 months) for 24 subjects (26 hips) treated arthroscopically for FAI. The average improvement of the mHHS was 28.2 points, a similar result found by others (13-18). Although two patients had to undergo a total hip arthroplasty due to OA, all subjects showed satisfaction with the first procedure.

In the study with the longest follow-up (11), Byrd and Jones show a minimum 10-year follow-up of 26 subjects submitted to an arthroscopic labral debridement. Immediate postoperative mHHS showed an improvement of 29 points. At 10 years, this improvement was of 18 points for the 18 subjects that did not develop hip OA. Of the eight patients with hip OA, seven were submitted to total hip arthroplasty (63 months after initial surgery). Naal and colleagues (12) performed a retrospective study with 185 subjects submitted to an open procedure for FAI treatment (surgical hip dislocation) and at five years, 82% of the patients were satisfied or extremely satisfied with the results of surgery. Total hip arthroplasty was performed in seven hips (3%), seven hips (3%) underwent major revisions, and 11 (4.7%) underwent minor revisions. Palmer et al (13) evaluated 201 patients with cam-type femoroacetabular impingement treated arthroscopically. The authors showed improvement in the nonarthritic hip score, visual analogue scale pain scores, and satisfaction levels at a mean follow-up of 46 months.

Return to sports occurs in over 70% of patients (professional athletes or not), if OA is not present, in up to 10-year follow-up (10, 37-40). Our study found 71.4% return to previous level of sports. In addition to this, four subjects began to practice sports after the surgery.

The repercussions of a labrum injury caused by femoroacetabular impingement, are now well understood, although the labrum is essential for the optimal performance of the hip (41-44). This awareness has led to the pursuit of better treatments with the correction of both morphological and chondrolabral alterations to stop the progression of joint damage (5). The continuous improvement of the surgical techniques and instruments allowed a gradual transition to arthroscopic techniques. This evolved from a simple osteoplastic technique for the correction of cam or pincer deformities and the recognition and debridement of devitalised labral surface to the current techniques that repair the labrum and are now regarded as the best option to restore the original function of the acetabular labrum

(26, 28, 29). This study was performed between 2004 and 2007 and the change in techniques used reflected the change in standard of care. Both the isolated osteochondroplasty and the one associated with labrum debridement or reattachment showed improvement in pain and function. In spite of this, it was not possible to demonstrate differences among the three approaches and this maybe due to our sample size.

This study has limitations. Firstly, HHS was initially designed to assess the function of older patients undergoing total hip arthroplasty. Nevertheless, it has also been used as a functional score for patients undergoing hip arthroscopy after the modification performed by Byrd (19) and has shown good correlation with postoperative patient satisfaction (45). Secondly, different surgical techniques were used throughout this study, and this could interfere in the outcomes although we found no difference between the procedures. Our sample size was small but similar to others (11, 37, 39, 40).

## CONCLUSIONS

Arthroscopic treatment of femoroacetabular impingement, at five years follow-up, revealed good results as shown by improved function, pain relief and satisfaction.

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