HIP

Arthroscopic femoral osteochondroplasty for cam femoroacetabular impingement in patients over 60 years of age

We reviewed the clinical outcome of arthroscopic femoral osteochondroplasty for cam femoroacetabular impingement performed between August 2005 and March 2009 in a series of 40 patients over 60 years of age. The group comprised 26 men and 14 women with a mean age of 65 years (60 to 82). The mean follow-up was 30 months (12 to 54).

The mean modified Harris hip score improved by 19.2 points (95% confidence interval 13.6 to 24.9; \( p < 0.001 \)) while the mean non-arthritic hip score improved by 15.0 points (95% confidence interval 10.9 to 19.1, \( p < 0.001 \)). Seven patients underwent total hip replacement after a mean interval of 12 months (6 to 24 months) at a mean age of 63 years (60 to 70). The overall level of satisfaction was high with most patients indicating that they would undergo similar surgery in the future to the contralateral hip, if indicated. No serious complications occurred.

Arthroscopic femoral osteochondroplasty performed in selected patients over 60 years of age, who have hip pain and mechanical symptoms resulting from cam femoroacetabular impingement, is beneficial with a minimal risk of complications at a mean follow-up of 30 months.

In most non-dysplastic hips, cam-type femoroacetabular impingement (FAI) has been found to be the most common mechanism for the development of early osteoarthritis.\(^1,2\) The presence of a prominence on the aspherical femoral head in cam FAI makes the acetabular chondral rim and labrum vulnerable to damage, particularly in the area of the anterolateral rim. Repetitive injury to the chondral surface can expose the underlying acetabular bone and potentially accelerate the degenerative process. It has therefore been suggested that timely surgical intervention for the treatment of FAI not only relieves symptoms but also slows the progression of the degenerative process in young patients.\(^1\)

Byrd and Jones\(^3\) stated that cam-type FAI is not the cause of pain, but as a morphological variant it damages the articular cartilage of the acetabulum and labrum in the hip which subsequently becomes symptomatic. While cam morphology may be present as an incidental finding in asymptomatic hips, cam impingement is recognised as a causative factor in early-onset osteoarthritis and also a source of disability in young adults with an active lifestyle.\(^3\)

A favourable clinical outcome in FAI has been reported with the use of contemporary surgical methods such as the open hip approach,\(^4,7\) arthroscopy,\(^8-12\) and combined arthroscopy with the open hip approach\(^13,14\) by resection of the cam lesion from the femoral neck at the junction of the head and neck and restoration of the head and neck offset.\(^15\) This improves the symptoms of pain and reduced movement by eliminating contact between the femoral neck and the acetabular rim during routine daily and sporting activities, especially in young patients. Arthroscopic treatment for FAI accompanied by suitable rehabilitation is indicated, especially in high-demand patients such as athletes\(^9\) and those who hope for an early return to their pre-injury level after surgery.\(^16\)

However, there is a paucity of evidence in the orthopaedic literature as to whether arthroscopic treatment of the cam-shaped lesion improves the outcome of FAI in patients over 60 years of age who may have concomitant degenerative labral tears, femoral and acetabular chondral degeneration and either early or established osteoarthritis.

Our aim was to assess the symptomatic relief from hip pain and the mechanical symptoms, and the level of satisfaction in carrying out routine daily activities including participation in recreational activities in this age group after arthroscopic femoral osteochondroplasty. We also wanted to determine the proportion of these patients who would...
undergo total hip replacement (THR) after arthroscopic surgery of the hip within 12 months of their treatment. Our final aim was to study the complications of arthroscopic femoral osteochondroplasty in this age group particularly with respect to fracture of the femoral neck, avascular necrosis of the femoral head and nerve injury.

Our hypothesis was that arthroscopic surgery for FAI in the elderly population improves the outcome without significant post-operative complications.

Patients and Methods
In our study we included all consecutive patients over the age of 60 years, who had been diagnosed as having cam FAI with pain and mechanical symptoms of locking, catching and a feeling of instability in the hip and who had subsequently undergone arthroscopy and femoral osteochondroplasty with a minimum follow-up of 12 months. We excluded patients with moderate to advanced osteoarthritis of the hip as seen on radiography (grade-2 and grade-3 according to Tönnis and Heinecke17), pincer FAI, bilateral cam FAI, inflammatory or metabolic hip disease, hip dysplasia, Perthes’ disease, a history of fracture of the hip or previous surgery on the hip.

Between August 2005 and March 2009, 1693 hip arthroscopies had been performed at our institution, but only 40 (2.36%) fulfilled the inclusion criteria (26 men, 14 women). The mean age of the patients was 65 years (60 to 82) with 23 right and 17 left hips affected. We retrospectively examined the clinical records, radiological investigations and outcome questionnaires from all of the patients. The indications for arthroscopy were the failure of conservative treatment for pain over a minimum of six months, limitation of internal rotation of the affected hip and a positive impingement test on flexion, adduction and internal rotation.1 The cam lesion was confirmed on anteroposterior (AP) pelvis and lateral radiographs of the affected hip by recording the loss of sphericity of the femoral head and reduction in the head and neck offset (Fig. 1).15 All patients had Tönnis grade-0 to grade-1 radiological changes of osteoarthritis.17 All underwent MRI of the hip to assess associated intra-articular pathology. These patients were referred after having unsuccessfully tried conservative treatment, which included analgesics, anti-inflammatory medication, physiotherapy, advice on change of lifestyle and modification of activities. There was a mean delay of 13 months (6 to 23) before a referral was made to the senior author (JMOD). This delay was noted to be somewhat shorter than that described by Burnett et al.18

The modified Harris hip score19 (HHS) and the non-arthritic hip score20 were recorded pre-operatively and at two, six, 26 and 52 weeks post-operatively, and then on an annual basis. The patients were also asked if they were satisfied or dissatisfied with the outcome of surgery and whether they would wish to have similar surgery on the contralateral hip with the same indication. The hip scores and satisfaction survey questionnaire were collected by postal enquiry after contacting all the patients by telephone. All gave specific consent for the use of their data.

All the surgical procedures were carried out by the senior author, who has been performing arthroscopic FAI surgery for the last nine years. All patients were positioned in a lateral decubitus position, under general anaesthesia without muscle relaxation, as described by Mason et al.21 The operated leg was placed in traction with a well-padded perineal post for counter-traction. Sufficient traction was applied to obtain distraction of at least 1 cm of the femoral head from the acetabulum. The post was pushed upwards against the medial part of the thigh of the operated hip avoiding direct

![Fig. 1a](image1.png)  ![Fig. 1b](image2.png)

Radiographs of the right hip of a 66-year-old man with femoroacetabular impingement in a) the lateral view showing asymmetry of the femoral head and reduction of the anterior head and neck offset (long arrow) compared with the normal appearance of the posterior head and neck junction (short arrow) and b) anteroposterior view which does not show a prominent cam lesion (arrow) as the deformity is mainly anterior (Fig. 1a).
compression to the branch of the pudendal nerve which crosses over the pubic ramus. The operated leg was placed in 10° of flexion and abduction while the foot remained in the neutral position. All the patients were given subcutaneous low-molecular-weight-heparin (Clexane, 20 mg) at the induction of anaesthesia. We used the proximal trochanteric portal just cephalad to the tip of the greater trochanter and centrally placed between the anterior and posterior borders of the greater trochanter and an anterior paratrochanteric portal, approximately 2 cm anterior to the anterior margin of the greater trochanter and level with the tip of the greater trochanter.

Assessment of the central compartment included grading of any chondral defect of the acetabulum and femoral head. The acetabular chondral lesions were categorised by measuring the depth and surface area affected. A grade-1 lesion was considered to be a small partial-thickness defect. A grade-2 lesion had full-thickness loss of cartilage with a maximum width of less than 30% of the distance from the acetabular rim to the fovea. In a grade-3 lesion there was full-thickness loss of cartilage with a maximum width greater than 30% of the distance from the acetabular rim to the fovea. The category of these chondral lesions corresponded to the classification of Outerbridge, in which a grade-1 lesion corresponded to Outerbridge grade 2 and grade-2 and grade-3 lesions to Outerbridge 3 and 4, but were respectively smaller and larger in size. Grade-1 acetabular lesions were treated by radiofrequency co-ablation while grade-2 and grade-3 lesions had debridement of unstable articular edges by curette and radiofrequency co-ablation and a microfracture technique whenever indicated.

The state of the labrum and ligamentum teres as well as the severity of synovitis was noted and recorded. Degenerative labral tears were treated by radiofrequency co-ablation. Adequate exposure of the hip and the anterior compartment was aided by anterior capsulotomy. After completion of the examination of the central compartment and therapeutic intervention wherever indicated, the distal capsular flap created by anterior capsulotomy was retracted by non-absorbable monofilament sutures and the traction was released with the hip flexed to approximately 25° in order to allow adequate inspection and assessment of the peripheral compartment and cam lesion. The retinacular vessels were identified and care was taken to preserve them during the osteochondroplasty. Once the cam lesion was fully exposed, it was excised with a 5.5 mm spherical burr. The goal was to remove the abnormal bone and recreate the normal concave relationship where the femoral neck meets the articular margin of the femoral head. During arthroscopy care was taken to avoid notching the femoral neck. Regular assessment of the progress of the cam resection was performed by flexing and internally rotating the hip. In addition, intra-operative fluoroscopy was used to assess the adequacy of resection in both the AP and Dunn views. The pressure of the irrigation pump was maintained at between 80 mmHg and 100 mmHg. At the end of the procedure, the joint was lavaged and injected with local anaesthetic. Figure 2 illustrates a cam lesion with associated pathology in a 75-year-old man.

Post-operatively, weight-bearing was allowed as tolerated on the operated limb, with crutches for the first few days. The patients were advised to minimise pain during activities of daily living by avoiding flexion of more than 90°, to minimise prolonged sitting and standing and to avoid lifting for four weeks. In addition, proprioceptive and gait-training exercises were taught. They were encouraged to mobilise early, including cycling at seven to 12 days to promote recovery of movement. Jogging and running were allowed at six to eight weeks after the operation.

**Statistical analysis.** The results were expressed as the mean, range, SD and 95% confidence interval (CI) as appropriate. The paired Student’s t-test was used for comparison between paired samples (modified HHS and non-arthritic hip score, pre- and post-operatively). A p-value ≤ 0.05 was considered to be statistically significant.

**Results**

The mean follow-up was 30 months (12 to 54). The age distribution of the patients is shown in Figure 3.

All the patients had femoral osteochondroplasty for cam FAI, of whom 13 had labral degeneration and tears and underwent radiofrequency co-ablation and mechanical debridement with shavers. Two of these patients were treated for bucket-handle tears of the labrum by the same methods. No labral tear was sutured in this elderly group.

Severe synovitis comprising florid, proliferative generalised changes was found in 12 patients, moderate generalised synovitis which was also present around the acetabular fossa was seen in 17, and mild synovitis which was localised either about the anterosuperior capsule or the acetabular fossa was seen in nine. Only two patients showed no evidence of synovitis. No tears of the ligamentum teres were noted apart from a haemorrhagic appearance in three patients (Fig. 2). No surgical intervention to the ligament teres was carried out. In 17 patients there was no arthroscopic evidence of osteoarthritis in the hip, but 23 had a variable degree of acetabular chondral loss and 12 of these had loss of articular cartilage from both the acetabulum and the femoral head.

Seven patients (four men, three women) underwent THR at a mean interval of 12 months (6 to 24). Their mean age at THR was 63 years (60 to 70). All but one had evidence of severe synovitis and four had grade-3 chondral loss from both the acetabulum and femoral head while three had a grade-3 lesion of the acetabular cartilage.

The mean modified HHS improved from 60.5 points (SD 16.25) pre-operatively to 79.7 points (SD 16.18) post-operatively, with an improvement of 19.2 points (95% CI 13.6 to 24.9, p < 0.001). The non-arthritic hip score also improved from 72.1 points (SD 13.24) pre-operatively to 77.2 points (SD 15.4) post-operatively, with an improvement of 15.1 points (95% CI 10.9 to 19.1, p < 0.001).
Of the 33 patients who did not have a THR, 30 were satisfied with their outcome. This represented an overall satisfaction rate of 75%. Of the three remaining patients who reported an unsatisfactory outcome and did not require THR, two had osteoarthritis of the lumbosacral spine and one had ipsilateral osteoarthritis of the knee.

No patient had revision arthroscopy of the hip and we experienced no cases of infection, fracture of the neck of the femur, thromboembolic phenomenon, permanent nerve injury or avascular necrosis of the head of femur. One patient had a minor scrotal skin burn from the iodine-based antiseptic solution. This resolved completely within six weeks. One patient had transient paraesthesia in the ipsilateral foot which fully resolved in four weeks.

Discussion
Cam-type FAI was initially treated by surgical dislocation which had a very low or no risk of avascular necrosis of the femoral head.\(^4\) It has remained the standard technique for dealing with the femoroacetabular pathology. However, over the years arthroscopy has become widely used for patients with FAI and also it is occasionally combined with a limited open technique.\(^{14}\) Decreased morbidity, reduced surgical trauma and early return to functional activities have been noted to be the main advantages of arthroscopy for impingement symptoms over the open approach.\(^{16,27}\) However, long-term clinical results of both techniques are awaited.

There have been various studies outlining the outcome of arthroscopy for FAI, but most of the patients treated were young. Philippon et al.\(^{28}\) reported on the return of 45 professional athletes who had arthroscopy for FAI. The mean follow-up was 1.6 years (6 months to 5.5 years) with 42 (93.3%) returning to professional competition after arthroscopic decompression of FAI. Others have reported their findings on the arthroscopic treatment of FAI in young adults with various lesions at a mean follow-up of six months\(^{10}\) or one year,\(^{11}\) in which a favourable outcome and symptomatic improvement were noted. Byrd and Jones\(^3\) reported the outcome of arthroscopy for cam-type FAI in 200 patients (207 hips) using a modified HHS. The
minimum follow-up was 12 months and the mean age was 33 years. The mean increase in the modified HHS was 20 points and 0.5% of patients had to have THR. They also noted a complication rate of 1.5%. They concluded that the short-term outcome of arthroscopic treatment of cam-type FAI was comparable with that of published reports for open methods with the advantage of less invasive surgery.

Our study has focused on patients over 60 years of age with cam FAI. Increasingly, as older patients are undertaking recreational and sporting activities and with more physical requirements, the symptoms of cam FAI may become more frequent. A recent pilot study reported the outcome of 15 patients over the age of 60 years who had arthroscopic hip surgery for cam FAI. The mean follow-up was 28.6 months. Overall, 12 did well while three underwent THR within 12 months. All the satisfied patients returned to normal activities by six months. The authors concluded that arthroscopy of the hip for cam FAI has a success rate of 80% in patients over 60 years of age and that the indications for surgery should be strict.

Our series represented 2.36% of all patients who had hip arthroscopy over a period of 43 months. The indications for arthroscopy were strict and it was only offered to treat mechanical symptoms associated with pain when conservative treatment had failed and the quality of life had deteriorated. Patients with symptoms of pain only were offered THR.

The results of our medium-term follow-up showed a statistically significant improvement in the outcome scores with a high rate of satisfaction (75%). Our post-arthroscopy conversion rate to THR (17%) was similar to that of Haviv and O'Donnell. There was no clear difference between male and female patients with respect to those who required subsequent THR.

A complication rate of less than 1.5% after hip arthroscopy has been reported. No patient in our study sustained any serious complication related to the surgery or anaesthesia. In particular, no patient had a fractured neck of the femur despite a mean age of 65 years for the series and the fact that 14 of the 40 patients were women.

Walton, Jahromi and Lewis suggested that therapeutic arthroscopy of the hip for osteoarthritis should be used with caution. Their retrospective study examined 70 patients with a mean age of 47 years (22 to 87) who had undergone arthroscopy and who were assessed for evidence of chondral degeneration using radiological and arthroscopic means. Byrd and Jones noted that the arthroscopic management of cam impingement had resulted in an improved HHS, even in the presence of advanced degenerative pathology with grade-3 and grade-4 articular damage in 94%. However, the principal surgical indication in our study was mechanical pain associated with a cam lesion and not debridement of an osteo-arthritic hip.

There were some limitations to our study, in particular, there was no control group of conservatively-treated patients with whom the results of arthroscopic intervention could be compared. However, our patients had conservative treatment for at least six months from their general practitioners without symptomatic improvement. Another limitation was the absence of three-dimensional CT scanning which would have helped to better define associated osteoarthritis and bone morphology.

We believe that our study reports the largest series of patients over 60 years of age with a mean follow-up of 30 months treated for cam FAI in the literature. We recommend that mechanical symptoms associated with cam FAI in the elderly population should be evaluated carefully after a period of conservative management. The evaluation should include a full physical examination to confirm impingement, adequately supported by radiological investigation and we would now include a three-dimensional CT in the position of discomfort as well as consideration of the impact of the symptoms on the quality of life of the patient. Once a proper indication has been established, and in the absence of significant arthritic change, patients should be offered arthroscopic surgery to relieve their symptoms.

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References


