Clinical Policy Bulletin:  
Femoro-Acetabular Surgery for Hip Impingement Syndrome  

Revised April 2014  
Number: 0736  

Policy  

Aetna considers femoro-acetabular surgery, open or arthroscopic, for the treatment of hip impingement syndrome medically necessary for persons who fulfil all the following criteria:  

- Diagnosis of definite femoro-acetabular impingement defined by appropriate imaging studies (X-rays, MRI or CT scans), showing cam impingement (alpha angle greater than 50 degrees), pincer impingement (acetabular retroversion or coxa profunda), or pistol grip deformity (nonspherical femoral head shape).  
- Severe symptoms typical of FAI (hip pain that is worsened by flexion activities (e.g., squatting or prolonged sitting) that significantly limits activities, with duration of at least six months where diagnosis of FAI has been made as above.  
- Positive impingement sign with sudden pain on 90 degree hip flexion with adduction and internal rotation or extension and external rotation.  
- Failure to respond to all available conservative treatment options including activity modification (e.g., restriction of athletic pursuits and avoidance of symptomatic motion), pharmacological intervention and physiotherapy.  
- Member is 15 years of age or older or skeletally mature (as indicated by epiphyseal closure)  
- Absence of advanced osteoarthritis change on preoperative Xray (Tonnis grade 2 or more) or severe cartilage injury (Outerbridge grade III or IV).  
- Absence of joint space narrowing on plain radiograph of the pelvis that is less than 2 mm wide anywhere along the sourcil.  
- Member does not have generalised joint laxity especially in diseases connected with hypermobility of the joints, such as Marfan syndrome and...
Aetna consider surgery for FAI impingement experimental and investigational for all other indications.

Aetna considers capsular plication experimental and investigational for the treatment of FAI because there is insufficient evidence regarding the effectiveness of this approach.

Background

Hip impingement syndrome, also known as femoro-acetabular impingement (FAI) syndrome, is a recently accepted pathological condition that primarily affects young and middle-aged adults. It is characterized by hip pain felt mainly in the groin, and can result in chronic pain and decreased range of motion in flexion and internal rotation. Femoro-acetabular impingement syndrome has been reported to be associated with progressive osteoarthritis of the hip. History, physical examination, as well as supportive radiographical findings including evidence of articular cartilage damage, acetabular labral tearing, and early-onset degenerative changes can aid in diagnosing this condition. Several pathological changes of the femur and acetabulum are known to predispose individuals to develop FAI syndrome.

The two basic mechanisms of FAI are cam impingement (most common in young athletic males) and pincer impingement (most common in middle-aged women). This classification is based on the type of anatomical anomaly contributing to the impingement process. Cam impingement is the result an abnormal morphology of the proximal femur, usually at the femoral head-neck junction; while pincer impingement is the result of an abnormal morphology or orientation of the acetabulum (Kassajian et al, 2007). These changes can be found on conventional radiography, magnetic resonance imaging (MRI) and computed tomography (CT) examinations (Beall et al, 2005; Bredella and Stoller, 2005). Characteristic magnetic resonance arthrographic findings of cam FAI entail large alpha angles and cartilage lesions at the antero-superior position and osseous bump formation at the femoral neck; while characteristic magnetic resonance arthrographic findings of pincer FAI include a deep acetabulum and posteroinferior cartilage lesions (Pfirrmann et al, 2006).

Management of individuals with FAI ranges from conservative therapies (e.g., modification of activities to reduce excessive motion and burden on the hip, the use of non-steroidal anti-inflammatory drugs, and discontinuation of activities associated with the painful hip movement) to surgery (e.g., peri-acetabular osteotomy, hip dislocation and debridement). Conservative measures, including physical therapy, restriction of activities, core strengthening, improvement of sensory-motor, and control and nonsteroidal anti-inflammatories are the mainstays of nonsurgical treatment (Samora, et al., 2011).

Surgical intervention usually focuses on improving the clearance for hip motion and alleviation of femoral abutment against the acetabular rim. Peri-acetabular osteotomy entails an incision over the front of the hip. With the aid of fluoroscopy, the surgeon cuts through the pelvic bones (i.e., ilium, ischium, and pubis) around
the acetabulum to free it from its original position. When the surgeon is satisfied with the new location of the acetabulum (facing the right direction with good coverage), it is secured with 3 to 6 screws. From the same incision, the surgeon can also access the hip joint to debride extra bone from the head/neck as needed. Hip dislocation and debridement is usually performed through an incision over the side of hip where the surgeon can dislocate the hip after preserving the vascular supply to the head. After exposing the femoral head and acetabulum, the surgeon can debride extra bone that contributes to the impingement. After removal of bone and damaged tissue, the greater trochanter is re-attached to the femur with screws.

It has been suggested that the surgical trauma sustained during the open procedure for the treatment of FAI syndrome may make it difficult for high-level/professional athletes to return to professional sports. As a result, an arthroscopic approach to treat FAI syndrome has been developed (Philippon and Schenker, 2006).

Ayeni, et al. (2012) systematically reviewed the clinical literature to determine the consistently reported indications for arthroscopic management of femoroacetabular impingement (FAI). The indications for FAI surgery reported in the literature included a positive impingement sign, symptoms or pain for more than 6 months, and a series of positive special tests. Commonly reported radiographic indicators for arthroscopic FAI management included the following: results from a computed tomography scan or magnetic resonance imaging, cam or pincer lesions evident on anteroposterior and/or lateral radiographs, loss of sphericity of the femoral neck, acetabular retroversion, magnetic resonance arthrography, reduction in head-neck offset, an alpha angle greater than 50°, and coxa profunda.

New guidance on arthroscopic femoroacetabular surgery for hip impingement syndrome from the National Institute for Health and Clinical Excellence (NICE, 2011) found evidence is adequate for symptom relief in the short- and medium-term. The consultation documents stated, however, that additional research is needed on patient selection and long-term outcomes specifically related to the development of osteoarthritis. The Committee noted that the available evidence was from observational studies. The guidance stated that, while this was considered adequate for the present recommendation, further studies would be useful. The Committee stated that they recognized the difficulties of comparative research and acquisition of long-term data on this procedure. The guidance noted that the British Hip Society is establishing a registry for arthroscopic femoroacetabular surgery for hip impingement syndrome, and stated that clinicians should submit details of all patients undergoing femoroacetabular surgery for hip impingement syndrome to the registry once it is available. The guidance noted that a prime purpose of the registry is to provide data on the long-term outcomes of the procedure. The guidance also stated that it is important that both the registry and other studies report details of patient selection to allow clear understanding of these outcomes.

Matsuda, et al., (2011) performed a systematic evidence review to analyze the current approaches to the surgical management of symptomatic femoroacetabular impingement (FAI), including open dislocation, mini-open, and arthroscopic
surgeries for femoroacetabular impingement. Eighteen peer-reviewed treatment outcome studies met the inclusion criteria with minimum 1-year follow-up of the surgical treatment of skeletal pathoanatomy and associated chondrolabral pathology in skeletally mature patients with FAI. There were 6 open surgical dislocation, 4 mini-open, and 8 arthroscopic studies, all with Levels of Evidence III or IV. The only prospective studies were in the arthroscopic category. Outcome data were extracted and analyzed with respect to surgical efficacy, failure rates, and complications. The authors concluded that the open dislocation, mini-open, and arthroscopic methods for treating symptomatic FAI are effective in improving pain and function in short-term to midterm studies and are relatively safe procedures. The authors said that the historical gold standard of open dislocation surgery had a comparatively high major complication rate primarily because of trochanteric osteotomy-related issues. The mini-open method showed comparable efficacy but a significant incidence of iatrogenic injury to the lateral femoral cutaneous nerve in some studies. The authors found that the arthroscopic method had surgical outcomes equal to or better than the other methods with a lower rate of major complications when performed by experienced surgeons. A critique of the systematic evidence review by Matsuda, et al. conducted by the Centre for Reviews and Dissemination (CRD, 2011) concluded that Matsuda, et al.’s conclusions should be treated with caution, given potential bias in the review process, inclusion of weak study designs, limited statistical data and wide variation in the included studies. The CRD noted that most studies of femoroacetabular surgery included in Matsuda, et al.’s systematic evidence review did not report confidence intervals and only one study provided power calculations and defined clinically meaningful changes in outcomes. The CRD stated that, given that most studies of FAI surgery were case series and no explicit methods were used to assess studies for quality, potential for bias was substantial as differences in participants, interventions and outcomes made it difficult to interpret the clinical relevance and reliability of the results. The CRD noted that three different surgical options reviewed by Matsuda, et al. were compared indirectly in potentially different populations, which made it difficult to interpret the findings. The CRD (2011) concluded that, given the potential biases in the review by Matsuda, et al. (searching, data extraction and quality assessment), inclusion of weak study designs, limited statistical data and wide variation in the included studies, Matsuda, et al.’s conclusions should be treated with caution.

Observational studies have demonstrated substantial improvements in symptoms with femoroacetabular surgery; however, observational studies may overestimate the actual degree of improvement from surgery. Studies of arthroscopy for shoulder impingement demonstrates the potential for observational studies to overestimate the benefit of an orthopedic intervention, when compared to controlled clinical trials (compare Odenbring, et al., 2008; Ketola, et al., 2009). In addition, further research is needed on the structural variants that contribute to hip pain; one study failed to find an association in the community between one of the structural variants treated by arthroscopic hip surgery and hip joint pain (Gosvig, et al., 2010; EMSCG, 2010).

The number of published studies of FAI surgery has increased exponentially over time. Haviv, et al. (2011) reviewed publications on FAI over the past decade, and found an exponential increase in numbers of publications on FAI over time; the
authors found, however, that there has been no corresponding increase in the quality of published studies.

A number of studies have reported positive short- and mid-term outcomes. In a case-series study of 213 treated hips including 19 patients who underwent simultaneous inter-trochanteric osteotomy with a minimum follow-up of 2 years, Ganz and colleagues (2001) reported that most patients had an improved range of motion as well as a reduction in pain following surgical dislocation of the hip. In another case-series study (22 patients; 29 hips), Siebenrock et al (2003) examined if symptomatic anterior FAI due to acetabular retroversion can be treated effectively with a peri-acetabular osteotomy. Follow-up ranged from 24 months to 49 months (average of 30 months). These investigators reported that peri-acetabular osteotomy produced a good or excellent result in 26/29 (90%) of hips. In a third case-series study, Murphy et al (2004) evaluated a group of 23 hips in 23 patients treated by surgical debridement for impingement: 22 patients were treated by full surgical dislocation and 1 patient was treated by relief of impingement without dislocation. Follow-up ranged from a minimum of 2 years to 12 years. These researchers reported that at 5.2 years' follow-up after debridement of the hip, 15/23 (65 %) of patients had functioning hips and had not required further surgery.

In a retrospective case series, Larson and Giveans (2008) assessed the early outcomes of arthroscopic management of FAI, reporting good to excellent results in 75 percent of patients. A total of 96 consecutive patients (100 hips) with radiographically documented FAI were treated with hip arthroscopy, labral debridement or repair/refixation, proximal femoral osteoplasty, or acetabular rim trimming (or some combination thereof). Outcomes were measured with the impingement test, modified Harris Hip Score, Short Form 12, and pain score on a visual analog scale (VAS) pre-operatively and post-operatively at 6 weeks, 3 months, and 6 months, as well as yearly thereafter. Pre-operative and post-operative radiographical alpha angles were measured to evaluate the adequacy of proximal femoral osteoplasty. There were 54 male and 42 female patients with up to 3 years' follow-up (mean of 9.9 months). The mean age was 34.7 years. Isolated cam impingement was identified in 17 hips, pincer impingement was found in 28, and both types were noted in 55. Thirty hips underwent labral repair/refixation. A comparison of pre-operative scores with those obtained at most recent follow-up revealed a significant improvement (p < 0.001) for all outcomes measured: Harris Hip Score (60.8 versus 82.7), Short Form 12 (60.2 versus 77.7), VAS for pain (6.74 cm versus 1.88 cm), and positive impingement test (100 % versus 14 %). The alpha angle was also significantly improved after resection osteoplasty. Complications included heterotopic bone formation (6 hips) and a 24-hour partial sciatic nerve neurapraxia (1 hip). No hip went on to undergo repeat arthroscopy, and 3 hips have subsequently undergone total hip arthroplasty. The authors concluded that arthroscopic management of patients with FAI results in significant improvement in outcomes measures, with good to excellent results being observed in 75% of hips at a minimum 1-year follow-up. However, alteration in the natural progression to osteoarthritis and sustained pain relief as a result of arthroscopic management of FAI remain to be seen.

Ilizaliturri, et al. (2008) reported on short-term followup of an uncontrolled cohort of 19 patients with cam femoroacetabular impingement. The authors reported a
modest improvement in WOMAC score from preoperatively to 2 years postoperatively (mean of 82 points preoperatively to mean of 89 points postoperatively). The authors conclude that "long-term follow-up is needed to fully understand the results of surgical intervention for the treatment of FAI." 

In a preliminary report, Philippon et al (2008) reported on the treatment of FAI in the adolescent population. Between March 2005 and May 2006, a total of 16 patients (aged 16 years or younger) underwent hip arthroscopy for FAI. There were 14 females and 2 males, with 1 patient undergoing a bilateral procedure. Five patients had isolated pincer impingement, 2 had isolated cam impingement, and 9 had mixed pathology. All patients had labral pathology. Seven patients were treated with suture anchor repair of the labrum and 9 with partial labral debridement. Subjective data were collected from each patient during their initial visit and at follow-up after surgery. Subjective data included the modified Harris Hip score (MHHS), patient satisfaction, and hip outcome score (HOS) activities of daily living (ADL), and sports subscales. The mean age at the time of arthroscopy was 15 years old (range of 11 to 16 years). The mean pre-operative MHHS was 55 (range of 33 to 70), HOS ADL was 58 (range of 38 to 75), and HOS sport score was 33 (range of 0 to 78). The mean time from injury to surgery was 10.6 months (range of 6 weeks to 30 months). The mean time to follow-up was 1.36 years (range of 1 to 2 years). The mean post-operative MHHS improved 35 points to 90 (range of 70 to 100; p = 0.005), post-operative HOS ADL improved 36 points to 94 (range of 74 to 100; p = 0.001), and post-operative HOS sport score improved 56 points to 89 (range of 58 to 100; p = 0.001). The mean patient satisfaction score was 9 (range of 9 to 10). The authors concluded that hip arthroscopy for FAI in the adolescent population produces excellent improvement in function and a high level of patient satisfaction in the short-term.

Philippon and colleagues (2009) reported the outcomes following hip arthroscopy for FAI with associated chondrolabral dysfunction. These investigators prospectively enrolled 122 patients who underwent arthroscopic surgery of the hip for FAI and met the inclusion criteria for this study. Patients with bilateral hip arthroscopy, avascular necrosis and previous hip surgery were excluded; 10 patients refused to participate, leaving 112 in the study (62 women and 50 men). The mean age of the patients was 40.6 years (95 % confidence interval (CI) 37.7 to 43.5). At arthroscopy, 23 patients underwent osteoplasty only for cam impingement, 3 underwent rim trimming only for pincer impingement, and 86 underwent both procedures for mixed-type impingement. The mean follow-up was 2.3 years (2.0 to 2.9). The mean MHHS improved from 58 to 84 (mean difference = 24 (95 % CI 19 to 28)) and the median patient satisfaction was 9 (1 to 10). Ten patients underwent total hip replacement at a mean of 16 months (8 to 26) after arthroscopy. The predictors of a better outcome were the pre-operative modified HHS (p = 0.018), joint space narrowing greater than or equal to 2 mm (p = 0.005), and repair of labral pathology instead of debridement (p = 0.032). The authors concluded that hip arthroscopy for FAI, accompanied by suitable rehabilitation, gives a good short-term outcome and high patient satisfaction.

Byrd and Jones (2009) prospectively assessed 200 patients (207 hips) who underwent arthroscopic correction of cam impingement from December 2003 to October 2007, using a MHHS. The minimum follow-up was 12 months (mean of 16 months; range of 12 to 24 months); no patients were lost to follow-up. The
average age was 33 years with 138 men and 62 women. A total of 158 patients (163 hips) underwent correction of cam impingement (femoroplasty) alone while 42 patients (44 hips) underwent concomitant correction of pincer impingement. The average increase in MHHS was 20 points; 0.5 % converted to total hip arthroplasty. There were a 1.5 % complication rate. The authors stated that the short-term outcomes of arthroscopic treatment of cam-type FAI are comparable to published reports for open methods with the advantage of a less invasive approach.

Bardakos and Villar (2009) investigated the effect of several radiological parameters, each indicative of a structural aspect of the hip joint, on the progression of osteoarthritis. Pairs of plain antero-posterior pelvic radiographs, taken at least 10 years apart, of 43 patients (43 hips) with a pistol-grip deformity of the femur and mild (Tönnis grade 1) or moderate (Tönnis grade 2) osteoarthritis were reviewed. Of the 43 hips, 28 showed evidence of progression of osteoarthritis. There was no significant difference in the prevalence of progression between hips with initial Tönnis grade 1 or grade 2 osteoarthritis (p = 0.31). Comparison of the hips with and without progression of arthritis revealed a significant difference in the mean medial proximal femoral angle (81 degrees versus 87 degrees, p = 0.004) and the presence of the posterior wall sign (39 % versus 7 %, p = 0.02) only. A logistic regression model was constructed to predict the influence of these two variables in the development of osteoarthritis. Mild-to-moderate osteoarthritis in hips with a pistol-grip deformity will not progress rapidly in all patients. In one-third, progression will take more than 10 years to manifest, if ever. The individual geometry of the proximal femur and acetabulum partly influences this phenomenon. A hip with cam impingement is not always destined for end-stage arthritic degeneration.

Horisberger et al. (2010) prospectively followed a cohort of 105 hips (88 patients; 60 males, 28 females) who underwent arthroscopic surgery for symptomatic cam or mixed femoroacetabular impingement. At a minimum follow-up of 1.3 years (average, 2.3 years; range, 1.3 to 4.1 years), all clinical outcome measures improved. Nine patients (8.6%) underwent total hip arthroplasty during follow-up.

Gedouin, et al. (2010) reported on outcomes of arthroscopic surgery for hip impingement in 111 hips in 110 patients (78 male, 32 female; mean age, 31 years). Sixty-five patients showed no radiographic sign of osteoarthritis, and 36 showed grade-1 early osteoarthritis on the Tönnis scale. The investigators reported that mean WOMAC score rose from 60.3 preoperatively to 83 (p less than 0.001) at a mean 10 months’ followup (range, 6 to 18 months). Seventy-seven percent of patients were satisfied or very satisfied with their result. The investigators noted that patients with early osteoarthritis had significantly lower WOMAC and satisfaction scores than those free of osteoarthritis. Operative crossover to open surgery for femoroacetabular impingement occurred in one case. Five patients (4%) had total hip replacement or resurfacing. There were seven complications (6%): three cases of heterotopic ossification, one of crural palsy, one of pudendal palsy, one of labium majus necrosis, and one non-displacement stress fracture of the femoral head/neck junction. There was no palsy of the territory of the lateral cutaneous nerve of the thigh.
In a case series study, Philippon et al (2010) examined the indications for and outcomes of arthroscopic labral reconstruction in the hip by use of ilio-tibial band (ITB) autograft. Between August 2005 and May 2008, the senior author performed 95 arthroscopic labral reconstructions using an ITB autograft in patients with advanced labral degeneration or deficiency. There were 47 patients (32 men, 15 women, mean age 37 years (range 18 to 55 years)) who had undergone surgery at a minimum of 1 year previously and met the inclusion criteria. The mean time from the onset of symptoms to labral reconstruction was 36 months (range of 1 month to 12 years). Subsequent total hip arthroplasty was performed in 4 patients (9%). Follow-up was obtained in 37 of the remaining 43 patients. The mean time to follow-up was 18 months (range of 12 to 32 months). The mean modified Harris Hip Score (MHHS) improved from 62 (range of 35 to 92) pre-operatively to 85 (range of 53 to 100) post-operatively (p = 0.001). Median patient satisfaction was 8 out of 10 (range of 1 to 10). Patients who were treated within 1 year of injury had higher modified Harris Hip Scores than patients who waited longer than 1 year (93 versus 81, p = 0.03). The independent predictor of patient satisfaction with outcome after labral reconstruction was age. The authors concluded that these findings showed that patients who have labral deficiency or advanced labral degeneration had good outcomes and high patient satisfaction after arthroscopic intervention with acetabular labral reconstruction. Lower satisfaction was associated with joint space narrowing and increased age. Patients who waited longer than 1 year from the time of injury to surgery had lower function at follow-up than those treated in the 1st year. The study by Philippon et al (2010) was a case series that examined arthroscopic labral reconstruction in the hip by use of ilio-tibial band autograft in patients with advanced labral degeneration or deficiency. It is unclear how many of the studied cases involved hip impingement syndrome/femoro-acetabular syndrome.

A controlled study of FAI surgery compared FAI surgery with resection of the torn labrum to FAI surgery with reattachment of the labrum to the acetabular rim (Espinosa, et al., 2006). Espinosa and co-workers (2006) examined if labral re- fixation after treatment of FAI affects the clinical and radiographical results. These investigators retrospectively reviewed the clinical and radiographical results of 52 patients (60 hips) with FAI who underwent arthroscopy and surgical dislocation of the hip to allow trimming of the acetabular rim and femoral osteochondroplasty. In the first 25 hips, the torn labrum was resected (group 1); in the next 35 hips, the intact portion of the labrum was re-attached to the acetabular rim (group 2). At 1 and 2 years post-operatively, the Merle d'Aubigné clinical score and the Tönnis arthrosis classification system were used to compare the two groups. At 1-year follow-up, both groups showed a significant improvement in their clinical scores (mainly pain reduction) compared with their pre-operative values (p = 0.003 for group 1 and p < 0.0001 for group 2). At 2-year follow-up, 28 % of the hips in group 1 (labral resection) had an excellent result, 48 % had a good result, 20 % had a moderate result, and 4 % had a poor result. In contrast, in group 2 (labral re-attachment), 80 % of the hips had an excellent result, 14 % had a good result, and 6 % had a moderate result. Comparison of the clinical scores between the two groups revealed significantly better outcomes for group 2 at 1-year (p = 0.0001) and 2-year (p = 0.01) follow-up. Radiographical signs of osteoarthritis were significantly more prevalent in group 1 than in group 2 at 1-year (p = 0.02) and at 2 -year (p = 0.009) follow-up. The authors concluded that patients treated with labral...
re-fixation recovered earlier and had superior clinical and radiographical outcomes when compared with patients who had undergone resection of a torn labrum. These investigators noted that the results must be considered preliminary, but they recommend re-fixation of the intact portion of the labrum after trimming of the acetabular rim during surgical treatment of FAI. Furthermore, they stated that long-term follow-up will be needed to evaluate if use of this technique results in improved functional outcomes and a reduction in the prevalence of symptomatic osteoarthritis in affected patients.

Nho, et al. (2011) reported on a case series showing that arthroscopic treatment of femoroacetabular impingement in a mixed group of high-level athletes resulted in a significant improvement in hip functional outcome: 78% of athletes were able to return to play at 1 year and 73% of athletes were able to play at 2-year follow-up. High-level athletes who underwent arthroscopic treatment of femoroacetabular impingement (rim trimming, labral re-fixation or debridement, femoral osteochondroplasty) with a minimum of 1-year follow-up were retrospectively identified. All patients completed hip-specific outcome scores (Modified Harris Hip Score [MHHS] and Hip Outcome Score [HOS]) at baseline and most recent follow-up. Forty-seven patients with an average age of 22.8 ± 6.2 years met the study criteria with a mean follow-up of 27.0 ± 5.5 months. Thirty-three patients (70.2%) were available for follow-up. The level of competition was 27.7% varsity high school, 53.2% college, and 19.1% professional athletes. There were statistically significant improvements in the mean MHHS score (preoperative, 68.6 ± 12.8; postoperative, 88.5 ± 17.7; P = .002) as well as the HOS score (preoperative, 78.8 ± 11.3; postoperative, 91.4 ± 14.0; P = .03). There was a significant improvement in the alpha angle, with 76.4° ± 14.5° preoperatively and 51.4° ± 11.7° postoperatively (P = .0003). Seventy-nine percent of patients were able to return to play after hip arthroscopy at a mean of 9.4 ± 4.7 months (range, 4-26 months); of those patients, 92.3% were able to return to the same level of competition. At 2-year follow-up, 73% of patients were able to return to play.

Byrd and Jones (2011) also found that most athletes treated with arthroscopic hip surgery were able to resume their activities. The authors reported on a case series of 200 patients identified who underwent arthroscopic management of femoroacetabular impingement, participated in athletic activities, and had achieved minimum 1-year follow up. The authors stated that there was 100% follow-up at an average of 19 months (range, 12-60 months). A total of 116 athletes had achieved 2-year follow-up. For the entire cohort, the average age was 28.6 years (range, 11-60 years) with 148 males and 52 females. There were 159 cam, 31 combined, and 10 pincer lesions. There were 23 professional, 56 intercollegiate, 24 high school, and 97 recreational athletes. The male:female ratio was 2.8:1 among cam lesions and 1:1 among pincer lesions. The median preoperative score was 72 with a postoperative score of 96 and the median improvement was 20.5 points, which was statistically significant (P < .001). The authors reported that 95% percent of professional athletes and 85% of intercollegiate athletes were able to return to their previous level of competition. There were 5 transient neurapraxias (all resolved) and 1 minor heterotopic ossification. One athlete (0.5%) underwent conversion to total hip arthroplasty and 4 (2%) underwent repeat arthroscopy. For the group with minimum 2-year follow up, the median improvement was 21 points with a postoperative score of 96.
Schilders, et al. (2011) reported that labral repairs achieved superior results to labral resection. The investigators reviewed 151 patients (156 hips) with femoroacetabular impingement and labral tears who had been treated arthroscopically. These were subdivided into those who had undergone a labral repair (group 1) and those who had undergone resection of the labrum (group 2). In order to ensure the groups were suitably matched for comparison of treatment effects, patients with advanced degenerative changes (Tönnis grade > 2, lateral sourcil height < 2 mm and Outerbridge grade 4 changes in the weight-bearing area of the femoral head) were excluded, leaving 96 patients (101 hips) in the study. At a mean follow-up of 2.44 years (2 to 4), the mean modified Harris hip score in the labral repair group (group 1, 69 hips) improved from 60.2 (24 to 85) pre-operatively to 93.6 (55 to 100), and in the labral resection group (group 2, 32 hips) from 62.8 (29 to 96) pre-operatively to 88.8 (35 to 100). The mean modified Harris hip score in the labral repair group was 7.3 points greater than in the resection group (p = 0.036, 95% confidence interval 0.51 to 14.09). Labral detachments were found more frequently in the labral repair group and labral flap tears in the resection group. The investigators reported that no patient in the study group required a subsequent hip replacement during the period of follow-up. The investigators concluded that this study shows that patients without advanced degenerative changes in the hip can achieve significant improvement in their symptoms after arthroscopic treatment of femoroacetabular impingement. The authors stated that this evidence also suggests that labral repair, where appropriate, provides a superior result to labral resection.

There are limited data on the efficacy of FAI surgery in adolescents. Fabricant, et al. (2012) reported on a small, retrospective case series of FAI surgery in adolescents. The investigators retrospectively reviewed the records of 27 hips in 21 patients 19 years of age or younger who underwent arthroscopic treatment for FAI between 2007 and 2008. From the records the investigators extracted demographic data, operative details, complications, and preoperative and postoperative modified Harris hip scores (HHS) and the Hip Outcome Score (HOS). The minimum followup was 1 year (average, 1.5 years; range, 1-2.5 years). The investigators reported that modified HHS improved by an average of 21 points, the activities of daily living subset of the HOS improved by an average of 16 points, and the sports outcome subset of the HOS improved by an average of 32 points. The investigators stated that all patients’ self-reported ability to engage in their preoperative level of athletic competition improved. In 24 hips that underwent cam decompression, the mean alpha-angle improved from 64° ± 16° to 40° ± 5.3° postoperatively. The investigators concluded that they found short-term improvements in HOS and HHS with no complications for arthroscopic treatment of FAI in our cohort of adolescent athletes.

There is emerging evidence of the efficacy of FAI surgery in older patients. Javed and O’Donnell (2011) reported on a small retrospective case series of FAI surgery in patients over 60 years of age. The investigators 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 investigators reported that 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.

Phillipon, et al. (2012) reported on a case series of patients age 50 years and older who underwent hip arthroscopy for femoracetabular impingement. Between 2006 and 2008, prospectively collected data were retrieved from the authors database on 153 patients aged 50 years or older undergoing hip arthroscopy for femoracetabular impingement. Data collected included range of motion, Modified Harris Hip Score (MHHS), Hip Outcome Score (HOS) for activities of daily living, HOS for sports, and Short Form 12 score. Survivors were defined as patients not requiring total hip replacement (THR). Survivorship was analyzed by use of the Kaplan-Meier method. The authors reported that THR was required after the arthroscopic treatment in 20% of patients (31 of 153). At 3 years (with data available in 64 patients), patients with greater than 2 mm of joint space had survivorship of 90% whereas those with 2 mm or less had survivorship of 57% (P = .001). In the patients who did not require THR, the MHHS improved from 58 to 84. The HOS for activities of daily living improved from 66 to 87 (P = .001), and the HOS for sports improved from 42 to 72 (P = .001). The physical component of the Short Form 12 improved from 38 to 49 (P = .001), whereas the mental component did not change (54 preoperatively v 53 postoperatively, P = .53). Median patient satisfaction was 9. The authors concluded that, on the basis of early results, patients with greater than 2 mm of joint space can expect improvement over preoperative status in pain and function after hip arthroscopy for femoracetabular impingement. In patients aged 50 years or older with 2 mm of joint space or less and low preoperative MHHSs, early conversion to THR was seen.

There is evidence that persons with advanced joint space narrowing do not improve with FAI surgery. Between September 2004 and April 2008, Larson, et al. (2011) treated 210 patients (227 hips) with FAI and a minimum 12-month followup (mean, 27 months). Group FAI consisted of 154 patients (169 hips) without radiographic joint space narrowing, whereas Group FAI-OA consisted of 56 patients (58 hips) with preoperative radiographic joint space narrowing. The authors collected Harris hip scores (HHS), Short Form-12 (SF-12), and pain scores on a visual analog scale (VAS) preoperatively and postoperatively. The authors reported that score improvements were better for Group FAI compared with Group FAI-OA. The overall failure rate was greater for Group FAI-OA (52%) than for Group FAI (12%). The authors found that, although patients with less than 50% joint space narrowing or greater than 2 mm joint space remaining on preoperative radiographs had improved scores throughout the study, they observed no score improvements at any time with advanced preoperative joint space narrowing. The authors found that greater joint space narrowing, advanced MRI chondral grade, and longer duration of preoperative symptoms predicted lower scores.
A number of reviews have evaluated the published data on FAI surgery, indicating positive results. A systematic evidence review (Stevens, et al., 2010) judged the evidence for femoroacetabular surgery as fair quality. Wittstein and Dienst (2006) stated that the early results after hip arthroscopy for the treatment of FAI syndrome are very promising. Guanche and Barel (2006) stated that arthroscopic treatment of FAI syndrome caused by an abnormal head-neck offset improves symptoms, restores hip morphology, and may arrest the progression toward degenerative joint disease in some patients. They noted that early results showed that if debridement of the impinging lesion and injured labrum is performed in the setting of normal femoral and acetabular articular surfaces, the results are promising.

Chládek and Trč (2007) noted that in the case of primary surgery for FAI, short- and middle-term results so far obtained are promising, and forthcoming long-term results will show whether, and for how many years, this therapy is able to postpone the necessity of total hip arthroplasty. Staandert el al (2008) stated that although a connection between anatomical abnormalities of the hip and the development of osteoarthritis has been recognized for some time, there are limited data on the natural history of FAI and no long-term studies on the effect of surgical treatment. Samorà, et al. (2011) concluded that the literature is replete with short-term evidence to support surgical treatment; however, there are currently no long-term prospective data or natural history studies examining the implications of FAI and effects of early intervention.

Longo, et al. (2010) completed a systematic computerized literature search on hip arthroscopy. The authors found that almost all studies reporting on the outcome of hip arthroscopy are of moderate scientific quality, and the evidence-based knowledge regarding results of hip arthroscopy arises from studies with a short-term follow-up period. The authors stated that the future of hip arthroscopy will require better visualization, access, instrumentation and implants with longer follow-up studies to prove its equivalence to or superiority over arthroscopy. The authors concluded that preliminary studies support the use of hip arthroscopy as an alternative to arthroscopy with an enormous therapeutic potential.

Beaulé et al (2009) stated that FAI is a recognized cause of hip pain and osteoarthritis in young adults. The clinical presentation of this pathology is quite varied in terms of the underlying deformity, patient age, and the degree of cartilage damage. Open hip surgery with surgical dislocation is the gold standard for treating femoral deformities and the damaged acetabular labral complex; however, less invasive techniques such as hip arthroscopy and arthroscopy combined with limited anterior hip arthroscopy may provide comparable outcomes with less surgical morbidity. Unresolved issues include the indications for acetabular rim trimming with labral reflation in the presence of acetabular retroversion and/or delaminated acetabular cartilage. Other issues involve the use of arthroplasty in older patients and/or in those with significant cartilage damage. The authors concluded that surgery should be tailored to treat individual patient's abnormal hip morphology and should address the major underlying impinging deformities.

In a review on arthroscopic treatment of FAI, Tzaveas and Villar (2009) stated that FAI is a recently recognized pathological entity. Arthroscopic treatment, as a modern and minimally invasive technique, has become an attractive and promising
treatment. Also, Larson and associates (2009) noted that improved techniques and longer-term outcomes studies will further define the optimal role of hip arthroscopy.

Macfarlane and Haddad (2010) noted the increasing number of studies of FAI in the published literature. The authors reviewed the etiology, pathophysiology, clinical features, diagnosis and treatment of FAI. Search terms included femoro-acetabular impingement, arthroscopic treatment, open treatment, etiology, pathophysiology. The search was limited to articles published in English. All articles were read in full by the authors and selected for inclusion based on relevance to the article. An increasing number of studies relating to FAI have been produced in the 10 years since its recognition. A range of clinical and radiological features have been described. Surgical management can be performed using a number of techniques, with promising results from various studies. Early treatment with open surgery has paved the way for less invasive and arthroscopic approaches, with short-to-medium term data reporting favorable functional results for arthroscopic treatment of FAI. Thus, the results of long-term studies are awaited.

Katz and Gomoll (2007) examined recent trends in the use of arthroscopic surgical techniques to address musculoskeletal problems. These investigators focused on arthroscopic approaches to problems of the hip, wrist, elbow and ankle. They noted that hip arthroscopy is permitting novel, minimally invasive approaches to the management of FAI, labral tears, loose bodies and chondral lesions. Complications of arthroscopic procedures occur very rarely. However, they stated that virtually all the literature on arthroscopy outcomes comes from small uncontrolled studies.

In a review on the management of labral tears and FAI in young, active patients, Bedi and colleagues (2008) determined (i) the quality of the literature assessing outcomes after surgical treatment of labral tears and FAI, (ii) patient satisfaction after open or arthroscopic intervention, and (iii) differences in outcome with open or arthroscopic approaches. Computerized literature databases were searched to identify relevant articles from January 1980 to May 2008. Studies were eligible for inclusion if they had a level I, II, III, or IV study design and if the patient population had a labral tear and/or FAI as the major diagnosis. Patients with severe pre-existing osteoarthritis or acetabular dysplasia were excluded. Of the 19 articles with reported outcomes after surgery, none used a prospective study design and 1 met the criteria for level III basis of evidence. Open surgical dislocation with labral debridement and osteoplasty is successful, with a good correlation between patient satisfaction and favorable outcome scores. The studies reviewed support that 65% to 85% of patients will be satisfied with their outcome at a mean of 40 months after surgery. A common finding in all series, however, was an increased incidence of failure among patients with severe pre-existing osteoarthritis. Arthroscopic treatment of labral tears is also effective, with 67% to 100% of patients being satisfied with their outcomes. The authors found that, although open surgical dislocation with osteoplasty is the historical gold standard, the scientific data do not show that open techniques have outcomes superior to arthroscopic techniques.
In an evaluation of the aforementioned systematic evidence review by Bedi, et al., the Centre for Reviews and Dissemination (2009) stated that the validity of the studies included in this systematic review was not assessed and the studies were of poor quality study design, so the reliability of their results is uncertain. The CRD concluded that Bedi, et al.’s conclusions reflected the data presented, but the potential for various biases in the review made their reliability unclear.

A systematic evidence review prepared by the Health Care Insurance Board of the Netherlands (CVZ, 2010) found no prospective comparative studies of surgery for femoroacetabular hip impingement syndrome. The systematic evidence review noted that evidence consists largely of retrospective case-series, which are heterogeneous in terms of patient populations, treatment and outcomes.

Clohisy and colleagues (2010) performed a systematic review of the literature to (i) define the level of evidence regarding hip impingement surgery; (ii) determine whether the surgery relieves pain and improves function; (iii) identify the complications; and (iv) identify modifiable causes of failure (conversion to total hip arthroplasty). These investigators searched the literature between 1950 and 2009 for all studies reporting on surgical treatment of FAI. Studies with clinical outcome data and minimum 2-year follow-up were analyzed. A total of 11 studies met criteria for inclusion -- 9 were Level IV and 2 were Level III. Mean follow-up was 3.2 years; range of 2 to 5.2 years. Reduced pain and improvement in hip function were reported in all studies. Conversion to total hip arthroplasty was reported in 0 % to 26 % of cases. Major complications occurred in 0 % to 18 % of the procedures. Current evidence regarding FAI surgery is primarily Level IV and suggests the various surgical techniques are associated with pain relief and improved function in 68 to 96 % of patients over short-term follow-up. The authors stated that long-term follow-up is needed to determine survivorship and impact on osteoarthritis progression and natural history.

Ng, et al. (2010) also reviewed the published evidence on the surgical treatment of femoroacetabular impingement (FAI). A total of 23 reports of case studies on the surgical treatment of FAI were identified and 1 systematic review was conducted. This review of 970 cases included 2 level III studies, and 20 level IV studies. One randomized controlled trial (level I study) (citing Espinosa, et al., 2006) was found, comparing labral repair to labral debridement. The authors found that those patients with Outerbridge grade III or IV cartilage damage seen intra-operatively or with pre-operative radiographs showing greater than Tonnis grade I osteoarthritis appear to have worse outcomes with treatment for FAI. The authors found 2 studies that directly compared labral re-fixation with labral debridement; the authors stated that this evidence appears to support labral re-fixation. Although several studies reported post-operative osteoarthritis findings, the authors found that it is too soon to predict whether progression of osteoarthritis is delayed or halted.

A review by ARIF (2010) concluded that the main limitation with the data identified in reviews of femoroacetabular surgery for hip impingement syndrome was that it had been derived from retrospective case series, limiting the conclusions one can draw about the effectiveness of arthroscopic surgery for hip impingement and/or hip pain compared with any conventional approach overall and within any particular subgroups.
An assessment by Public Health Wales (Webb, 2010) found that the available evidence from systematic reviews is mainly of level III (case series) and level IV (expert opinion/formal consensus) type and is suggestive of short term improvements in outcomes with both open and arthroscopic surgical procedures. The assessment found that small prospective cohort studies also confirm outcome improvement. The assessment stated that most studies documented decreased pain and improved function in the majority of patients with short term follow-up. However, long term follow up studies were not found. The assessment stated that predictors of treatment outcome and the efficacy of various surgical techniques need to be established in well-designed clinical trials.

A systematic evidence review commissioned by the Washington State Healthcare Authority (Dettori, et al., 2011) found "no data to assess the short- or long-term efficacy of FAI surgery compared with no surgery." The assessment found "no evidence that one specific treatment resulted in better outcomes than another (surgery versus no surgery, labral debridement versus refixation, osteoplasty versus no osteoplasty)." The assessment identified several case series that reported improvement in pain, patient reported and clinician reported hip outcome scores, patient satisfaction and return to normal activities following FAI surgery. "However, whether this improvement is a result of the surgery, or the postoperative rehabilitation, or the change in activity subsequent to the surgery or placebo is not known." The assessment found "no data available to assess long term effectiveness of FAI surgery compared with no surgery." The assessment stated that "there are no data yet published to test the hypothesis that FAI surgery prevents or delays hip osteoarthritis or the need for total hip arthroplasty." The Washington State Health Technology Clinical Committee (2011) concluded that the current evidence on surgery for femoroacetabular impingement syndrome demonstrates that there is insufficient evidence to cover. The committee stated that it considered all the evidence, including the comprehensive report, public comments, and utilization data, and gave greatest weight to the evidence it determined, based on objective factors, to be the most valid and reliable.

There is new emerging evidence of the long-term effectiveness of FAI surgery. Meftah, et al. (2011) reported on long-term outcomes of arthroscopic labral debridement. The investigators reported on fifty consecutive patients who underwent hip arthroscopy and labral debridement with a mean follow-up of 8.4 years. Patients' preoperative Harris Hip Scores and coexisting pathologies such as femoroacetabular impingement, dysplasia, or arthritis were recorded as variables. Postoperative Harris Hip Score and satisfaction at final follow-up were recorded as outcomes. The authors reported that good or excellent results were achieved in 62% of cases (58% in patients with untreated femoroacetabular impingement and 19% in patients with arthritis). Failures included 2 cases that were converted to total hip replacement (4.5 and 5.2 years after index procedure) due to advancement of arthritis and 1 case of repeat arthroscopy for cam decompression. Patients with no coexisting pathology had significantly higher satisfaction and Harris Hip Scores. The authors noted that almost all of the patients with low postoperative Harris Hip Scores had arthritic changes, and that arthritis had a significant correlation with low postoperative Harris Hip Scores and satisfaction. The authors found that coexisting pathology, especially arthritis and untreated femoroacetabular impingement, can result in inferior outcomes. The authors
concluded that arthroscopic labral debridement of symptomatic tears in selected patients with no coexisting pathology can result in favorable long-term results. The authors found that arthritis is the strongest independent predictor of poor outcomes.

Previously published long-term data come from Byrd and Jones (2010), who investigated the response to hip arthroscopy in a consecutive series of patients with 10 years followup. Since 1993, the authors assessed all patients undergoing hip arthroscopy prospectively with a modified Harris hip score preoperatively and then postoperatively at 3, 12, 24, 60, and 120 months. A cohort of 50 patients (52 hips) was identified who had achieved 10-year followup and represent the substance of this study. The authors reported that there was 100% followup of these patients. The average age of the patients was 38 years (range, 14-84 years), with 27 males and 23 females. The median improvement was 25 points (preoperative, 56 points; postoperative, 81 points). Fourteen patients were converted to THA and two died. Four patients underwent repeat arthroscopy. There were two complications in one patient. The presence of arthritis at the time of the index procedure was an indicator of poor prognosis. The authors concluded that this study substantiates the long-term effectiveness of arthroscopy in the hip as treatment for various disorders, including labral pathology, chondral damage, synovitis, and loose bodies. The authors found that arthritis is an indicator of poor long-term outcomes with these reported methods.

In summary, there is currently sufficient evidence to support the short- and midterm effectiveness of surgery (open or arthroscopic) for the treatment of individuals with FAI syndrome. However, there is a lack of evidence that surgical intervention slows the rate of progression to osteoarthritis of the hip in these patients.

A systematic review of the evidence for FAI surgery (Harris, et al., 2013) found that study methodological quality, analyzed using Modified Coleman Methodology Score (MCMS), was poor.

Clohisy, et al. (2013) stated that FAI surgery is at the development level, with only case series supporting the intervention. The authors stated that recently published systematic reviews of the literature indicate that the current evidence regarding FAI surgery primarily consists of level IV studies. These studies support the clinical efficacy of FAI surgery, with most patients reporting reduced pain, improved function, and a better quality of life after surgical intervention for symptomatic FAI. Similar to the data supporting many surgical interventions, these data have limitations, however, in that the study cohorts are relatively small, the surgical interventions are varied, and the follow-up duration is short- to midterm. The authors stated that, in the scheme of an ideal introduction of a new intervention, FAI surgery is at the development level, with only case series supporting the intervention. The authors stated that, to bolster the strength of clinical evidence regarding FAI surgery, larger clinical studies are needed to compare surgical and nonsurgical hip rehabilitation interventions, identify the predictive factors of treatment outcomes, and determine the long-term impact of FAI surgery on joint survivorship and disease modification, that is, the delay or prevention of secondary osteoarthritis.

The United Kingdom Feasibility study of a trial of ArthroscopicSurgery for Hip Impingement compared with Non-operative care (UK FASHIoN) is a large-scale
multicenter pilot project funded by the Health Technology Assessment Programme, a division of the National Institute for Health Research (NIHR) of the National Health Service in the United Kingdom. The study began in March 2012, with a planned 18-month study period. The research team seeks to establish the feasibility of an RCT comparing hip arthroscopy with the so-called best nonsurgical care for symptomatic FAI.

Currently, there is insufficient evidence regarding the use of capsular plication as a treatment for FAI. Larson, et al. (2014) reported that capsular plication was a predictor of improved outcomes with revision arthroscopic surgery for residual FAI. The authors reviewed patients who underwent arthroscopic hip revision for residual FAI. The authors evaluated pathomorphological findings, intraoperative findings, and preoperative and postoperative modified Harris Hip Score (MHHS), Short Form-12 (SF-12), and pain on a visual analog scale (VAS) values. The authors compared outcomes after revision arthroscopic FAI correction with outcomes of a matched cohort who underwent primary arthroscopic FAI correction. A total of 79 patients (85 hips) with a mean age of 29.5 years underwent arthroscopic revision FAI correction (mean follow-up, 26 months). The labrum was debrided (27 hips), repaired (49 hips), or reconstructed (7 hips). Two labrums were stable and required no treatment. The authors compared results of revision arthroscopic FAI correction with those of 220 age- and sex-matched patients (237 hips) who underwent primary arthroscopic FAI correction (mean follow-up, 23 months). The mean improvement in outcome scores after revision FAI correction was 17.8 (MHHS), 12.5 (SF-12), and 1.4 (VAS) points compared with 23.4 (MHHS), 19.7 (SF-12), and 4.6 (VAS) points after primary arthroscopic FAI correction. The mean improvement was significantly better in the primary cohort compared with the revision cohort (P < .01 for MHHS, SF-12, and VAS values). Good/excellent results were achieved in 81.7% of the primary cohort and 62.7% of the revision cohort (P < .01). The authors reported that capsular plication (P = .032), greater postoperative head-neck offset (P = .024), subspine/anterior inferior iliac spine (AIIS) decompression (P = .014), and labral repair/reconstruction (P = .009) were significant predictors for better outcomes after revision surgery.

Bedi and colleagues (2011) noted that advances in the ability to treat various soft-tissue and osseous pathologic conditions of the hip arthroscopically have been predicated on an improved exposure of the pathology of the central, peripheral, and peri-trochanteric compartments. The management of the capsule is critical and must allow for an improved exposure without compromising stability and kinematics of the hip. Described approaches have included capsulectomy, limited capsulotomy, extensile capsulotomy, capsular plication, and capsular shift. The selected approach must consider various factors, including symptomatic complaints, underlying hyper-laxity, specific mechanical pathology, and surgical expertise. Universally using a single technique without consideration of the complex mechanical and anatomic factors unique to each patient may result in incomplete treatment of the patho-anatomy or iatrogenic instability.

Domb et al (2013) critically evaluated the available literature exploring the role of the hip joint capsule in the normal state (stable) and pathologic states (instability or stiffness). Furthermore, these researchers examined the various ways that arthroscopic hip surgeons address the capsule intra-operatively: (i) capsulotomy or
capsulectomy without closure, (ii) capsulotomy with closure, and (iii) capsular plication. Two independent reviewers performed a systematic review of the literature using PubMed and the reference lists of related articles by means of defined search terms. Relevant studies were included if these criteria were met: (i) written in English, (ii) Levels of Evidence I to V, (iii) focus on capsule and its role in hip stability, and (iv) human studies and reviews. Articles were excluded if they evaluated (i) total hip arthroplasty constructs using bony procedures or prosthetic revision, (ii) developmental dysplasia of the hip where re-orientation osteotomies were used, (iii) syndromic instability, and (iv) traumatic instability with associated bony injury. By use of the search method described, a total of 5,085 publications were reviewed, of which 47 met appropriate criteria for inclusion in this review. Within this selection group, there were multiple publications that specifically addressed more than 1 of the inclusion criteria. Relevant literature was organized into the following areas: (i) capsular anatomy, biomechanics, and physiology; (ii) the role of the capsule in total hip arthroplasty stability; (iii) the role of the capsule in native hip stability; and (iv) atraumatic instability and capsulorrhaphy. The authors concluded that as the capsule-ligamentous stabilizers of the hip continue to be studied, and their role defined, arthroscopic hip surgeons should become facile with arthroscopic repair or plication techniques to restore proper capsular integrity and tension when indicated.

Appendix

Arthroscopic hip surgery may be medically necessary for the following additional indications:

- Acute fractures of the femoral head or acetabulum; or
- Malunion of a previous intraarticular fracture; or
- Persons with chronic (3 or more months duration), persistent hip pain or dysfunction due to avascular necrosis or loose bodies; or
- Limited synovectomy for chronic inflammatory arthropathies (e.g., rheumatoid arthritis, psoriatic arthritis, Lyme arthritis), benign neoplastic disorders (e.g., osteochondromatosis and pigmented villonodular synovitis), recurrent hemarthrosis (e.g., hemophilia), or septic arthritis; or
- Ligamentum teres injuries; or
- Synovial biopsy.

Table 1: Tönnis Classification of Osteoarthritis by Radiographic Changes

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No signs of OA</td>
</tr>
<tr>
<td>1</td>
<td>Increased sclerosis, slight joint space narrowing, no or slight loss of head sphericity</td>
</tr>
<tr>
<td>2</td>
<td>Small cysts, moderate joint space narrowing, moderate loss of head sphericity</td>
</tr>
<tr>
<td>3</td>
<td>Large cysts, severe joint space narrowing, severe deformity of the head</td>
</tr>
</tbody>
</table>

Table 2: Outerbridge classification:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>normal cartilage;</td>
</tr>
<tr>
<td>1</td>
<td>cartilage with softening and swelling;</td>
</tr>
<tr>
<td>2</td>
<td>a partial-thickness defect with fissures on the surface that do not reach subchondral bone or exceed 1.5 cm in diameter;</td>
</tr>
</tbody>
</table>
Grade III: fissuring to the level of subchondral bone in an area with a diameter more than 1.5 cm; 
Grade IV: exposed subchondral bone.

CPT Codes / HCPCS Codes / ICD-9 Codes

CPT codes covered if selection criteria are met:

29914
29915
29916
29862

ICD-9 codes not covered for indications listed in the CPB (not all-inclusive): 

756.51 Osteogenesis imperfecta
756.83 Ehlers-Danlos syndrome
759.82 Marfan syndrome

ICD-9 codes related for indications listed in the CPB:

715.35 Osteoarthritis, localized, not specified whether primary or secondary, involving pelvic region and thigh [advanced osteoarthritis]
715.95 Osteoarthritis, unspecified whether generalized or localized, involving pelvic region and thigh [advanced osteoarthritis]
718.05 Articular cartilage disorder, pelvic region and thigh
718.35 Recurrent dislocation of joint of pelvic region and thigh [hip impingement syndrome]
718.85 Other joint derangement, not elsewhere classified, pelvic region and thigh
718.95 Unspecified derangement of joint of pelvic region and thigh [hip impingement syndrome]
719.45 Pain in joint involving pelvic region and thigh [hip impingement syndrome]
719.55 Stiffness of joint, not elsewhere classified, pelvic region and thigh
719.7 Difficulty in walking
719.85 Other specified disorders of joint of pelvic region and thigh [hip impingement syndrome]

719.95 Unspecified disorder of joint of pelvic region and thigh [hip impingement syndrome]

843.8 Sprain of other specified sites of hip and thigh [labral tear]

The above policy is based on the following references:


31. Health Care Insurance Board / College voor zorgverzekeringen (CVZ). Femoro-acetabulaire chirurgie ter behandeling van FAI voldoet niet aan het criterium van de stand van de wetenschap en praktijk [Femoroacetabular surgery for the treatment of femoroacetabular impingement does not meet


