Original Article

Clinical Outcomes of an Initial 3-month Trial of Conservative Treatment for Femoroacetabular Impingement

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Abstract

Background: Femoroacetabular impingement (FAI) can be managed either conservatively or by a surgical correction of the deformity causing impingement. However, there is insufficient evidence to justify an immediate surgical treatment in all symptomatic patients, and the role of a nonoperative treatment is unclear. This study evaluates the role of conservative treatment for FAI. **Materials and Methods:** 87 patients (102 hips) diagnosed as FAI between January 2011 and May 2012 were included in this retrospective study. All patients underwent an initial 3-month conservative treatment followed by arthroscopic hip surgery if symptoms did not improve. Clinical outcome scores (modified Harris Hip Score, nonarthritic hip score, and Western Ontario and McMaster Universities Arthritis Index) were evaluated at baseline and at the end of followup, and scores were compared between the nonsurgical and surgical groups. **Results:** The final analysis included 83 patients (55 men, 28 women; 97 hips) because four patients were lost to followup. The average age was 45.1 years and 14 patients had bilateral symptomatic FAI. After an initial conservative treatment averaging 27.5 months (range 24–36 months), 53 hips (54.6%) could perform normal daily activities. The nonsurgical group had significant improvements in all clinical scores at the end of followup ($P < 0.001$). Forty four hips (45.4%) were unresponsive to conservative treatment and underwent arthroscopic hip surgery with subsequent significant improvements in clinical scores ($P < 0.001$). At the end of followup, there were no significant differences in clinical scores between the two groups. **Conclusion:** An initial trial of conservative treatment of sufficient length should be considered for FAI patients before surgical intervention.

Keywords: *Conservative treatment, femoroacetabular impingement, hip arthroscopy*
MeSH terms: *Arthroscopic surgical procedures, femur head, arthritis*

Introduction

Femoroacetabular impingement (FAI) is a pathomechanical process of the hip caused by an abnormal contact between the acetabular labrum and proximal femur, typically on flexion, internal rotation, and adduction. The repetitive abutment of bony structures results in labral tears and cartilage delamination that can predispose hips to osteoarthritis if not treated.[1-6] FAI is considered to be responsible for a significant portion of hip pain and dysfunction in young adults.[7-10]

The treatment goal for FAI is to maintain a pain-free and functional hip joint without any limitation of patient desired activities and to prevent the hip joint from sustaining cartilage damage. This can be achieved by either a conservative method or a surgical correction of the deformities that cause impingement. Both open dislocation and arthroscopic surgery have yielded favorable results and surgical methods have evolved over the last decade. Till date, most studies on the treatment results of FAI have been limited to postoperative outcomes.[11-17] FAI is believed to primarily be a morphological disorder that will cause cartilage degeneration in the long term if not surgically corrected.[8-10,18,19] Thus, many clinicians prefer surgical treatment over conservative treatment.

Nonetheless, guidelines for choosing optimal surgical candidates remain ill-defined, and there is insufficient evidence at present to justify an immediate surgical treatment in all symptomatic FAI patients.[20,21] Most relevant studies either lack proper control groups including conservatively treated patients or have few study participants.[12-15,19] Although studies of conservative treatment clinical outcomes for FAI are scarce, some authors have reported good results.[9,10] We have observed that some patients with FAI do well without

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surgical treatment, but the role of surgery in FAI is unclear. Thus, the purpose of the present study was to evaluate the clinical outcomes of patients with FAI who had received an initial conservative treatment for a minimum of 3 months. We hypothesized that painful FAI will improve after a conservative treatment but that patients who underwent surgery will have better clinical results at the end of the followup period.

Materials and Methods

87 patients (102 hips) who presented with hip pain secondary to FAI at our hospital between January 2011 and May 2012 were included in this retrospective study. FAI was diagnosed on the basis of information obtained from the patient history, physical examination, and radiographic studies. Clinical inclusion criteria were (1) anterior or lateral hip pain; (2) history of pain that worsened with activity, pivoting, hip flexion, or weight bearing; (3) mechanical symptoms associated with pain (popping, clicking, or locking); (4) pain at rest; and (5) positive physical examination findings of the impingement test, Patrick test, or log rolling test. All patients underwent standard radiographic studies, including a standing anteroposterior (AP) view of the pelvis, frog-leg lateral view, and 45° Dunn view. Pelvic radiographs were taken with patients in the supine position with a tube-to-film distance of 102 cm (40 in) with the tube perpendicular to the table. The beam crosshairs were centered on the point midway between the superior border of the pubic symphysis and a line drawn that connected the anterior superior iliac spines. The pelvic AP view was considered true when the coccyx tip and pubic symphysis were in line and the distance between them was between 1 and 3 cm, and both teardrops, the iliac wing, and obturator foramen were symmetrical. Radiographs were reviewed by two experienced orthopedic surgeons for the following measurements and signs: (1) lateral center–edge angle (LCEA); (2) alpha angle on both AP and lateral views; (3) crossover sign; (4) pistol-grip deformity; and (5) bony bump at the femoral head–neck junction. Cam-type FAI was defined as the presence of the following signs on each of the three views: pistol-grip deformity, osseous bump at the femoral head–neck junction, or an alpha angle >50°. Pincer-type FAI was defined as the presence of the following signs on the pelvic AP view: crossover sign or an LCEA >40°. Mixed-type FAI was defined when the hips had features of both cam-type and pincer-type morphologies.

All patients underwent an initial 3-month trial of a conservative treatment that involved activity modification and nonsteroidal anti-inflammatory drugs (NSAIDs) initially twice a day for 6 weeks and thereafter as required. Activity modification included avoiding squatting, leg crossing, pivoting, excessive physical activity, and sitting on the floor. Patients were followed up at 2, 6, and 12 weeks and then every 3 months thereafter. Arthroscopic hip surgery was indicated in (1) patients with persistent pain unresponsive to the minimum 3-month conservative treatment, (2) patients who had refused further conservative treatment and wanted to undergo surgical treatment for early recovery, and (3) patients with surgically amenable lesions on magnetic resonance arthrography of the hip. At baseline and the end of followup, clinical outcome assessments were performed using the modified Harris Hip Score (mHHS), nonarthritic hip score (NAHS), and Western Ontario and McMaster Universities Arthritis Index (WOMAC). When outcome assessments at the minimum 2-year followup were missing in the nonsurgical group, incomplete questionnaires were completed using telephone interviews. We compared baseline characteristics and clinical outcomes between the nonsurgical (conservative treatment) and surgical (hip arthroscopy) groups at the end of followup. This study was approved by our institutional review board.

All statistical analyses were performed using IBM SPSS version 15.0 (SPSS, Chicago, IL, USA). Paired *t*-tests were used to compare ages and clinical scores (continuous variables) between the nonsurgical and surgical groups. Chi-square tests were used to compare other baseline characteristics (categorical variables) between the two groups. The value of $P < 0.05$ was considered statistically significant.

Results

Four patients were lost to followup and one patient underwent arthroscopic hip surgery at another hospital before the 3-month followup. Thus, 83 patients (97 hips) were included in our analysis (55 men and 28 women) with an average age of 45.1 years (range 22.0–68.4 years). Of the 97 hips included, 48 were classified as cam-type, 14 as pincer-type, and 35 as mixed-type FAI. No significant differences in baseline characteristics were found between the nonsurgical and surgical groups except for age. The mean age of the surgical group was significantly lower than that of the nonsurgical group [41.8 ± 12 and 47.9 ± 12 years, respectively; $P = 0.016$, Table 1]. The mean alpha angle of the affected hips was 60.3° (range 51.2°–87.7°) in the cam-type or mixed-type and 38.2° (range 32.7°–45°) in the pincer-type FAI. Fourteen patients had bilateral symptomatic FAI. Out of the remaining 69 unilateral symptomatic patients, 40 patients had FAI-related radiographic abnormalities in the contralateral asymptomatic hip.

At an average of 27.5 months after the initial conservative treatment (range 24–36 months), 53 hips (54.6%) could perform normal daily activities without surgery. The nonsurgical group had statistically significant improvements in all outcome measures at the end of followup (mHHS 68.2–95.8; NAHS 66.4–95.7; WOMAC 53.5–90.1; $P < 0.001$). In our series, arthroscopic hip surgery was performed in 44 hips (45.4%) that were unresponsive to conservative treatment at an average of 10 months (range

3–29.5 months) after the initial conservative treatment [Figure 1]. At baseline, the outcome measures of the surgical group were as follows: MHHS 64.2; NAHS 60.5; WOMAC 52.1. There were significant improvements in all outcome measures from baseline to the average 25.4-month followup [mHHS 72.0–95.7; NAHS 70.2–93.7; WOMAC 71.0–91.8; $P < 0.001$; Table 2].

At the end of followup, no significant difference was found in the mean mHHS, NAHS and WOMAC scores between the two groups [Table 3]. More than 90% of patients in both groups had good or excellent results at the final followup [conservative treatment vs. hip arthroscopy: MHHS 98.1% vs. 100%; NAHS 98.1% vs. 91.0%; WOMAC 90.6% vs. 100%; Table 4].

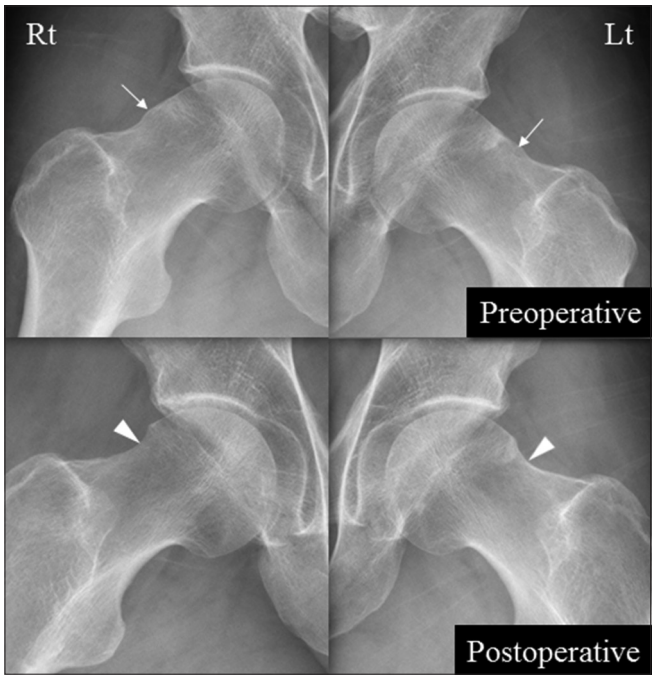

Figure 1: A 37-year-old male with bilateral hip pain. Preoperative frog-leg lateral radiographs showing a bilateral cam-type deformity (arrows). The patient was unresponsive to 6-month conservative treatment and underwent bilateral arthroscopic bumpectomy. Postoperative radiographs showing restored normal head–neck offset (arrowheads)

Discussion

To the best of our knowledge, the present study included the largest number of FAI patients who received conservative management till date; in addition, no previous study included only patients who had both positive clinical and radiological findings of FAI. All patients in the present study had significantly improved scores at the end of followup, regardless of treatment modality. After an average 27.5-month followup, 53 of 97 hips (54.6%) showed a significant improvement in symptoms with nonoperative therapy alone and did not require surgical intervention [Figure 2]. Furthermore, there was no difference in final outcomes between the nonsurgical and surgical groups, suggesting that conservative treatment was not inferior to surgical treatment in the early phase. Age was the only significantly different factor between the two groups with a younger average age in the surgical group. This is probably because younger patients are more active and thus experience more symptoms or demand higher activity levels and want surgery to achieve their goals. Hunt *et al*.[10] also reported that younger patients were more likely to choose surgery.

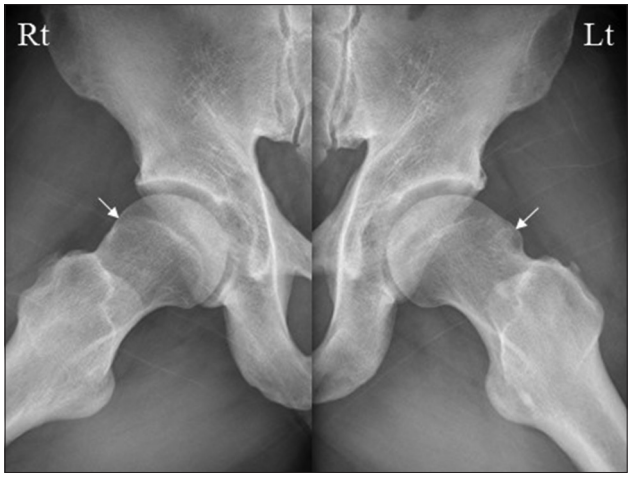

Figure 2: A 46-year-old man with left hip pain. A frog-leg lateral radiograph showing a prominent bony bump and flattened femoral head–neck offset on left and right hips, respectively (arrows). The patient resumed pain-free activity after a 5-month conservative treatment

Table 1: Baseline characteristics of femoroacetabular impingement patients

Characteristic	Total (*n*=97)	Nonsurgical (*n*=54)	Surgical (*n*=44)	*P*
Age (mean±SD) in years	45.1±13	47.9±12	41.8±12	0.016*
Female gender (%)	33.0	30.2	36.4	0.520
Right (%)	57.7	60.4	54.5	0.563
Onset, month (mean±SD)	6.3±7	6.4±8	6.1±5	0.754
Positive impingement test (%)	94.8	92.5	97.7	0.373
Type (%)				
Cam	49.5	58.5	38.6	0.148
Pincer	14.4	11.3	18.2	
Mixed	36.1	30.2	43.2	
Fibrocystic change (%)	25.8	24.5	27.3	0.758

*Statistically significant (P<0.05). According to separate independent samples, *t*-tests for continuous variables and Chi-square tests for categorical variables. FAI=Femoroacetabular impingement, SD=Standard deviation

In contrast to our present findings, earlier studies on FAI treatment reported poorer results for nonoperative treatment. In a study by Jäger *et al*.,[12] the nonoperative treatment group had no improvement in hip pain and dysfunction, whereas the surgical group had excellent results. However, radiographic studies in that study showed that patients who underwent a nonoperative treatment already had a prominent destruction of the hip joint cartilage, whereas those who underwent surgery had only mild degeneration. This fact might account for the inferior results of the nonoperative treatment group in that report. Another limitation of that study was the small sample size and low-quality evidence which were not sufficient to draw a meaningful conclusion.

Other recent studies have reported better results from a conservative treatment of FAI. Emara *et al*.[9] reported better treatment outcomes than we found in the current study, describing symptom improvement in >70% of their patients who received nonoperative treatment. Only four out of their 37 patients experienced failure and underwent surgery. They concluded that their nonoperative treatment results were comparable to those of arthroscopic surgery. However, their study group was limited to mild FAI only (alpha angle <60°) and excluded patients with the previous hip disease, severe osteoarthritis, and an older age (>55 years). There is also a concern that some of the patients did not even have FAI because the lower alpha angle limit of the patients was not provided.[22] Hunt *et al*.[10] reported similar results to our present data, finding that 44% of prearthritic hip patients were satisfied with conservative care. Their study design closely resembled ours, and both the surgical and nonsurgical groups had significant improvements in symptoms. However, their study included a heterogeneous group of patients with both FAI and developmental dysplasia of the hip (prearthritic hip disease), and only a small number of FAI patients (n = 18) were included in that series. They also did not describe the results for FAI patients alone, making it difficult to interpret their FAI patient specific findings.

Clinicians often face challenging situations when choosing the appropriate treatment for FAI because there are no clear guidelines. It seems that many clinicians initially try a nonoperative treatment but the length of the trial before proceeding to surgery varies, ranging from 1.5 to 6 months.[14,16,17,23] However, there is not sufficient evidence at present to support an optimal timing for a surgical intervention.[20,21] It may be possible that symptoms resolve after 6 months. In the present study, we recommended surgical treatment if the pain persisted for >3 months but continued conservative treatment if the patient preferred to do so (for an average of 10 months).

Table 2: Clinical score results for the hips that underwent a surgical treatment

Outcome scores	Baseline	Preoperative	Postoperative	*P*
mHHS	64.2	72.0	95.7	<0.001*
NAHS	60.5	70.2	93.7	<0.001*
WOMAC	52.1	71.0	91.8	<0.001*

*Statistically significant (P<0.05). mHHS=Modified Harris Hip Score, NAHS=Nonarthritic hip score, WOMAC=Western Ontario and McMaster Universities Arthritis Index

Table 3: Comparison of clinical results between the nonsurgical and surgical groups

Outcome measures	Nonsurgical (n=53)	Surgical (n=44)	*P*
Follow up (months)	27.5	25.4	
Baseline outcome measure			
mHHS	68.2	64.2	0.180
NAHS	66.4	60.5	0.112
WOMAC	53.5	52.1	0.654
Final outcome measure			
mHHS	95.8	95.7	0.919
NAHS	95.7	93.7	0.087
WOMAC	90.1	91.8	0.164

mHHS=Modified Harris Hip Score, NAHS=Nonarthritic hip score, WOMAC=Western Ontario and McMaster Universities Arthritis Index

Table 4: Comparison of final outcome scores between nonsurgical and surgical groups

Final outcome	Nonsurgical (n=53) (%)	Good or excellent result (%)	Hip arthroscopy (n=44) (%)	Good or excellent result (%)
mHHS				
Fair	1 (1.9)		0	
Good	13 (24.5)	98.1	6 (13.6)	100
Excellent	39 (73.6)		36 (86.4)	
NAHS				
Fair	1 (1.9)		4 (9.0)	
Good	6 (11.3)	98.1	9 (20.5)	91.0
Excellent	46 (86.8)		31 (70.5)	
WOMAC				
Fair	5 (9.4)		0	
Good	15 (28.3)	90.6	12 (27.3)	100
Excellent	33 (62.3)		32 (72.7)	

mHHS=Modified Harris Hip Score, NAHS=Nonarthritic hip score, WOMAC=Western Ontario and McMaster Universities Arthritis Index

Many of our patients were treated conservatively for >3 months and they had improved by the end of the followup period. This indicates that the duration of symptoms should not be the sole factor considered when choosing the type of FAI treatment, but that a comprehensive approach is needed. Further studies are needed to clarify the surgical indications for FAI.

Another notable finding of our current study was that many bilateral FAI patients had only unilateral symptoms: 69 patients (83.1%) had a bilateral osseous deformity confirmed by X-ray, but 49 (58.9%) had unilateral FAI symptoms. This result supports the opinion expressed by many authors that FAI is a clinical diagnosis and that the decision for surgery should not be made on a radiological basis alone.[6,24] Many investigators have reported a high incidence of asymptomatic FAI in volunteers, although the natural history of untreated asymptomatic FAI remains uncertain.[25-27] Further observation of these patients may reveal the eventual fate of FAI, which may help clinicians in deciding the appropriate treatment.

The present study has a number of limitations. First, there was no long term followup. Many previous studies have reported acceptable long term surgical results.[11,14-16,28-30] However, earlier reports on conservative treatment had a relatively short followup period, ranging from 12 to 28 months.[9,10,12] Whether patients treated conservatively will remain symptom free in the long term is still in question, because there is the unresolved issue of whether a conservative treatment alone is sufficient to prevent osteoarthritis of the hip. Some authors fear that cartilage damage will progress with a conservative treatment alone and that the optimal time for joint preserving surgery will be missed.[8,18,19]

Second, the treatment regimen was not standardized. Our treatment protocol was limited to activity modification (avoidance of pain-provoking positions) and medical therapy (NSAIDs). Many studies have attempted detailed and individualized physical therapy sessions, which were not used in our current patients.[9,10,22] The aim of physical therapy is to improve a deficiency in hip function, including altered hip muscle strength, range of motion, and gait biomechanics in FAI patients.[9,10,31] However, there are few published studies that provide guidance and evidence on how physical therapy led, care should be delivered. In addition, many investigators have reported the difficulty of standardizing the delivery of this care, significant variability in attendance at the physical therapy session, and poor compliance of home based exercise programs.[22,31] Recently, a randomized controlled trial comparing hip arthroscopy with a conservative treatment for FAI patients showed encouraging outcomes of personalized hip therapy, including hip specific function and lower limb strengthening, core stability, and postural balance exercise.[31] Since there are substantial differences regarding patient specific anatomies and the pathomechanism of cam-type and pincer type FAI, individualized physical therapy could confer some benefit to patients. Third, the represented groups (surgical versus nonsurgical) had a significant age difference and this may be because of possible activity level differences between the two groups and we did not compare the two groups on the basis of activity scores. However, we evaluated the two group son the basis of mHHS, NAHS, and WOMAC, which did provide sufficient information about the daily functional activities of the two groups. Fourth, we defined a pincer-type lesion based on a crossover sign and an LCEA >40° only and did not consider other radiological parameters such as ischial spine and posterior wall sign. Finally, we could not provide definite criteria for the "failure" of nonoperative treatment, as mentioned above. However despite these limitations, our data suggest that more than half of the patients with FAI-associated hip pain and discomfort improved with an initial conservative treatment for a minimum of 3 months.

Conclusion

An initial trial of conservative treatment of a sufficient period should be considered for FAI patients before deciding on surgical intervention.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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