

Conservative treatment for mild femoroacetabular impingement

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ABSTRACT

Purpose. To report early results of conservative treatments (including modifications in activities of daily living) for mild femoroacetabular impingement. **Methods.** 27 male and 10 female athletic patients aged 23 to 47 years presented with unilateral hip pain secondary to femoroacetabular impingement and an alpha angle of $<60^\circ$. Patients were instructed to adapt to their safe range of movement and perform activities of daily living with minimal friction. The Harris Hip Score and non-arthritis hip score before and after treatment were compared. Open or arthroscopic hip surgery to remove the impinging bone was indicated when conservative treatment failed.

Results. Patients were followed up for 25 to 28 months. Of the 37 patients, 4 underwent surgical treatment after conservative management failed. For the remaining 33 patients, the mean Harris Hip Score improved significantly from 72 before treatment to 91 at the 24-month follow-up. The mean non-arthritis

hip scores improved from 72 to 91, and the mean visual analogue scores for hip pain from 6 to 2. Six of the 33 patients had recurrent hip pain and discomfort but not severe enough for surgical treatment.

Conclusion. Conservative treatment did not improve the range of hip movement, despite improvement in function and symptoms. Yet it achieved good early results, as long as the patients could modify activities of daily living to adapt to their hip morphology.

Key words: acetabulum; arthritis; hip joint; pelvic pain; sports

INTRODUCTION

The hip joint is a ball-and-socket joint that enables a wide range of movement.¹ Femoroacetabular impingement (FAI) with hip pain is caused by frequent abnormal contact between the acetabular labrum and the head-neck junction of the femur (usually in the anterosuperior area).²⁻⁴ It occurs when there is abnormality in the femoral head offset from

the neck (cam type) or in the acetabulum (Pincer type). Cam impingement is the result of decreased head-neck offset with a gradual aspherical contour from the femoral head to the neck anterolaterally, together with a relative retroversion of the femoral head or a prominent portion engaging the articular surface of the acetabulum.^{5,6} This osteochondral lesion impacts the acetabular rim during flexion and internal rotation at the hip.⁷ FAI may occur in patients with coxa magna, slipped capital femoral epiphysis or secondary to abnormal physeal development⁸; or in patients with abnormal retroversion or a deep acetabulum (pincer type) such as protrusio acetabuli or overcorrection after acetabular osteotomy, owing to the relative over-coverage by the anterior rim producing a linear contact between the rim and femoral neck³; or in patients with a combined acetabular and femoral aetiology.^{9,10}

FAI causes hip pain and predisposes to hip osteoarthritis.¹ Hip flexion and internal rotation leads to maximum contact between the anterosuperior femoral head-neck junction and the acetabular labrum, especially when there is not enough clearance to avoid friction. Degenerative labral tears are produced anteriorly by the repetitive compression and shear forces.¹¹ The position of the lower limb during walking and activities of daily living plays an important role in FAI.¹²

The treatment goal is to decrease the mechanical contact between the acetabular edge and the femoral neck.^{13,14} If conservative treatments fail to alleviate the symptoms, early surgical intervention is recommended to avert the pathologic progression from impingement to end-stage arthrosis.¹⁵ This involves open¹⁶ or arthroscopic^{14,17} hip surgery to remove the impinging bone (with or without reattachment of the acetabular labrum).

We aimed to report the early results of conservative treatments (including modifications in activities of daily living) for mild FAI syndrome.

MATERIALS AND METHODS

This study was approved by the ethics committee of our hospital. Informed consent was obtained from each patient. Between November 2006 and April 2007, 27 male and 10 female athletic patients aged 23 to 47 (mean, 33; standard deviation, 5) years presented with unilateral hip pain secondary to FAI and an alpha angle of $<60^\circ$. Patients older than 55 years or who were skeletally immature were excluded, as were those with a history of hip disease or surgery (e.g. slipped capital femoral epiphysis, Perthes disease,

hip osteotomy, developmental dysplasia of the hip), or those with an alpha angle of $>60^\circ$ or any evidence of hip arthritis or a non-spherical femoral head.

The range of hip movement was recorded. In all patients, the hip impingement test (flexion and internal rotation that reproduced anterior hip pain) was positive on the symptomatic side and negative on the normal side. Anteroposterior and frog lateral radiographs were used to assess the alpha angle, centre-edge angle, and acetabular retroversion (crossover sign), and to exclude any arthritic changes or major bony pathology. Soft-tissue pathology was assessed using magnetic resonance imaging.

All patients underwent 4 stages of conservative treatment. The first involved avoidance of excessive physical activity and the use of anti-inflammatory drugs (diclofenac 50 mg, twice a day) for 2 to 4 weeks during the acute attack. The second involved physiotherapy for 2 to 3 weeks in the form of stretching exercises (20 to 30 minutes daily) to improve hip external rotation and abduction in extension and flexion, and to avoid the 'W' sitting position (Fig. 1). The third involved assessment of the normal range of hip internal rotation and flexion after the acute pain subsided. The safe range of movement to avoid FAI was between maximum internal and external rotation. The patients were instructed to adapt to their safe range of movement and perform activities of daily living with minimal friction. The

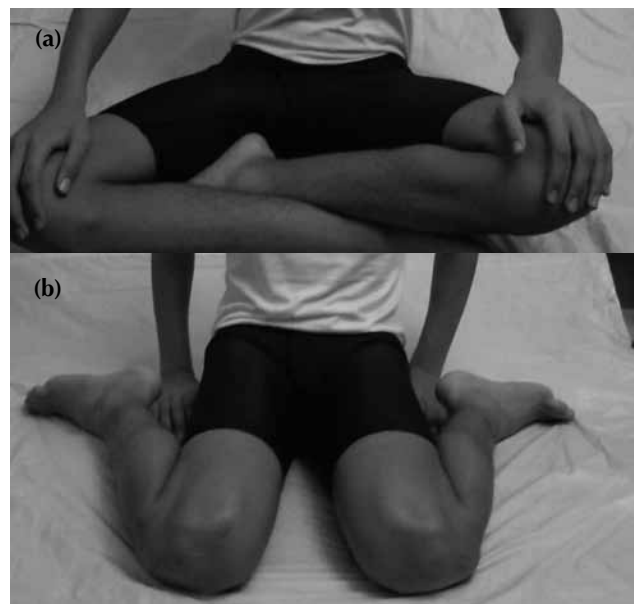


Figure 1 Sitting with the hip (a) in flexion, abduction, and external rotation rather than (b) in flexion, adduction, and internal rotation (the 'W' position) gives less hip impingement.

fourth involved modification of activities of daily living predisposing to FAI (e.g. hip internal rotation associated with flexion and adduction, Fig. 2).

The patients were taught to avoid running on a treadmill or narrow straight trails to prevent internal rotation of the lower limbs. Such activities were to be replaced by running in a zigzag and wide courses (requiring some abduction and external rotation during turns).^{18,19} Cycling was also to be avoided, as this involved hip flexion and internal rotation at the same time. When cycling was unavoidable, the patients were to externally rotate the legs to give some rest to their hip and also elevate the bicycle seat to avoid deep hip flexion. Patients needed to avoid sitting continuously for a long time with the spine fully straight and the hip in flexion; when sitting, lean back every 5 or 7 minutes (to decrease hip flexion) was encouraged (Fig. 3).

Patients were followed up every 2 to 3 weeks until symptoms resolved and then every 3 months for 12 months, and every 6 months thereafter. Open or arthroscopic hip surgery to remove the impinging bone was indicated when conservative treatment failed.

Harris Hip Score²⁰ (HHS) and non-arthritic hip score²¹ before and after treatment, and the range of movement relative to the normal side were compared using the paired *t* test. A *p* value of <0.05 was considered statistically significant.

RESULTS

86.5% of the patients presented with groin pain

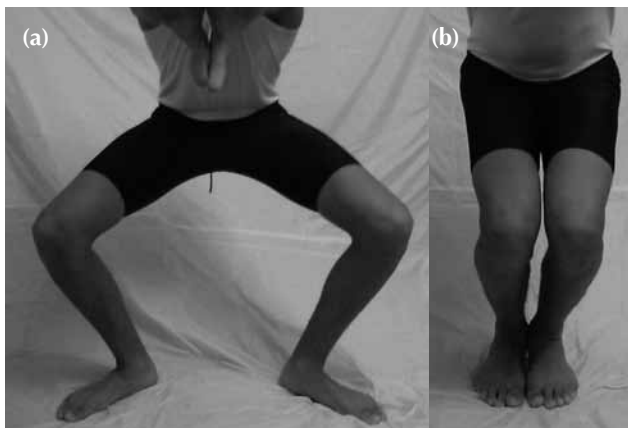


Figure 2 Squatting with the hip (a) in abduction and external rotation rather than (b) in adduction and internal rotation gives less hip impingement.

only, whereas 13.5% complained of groin and lateral hip pain. The mean duration of hip pain before presentation was 18.5 (range, 9–36) months. Patients were followed up for 25 to 28 months. The mean alpha angles of the normal and abnormal sides differed significantly (47° vs. 57°, *p*<0.01). Nine of the 37 hips had a positive crossover sign. The centre-edge angle of all patients ranged from 25° to 30°.

Of the 37 patients, 4 underwent surgical treatment after conservative management failed. For the remaining 33 patients, the mean HHS improved significantly from 72 before treatment to 91 at the 6-month follow-up and 91 at the 24-month follow-up (*p*<0.01, paired *t* test, Table 1). The mean non-arthritic

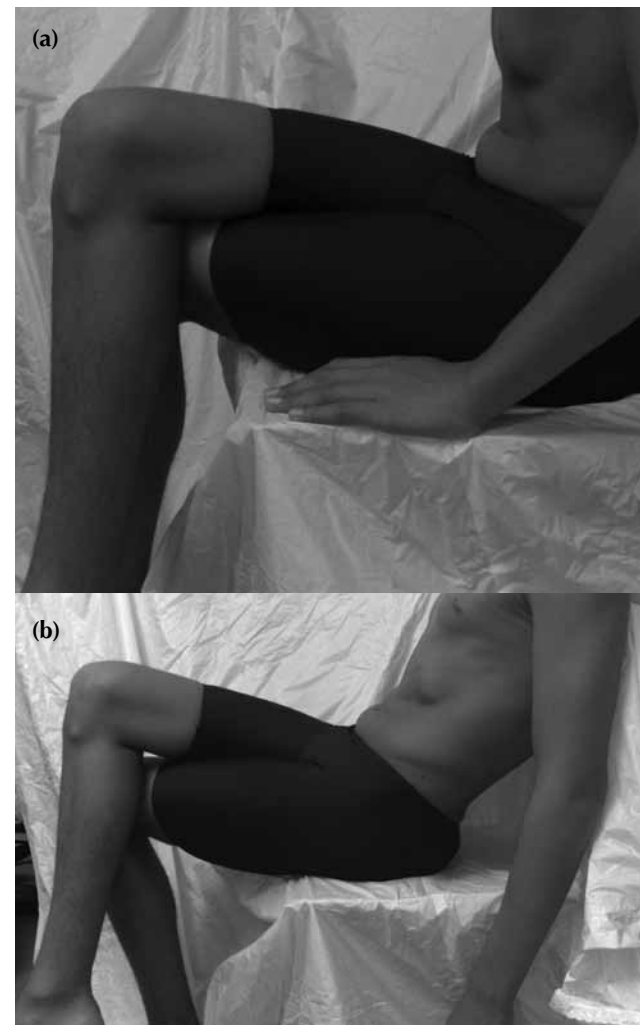


Figure 3 (a) The hip is in more flexion when sitting with the spine fully straight. (b) Leaning back every 5 to 7 minutes can decrease hip flexion and avoid stress on the acetabular labrum.

hip scores improved from 72 to 90 to 91 ($p < 0.01$, paired t test, Table 1), and the mean visual analogue scores for hip pain improved from 6 to 3 to 2 ($p < 0.01$, paired t test, Table 1).

At the 24-month follow-up, 6 of the 33 patients had recurrent hip pain and discomfort but not severe enough for surgical treatment. The range of movement was significantly less on the affected side than the normal side ($p < 0.01$); conservative treatment did not improve the range of hip movement, despite improvement in function and symptoms (Table 2).

DISCUSSION

Increased alpha angle and a positive crossover sign are indicators of borderline pathologies of the hip. The hip is considered normal if these changes do not interfere with activities of daily living, but if the abnormal contact between the acetabular edge and femoral neck persists, the patient is at risk of developing osteoarthritis.

The goal of conservative treatment is to reduce hip pain and avoid further cartilage damage by modifying activities of daily living to adapt to the

morphology, without limiting the level of activity.²² Of our 37 patients, 27 had marked improvement of function and symptoms, 6 had partial improvement, and 4 had no improvement and underwent surgery. Improvement of impingement symptoms was not associated with any change in the range of hip movement, but ensued because the patients performed the same activities within the suitable range of hip movement based on morphology.

Our results are comparable to those after open^{3,23} or arthroscopic^{9,24} hip surgery. The open dislocation method achieved good-to-excellent short- to mid-term results in 70 to 80% of patients.³ Nonetheless, surgery confers anaesthetic risks and complications (trochanteric osteotomy nonunion and wound complications). In a study of 57 adolescent patients followed up for 12 to 73 months, 7 underwent total hip replacement, 2 underwent hip fusions, and 4 developed avascular necrosis.²³

Arthroscopic hip surgery is less invasive but still has its limitations. In a study of 200 patients followed up for 12 to 24 months,²⁴ 83% achieved improvement, whereas the complication rate was 1.5%, and 0.5% of the patients underwent total hip replacement. In a study of 100 patients with a mean age of 33 years,⁹

Table 1
Harris Hip score (HHS), non-arthritic hip score (NHS), and visual analogue score (VAS) of 33 patients before and after conservative treatment

Functional scoring	Before treatment	6-month follow-up	12-month follow-up	18-month follow-up	24-month follow-up
HHS	72±6	91±4*	92±4*	91±4*	91±4*
NHS	72±4	90±5*	91±5*	91±5*	91±5*
VAS	6±1	3±1*	2±1*	2±1*	2±1*

* $p < 0.01$ when compare with baseline

Table 2
Range of hip movement of 33 patients in the normal and symptomatic sides

Range of movement	Normal side	Symptomatic side			
		Before treatment	6-month follow-up	12-month follow-up	24-month follow-up
Flexion (degrees)	103.0±2.6*	95.0±0.4	88.0±3.5	88.8±3.5	88.0±3.5
Extension (degrees)	4.3±1.7*	4.0±1.6	3.7±2.2	3.6±2.2	3.6±2.2
Abduction (degrees)	43.0±3.3*	37.0±0.4	36.0±1.4	36.0±1.4	36.0±1.4
Adduction (degrees)	19.0±8.0*	17.0±7.0	17.0±9.0	17.0±9.0	17.0±9.0
External rotation in flexion (degrees)	33.9±4.0*	28.5±0.5	28.4±1.2	28.0±1.2	27.0±1.1
External rotation in extension (degrees)	29.7±3.2*	25.3±0.3	24.5±1.0	24.8±1.0	24.6±1.0
Internal rotation in flexion (degrees)	14.6±2.9*	9.4±0.3	11.3±0.5	11.0±0.5	10.0±0.6
Internal rotation in extension (degrees)	19.0±2.6*	15.8±0.4	15.7±0.7	15.8±0.7	15.8±0.7

* $p < 0.01$ when compare with the symptomatic side at the 24-month follow-up

one patient incurred a postoperative femoral neck fracture and 11 underwent total hip replacement.

A longer term follow-up can provide further information on the relation between hip impingement

and arthritis.^{25,26} Conservative treatment for FAI achieved good early results so long as the patients can modify activities of daily living to adapt to their hip morphology.

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