PHP_7.01.118	Surgical Treatment of Femoroacetabular Impingement		
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Section:	7.0 Surgery	**Page:**	Page 1 of 25

State Guidelines

As of the publication of this policy, there are no applicable Medi-Cal guidelines (Provider Manual or All Plan Letter). Please refer to the Policy Statement section below.

Policy Statement

In the absence of any State Guidelines, please refer to the criteria below.

I. Open or arthroscopic treatment of femoroacetabular impingement (FAI) may be **medically necessary** when **all** of the following conditions have been met:

Age

A. Candidates should be skeletally mature with documented closure of growth plates (e.g., greater than or equal to 15 years of age)

Symptoms

A. Moderate-to-severe hip pain worsened by flexion activities (e.g., squatting or prolonged sitting) that significantly limits activities
B. Unresponsive to conservative therapy for at least 3 months (including activity modifications, restriction of athletic pursuits, and avoidance of symptomatic motion)
C. Positive impingement sign on clinical examination (pain elicited with 90 degrees of flexion and internal rotation and adduction of the femur)

Imaging

A. Morphology indicative of cam or pincer FAI (e.g., pistol-grip deformity, femoral head-neck offset with an alpha angle greater than 50 degrees, a positive wall sign, acetabular retroversion [overcoverage with crossover sign]), coxa profunda or protrusion, or damage of the acetabular rim
B. High probability of a causal association between the FAI morphology and damage (e.g., a pistol-grip deformity with a tear of the acetabular labrum and articular cartilage damage in the anterosuperior quadrant)
C. No evidence of advanced osteoarthritis, defined as Tönnis grade 2 or 3, or joint space of less than 2 millimeters (mm)
D. No evidence of severe (Outerbridge grade IV) chondral damage

II. Treatment of femoroacetabular impingement (FAI) is considered **investigational** in all other situations.

Policy Guidelines

If femoroacetabular impingement morphology (FAI) is identified, individuals should be advised not to play aggressive sports. No more frequent than annual follow-up with magnetic resonance arthrography (MRA) may be indicated for FAI morphology to evaluate cartilage changes before damage becomes severe. It should be noted that current imaging techniques limit the early identification of cartilage defects, whereas delay in the surgical correction of bony abnormalities may lead to disease progression to the point at which joint preservation is no longer appropriate.

Confirmation of subtle FAI morphology may require 3-dimensional computed tomography. Some clinicians may also use local anesthetic injection into the joint to assist in confirming FAI pathology.

Treatment of FAI should be restricted to centers experienced in treating this condition and staffed by surgeons adequately trained in techniques addressing FAI. Because of the differing benefits and risks of open and arthroscopic approaches, individuals should make an informed choice between the procedures.

Some individuals may require a revision procedure if symptoms recur or persist. Published studies have indicated that all sources of impingement might not have been identified before surgery, and those that had might not have been adequately treated. The risk of additional surgical procedures can be reduced by intraoperative assessment of impingement after bone debridement and reshaping.

Coding

See the Codes table for details.

Description

Femoroacetabular impingement results from localized compression within the joint as a result of an anatomic mismatch between the head of the femur and the acetabulum. Symptoms of impingement typically occur in young to middle-aged adults before the onset of osteoarthritis but may be present in younger individuals with developmental hip disorders. The objective of surgical treatment of femoroacetabular impingement is to provide symptom relief and reduce further joint damage.

Summary of Evidence

For individuals who are adults with asymptomatic femoroacetabular impingement who receive femoroacetabular impingement surgery, there is no direct evidence that the surgical treatment will prevent the development of osteoarthritis. Relevant outcomes are symptoms, functional outcomes, health status measures, quality of life, and change in disease status. Indirect evidence consists of observational studies. In retrospective studies of patients with osteoarthritis, the relevant outcomes were radiographic evidence of hip joint malformations. In prospective studies of patients with femoroacetabular impingement, the relevant outcome is progression to osteoarthritis. Several large observational studies (>1000 patients), as well as smaller studies, have shown radiographic evidence of relationships between abnormal hip morphology and the development of osteoarthritis. There have been no studies in which femoroacetabular impingement surgery was performed on patients with femoroacetabular impingement morphology but no symptoms. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who are adults with symptomatic femoroacetabular impingement who receive femoroacetabular impingement surgery, the evidence includes mostly systematic reviews of large and small observational studies and systematic reviews of randomized controlled trials (RCTs). Relevant outcomes are symptoms, functional outcomes, health status measures, quality of life, and change in disease status. Open hip dislocation surgery and arthroscopic surgery are the most common surgical techniques performed on patients with femoroacetabular impingement. Systematic reviews have evaluated open hip dislocation surgery and arthroscopic surgery, compared with no comparator, nonsurgical management, and other surgical techniques. Compared with nonsurgical management, all types of surgical techniques have resulted in significant improvements in functional outcomes, pain, and radiographic measurements. The reviews were limited when comparing surgical techniques with each other because patient characteristics and outcome measurements were heterogeneous among studies. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who are children 15 years of age or younger with symptomatic femoroacetabular impingement who receive femoroacetabular impingement surgery, the evidence includes a meta-analysis evaluating small observational studies and individual observational studies. Relevant outcomes are symptoms, functional outcomes, health status measures, quality of life, and change in disease status. While the studies reported reductions in pain and improvements in functional outcomes, the sample sizes were relatively small, ranging between 11 and 116 hips per study. Additionally, comparative studies were not identified. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who are children 15 years of age or younger with slipped capital femoral epiphysis-associated femoroacetabular impingement who receive femoroacetabular impingement surgery, the evidence includes a systematic review and small observational studies (range, 19 to 51 patients). Relevant outcomes are symptoms, functional outcomes, health status measures, quality of life, and change in disease status. While most patients experienced symptom relief following femoroacetabular impingement surgery, the surgery is invasive and complications (e.g., nonunions) were reported. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have residual femoroacetabular impingement symptoms following a primary surgery who receive revision arthroscopic surgery, the evidence includes systematic reviews of observational studies (>400 patients). Relevant outcomes are symptoms, functional outcomes, health status measures, quality of life, and change in disease status. Though the studies were of low-quality, consistent improvements in functional outcomes, pain relief, and patient satisfaction were reported, in some cases beyond 3 years. The evidence is sufficient to determine that the technology results in an improvement in the net health outcome.

Additional Information
Not applicable.

Related Policies

- Hip Resurfacing

Benefit Application

Blue Shield of California Promise Health Plan is contracted with L.A. Care Health Plan for Los Angeles County and the Department of Health Care Services for San Diego County to provide Medi-Cal health benefits to its Medi-Cal recipients. In order to provide the best health care services and practices, Blue Shield of California Promise Health Plan has an extensive network of Medi-Cal primary care providers and specialists. Recognizing the rich diversity of its membership, our providers are given training and educational materials to assist in understanding the health needs of their patients as it could be affected by a member's cultural heritage.

The benefit designs associated with the Blue Shield of California Promise Medi-Cal plans are described in the Member Handbook (also called Evidence of Coverage).

Regulatory Status

Surgery for treatment of femoroacetabular impingement is a procedure and, as such, is not subject to regulation by the U.S. Food and Drug Administration.

Health Equity Statement

Blue Shield of California Promise Health Plan's mission is to transform its health care delivery system into one that is worthy of families and friends. Blue Shield of California Promise Health Plan seeks to advance health equity in support of achieving Blue Shield of California Promise Health Plan's mission.

Blue Shield of California Promise Health Plan ensures all Covered Services are available and accessible to all members regardless of sex, race, color, religion, ancestry, national origin, ethnic group identification, age, mental disability, physical disability, medical condition, genetic information, marital status, gender, gender identity, or sexual orientation, or identification with any other persons or groups defined in Penal Code section 422.56, and that all Covered Services are provided in a culturally and linguistically appropriate manner.

Rationale

Background

Femoroacetabular Impingement

Femoroacetabular impingement arises from an anatomic mismatch between the head of the femur and the acetabulum, causing compression of the labrum or articular cartilage during flexion. The mismatch can arise from subtle morphologic alterations in the anatomy or orientation of the ball-and-socket components (e.g., a bony prominence at the head-neck junction or acetabular over coverage), with articular cartilage damage initially occurring from abutment of the femoral neck against the acetabular rim, typically at the anterosuperior aspect of the acetabulum. Although hip joints can possess the morphologic features of femoroacetabular impingement without symptoms, femoroacetabular impingement may become pathologic with repetitive movement and/or increased force on the hip joint. High-demand activities may also result in pathologic impingement in hips with normal morphology.

Two types of impingement, cam and pincer, may occur alone or, more frequently, together. Cam impingement is associated with an asymmetric or nonspherical contour of the head or neck of the femur jamming against the acetabulum, resulting in cartilage damage and delamination (detachment from the subchondral bone). Deformity of the head/neck junction that looks like a pistol-grip on radiographs is associated with damage to the anterosuperior area of the acetabulum. Symptomatic cam impingement is found most frequently in young male athletes. Pincer impingement is associated with over coverage of the acetabulum and pinching of the labrum, with pain more typically beginning in women of middle age. In cases of isolated pincer impingement, the damage may be limited to a narrow strip of the acetabular cartilage.

Epidemiologic and radiographic studies have found correlations between hip osteoarthritis and femoroacetabular impingement lesions, supporting the theory that prolonged contact between the anatomically mismatched acetabulum and femur may lead not only to cam and pincer lesions but also to further cartilage damage and subsequent joint deterioration. It is believed that osteoplasty of the impinging bone is needed to protect the cartilage from further damage and to preserve the natural joint. Therefore, if femoroacetabular impingement morphology is shown to be an etiology of osteoarthritis, a strategy to reduce the occurrence of idiopathic hip osteoarthritis could be early recognition and treatment of femoroacetabular impingement before cartilage damage and joint deterioration occurs.

An association between femoroacetabular impingement and athletic pubalgia, sometimes called sports hernia, has been proposed. Athletic pubalgia is an umbrella term for a large variety of musculoskeletal injuries involving attachments and/or soft tissue support structures of the pubis.

Treatment

A technique for hip dislocation with open osteochondroplasty that preserved the femoral blood supply was reported by Ganz. Visualization of the entire joint with this procedure led to the identification and acceptance of femoroacetabular impingement as an etiology of cartilage damage and the possibility of correcting the abnormal femoroacetabular morphology. Open osteochondroplasty of bony abnormalities and treatment of the symptomatic cartilage defect is considered the criterion standard for complex bony abnormalities. However, open osteochondroplasty is invasive, requiring transection of the greater trochanter (separation of the femoral head from the femoral shaft) and dislocation of the hip joint to provide full access to the femoral head and acetabulum. In addition to the general adverse events of open surgical procedures, open osteochondroplasty with dislocation has been associated with nonunion and neurologic and soft tissue lesions.

Less invasive hip arthroscopy and an arthroscopy-assisted mini-approach were developed by 2004. Arthroscopy requires specially designed instruments and is considered technically more difficult due to reduced visibility and limited access to the joint space. Advanced imaging techniques, including computed tomography and fluoroscopy, have been used to improve visualization of the 3-dimensional head/neck morphology during arthroscopy.

Femoroacetabular impingement can also be a source of hip pain and decreased hip internal rotation in the pediatric population. When nonoperative management of femoroacetabular impingement in children and adolescents is ineffective, surgical procedures may be indicated. Surgical techniques include arthroscopy, open hip dislocation, limited open with arthroscopy, and osteotomy.

Slipped Capital Femoral Epiphysis

Patients with slipped capital femoral epiphysis have a displaced femoral head in relation to the femoral neck within the confines of the acetabulum, which can result in hip pain, thigh pain, knee pain, and the onset of a limp. Slipped capital femoral epiphysis occurs most frequently in children between the ages of 10 to 16. Upon reaching skeletal maturity, 32% of patients diagnosed with slipped capital femoral epiphysis were found to have clinical signs of impingement. It is not uncommon for patients with slipped capital femoral epiphysis to develop premature osteoarthritis and require total hip arthroplasty within 20 years.

Treatment

The standard treatment for slipped capital femoral epiphysis is stabilization across the physis by in situ pinning. Alternative treatments proposed for pediatric patients with slipped capital femoral epiphysis-related femoroacetabular impingement include osteoplasty without dislocation, or with the open dislocation technique described by Ganz. The Ganz technique (capital realignment with open dislocation) is technically demanding, with a steep learning curve and a high-risk of complications, including avascular necrosis. Therefore, early treatment to decrease impingement must be weighed against the increased risk of adverse events.

Literature review

Evidence reviews assess the clinical evidence to determine whether the use of technology improves the net health outcome. Broadly defined, health outcomes are the length of life, quality of life, and ability to function, including benefits and harms. Every clinical condition has specific outcomes that are important to individuals and managing the course of that condition. Validated outcome measures are necessary to ascertain whether a condition improves or worsens; and whether the magnitude of that change is clinically significant. The net health outcome is a balance of benefits and harms.

To assess whether the evidence is sufficient to draw conclusions about the net health outcome of technology, 2 domains are examined: the relevance, and quality and credibility. To be relevant, studies must represent 1 or more intended clinical use of the technology in the intended population and compare an effective and appropriate alternative at a comparable intensity. For some conditions, the alternative will be supportive care or surveillance. The quality and credibility of the evidence depend on study design and conduct, minimizing bias and confounding that can generate incorrect findings. The randomized controlled trial (RCT) is preferred to assess efficacy; however, in some circumstances, nonrandomized studies may be adequate. Randomized controlled trials are rarely large enough or long enough to capture less common adverse events and long-term effects. Other types of studies can be used for these purposes and to assess generalizability to broader clinical populations and settings of clinical practice.

Adults with Asymptomatic Femoroacetabular Impingement
Clinical Context and Therapy Purpose
The purpose of femoroacetabular impingement surgery is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as observation, in adults with asymptomatic femoroacetabular impingement.

The following PICO was used to select literature to inform this review.

Populations
The relevant population of interest is individuals who are adults with asymptomatic acetabular impingement.

Femoroacetabular impingement is more prevalent in the athletic population. The true prevalence of femoroacetabular impingement is difficult to obtain as there is disagreement whether it should be assessed on the basis of radiographic or clinical findings suggestive of femoroacetabular impingement, as a large percentage of patients in both the athletic and general population may have radiographic findings indicative of femoroacetabular impingement, but remain clinically asymptomatic.[1] Frank et al conducted a systematic review of 26 studies to determine the prevalence of femoroacetabular impingement in asymptomatic individuals (N=2114).[2] The prevalence of cam-type deformity was 23.1% in the general population compared with 54.8% in the athletic population.

Interventions
The therapy being considered is femoroacetabular impingement surgery. Femoroacetabular impingement results from localized compression in the joint due to an anatomic mismatch between the head of the femur and the acetabulum. Symptoms of impingement typically occur in young to middle-aged adults before the onset of osteoarthritis but may be present in younger patients with developmental hip disorders.

The objective of surgical treatment of femoroacetabular impingement is to provide symptom relief and reduce further joint damage.

Comparators
Comparators of interest include observation.

Outcomes
The general outcomes of interest are symptoms, functional outcomes, health status measures, quality of life, and change in disease status.

The existing literature evaluating femoroacetabular impingement surgery as a treatment for patients who are adults with asymptomatic femoroacetabular impingement has varying lengths of follow up. At least 1 year of follow-up is desirable to assess outcomes.

Study Selection Criteria
Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

Currently, there are no studies providing evidence on the efficacy of femoroacetabular impingement surgery for adults with asymptomatic femoroacetabular impingement morphology for the prevention of osteoarthritis. Indirect evidence consists of observational studies that demonstrate a relationship between femoroacetabular impingement and osteoarthritis.

Observational Studies

Oner et al (2016) conducted a retrospective study to determine the prevalence of femoroacetabular impingement as an etiologic factor for osteoarthritis in the hip joint among patients who had undergone total hip arthroscopy (THA).[3] Radiographs of 1004 patients who had undergone THA between 2005 and 2010 were reviewed by 3 authors. Intra- and interobserver consistencies were calculated. The predisposing etiologic factor leading to end-stage degenerative hip disease was undetermined in 26 of the radiographs. Among the remaining 978 patients, 99 patients were diagnosed with femoroacetabular impingement by all 3 reviewers, 83 with a cam-type femoroacetabular impingement, and 16 with pincer-type femoroacetabular impingement. Interobserver agreement was high, with a contingency coefficient between observers of 0.71 for the diagnosis of femoroacetabular impingement.

A population-based cohort study by Thomas et al (2014) found that subclinical deformities of the hip, including cam-type femoroacetabular impingement, were significant predictors of radiographic evidence of osteoarthritis and total hip replacement in women.[4] A cohort of 1003 women underwent pelvis radiographs at years 2 and 20. At 20 years, blinded radiographic analysis was available for 670 (46%) hips, of which 70 (11%) showed osteoarthritis. For total hip replacement (see evidence review 7.01.80), data at the 20-year assessment were available for 1455 (99%) hips, of which 40 (3%) had undergone replacement. Pincer-type femoroacetabular impingement at year 2 was not significantly associated with radiographic evidence of osteoarthritis. Cam-type femoroacetabular impingement at year 2 was significantly associated with the development of radiographic osteoarthritis and total hip replacement. Each degree increased in the alpha angle above 65° was associated with an increased risk of 5% for radiographic evidence of osteoarthritis and 4% for total hip replacement. These findings were limited by the low rate of participants having both baseline and follow-up radiographs.

Ganz and colleagues began a cross-sectional population-based natural history cohort in 2005 that included over 1000 young men to determine whether morphologic alterations are associated with an increased rate of early osteoarthritis. Reichenbach et al (2011) reported on 1080 asymptomatic young men in the Sumiswald Cohort that had undergone clinical examination and completed the Western Ontario and McMaster Universities Osteoarthritis Index and the EuroQoL health-related quality of life questionnaire.[5] Of these, 244 randomly selected subjects (mean age, 19.9 years) underwent magnetic resonance imaging to evaluate cam-type deformities, labral lesions, cartilage thickness, and impingement pits. Definite cam-type deformities were detected in 67 (27%) asymptomatic men. Logistic regression models, adjusted for age and body mass index, found for patients with cam-type deformities odds ratios (ORs) of 2.77 for labral lesions, 2.91 for impingement pits, and 2.45 for labral deformities. Cartilage thickness was -0.19 mm lower in subjects with cam-type deformities.

Gosvig et al (2010) published findings from a cross-sectional radiographic and questionnaire database of 4151 individuals from the Copenhagen Osteoarthritis study.[6] The study group consisted of 1332 men (mean age, 60.0 years; range, 22 to 90 years), and 2288 women (mean age, 60.8 years; range, 21 to 90 years). The hips were categorized as being without malformations or as having an abnormality consisting of a deep acetabular socket, a pistol-grip deformity, or a combination of the 2 based on radiographic criteria. Male and female prevalence of hip joint malformations was 71% and 36.6%, respectively. The prevalence of hip osteoarthritis, radiographically defined, was 9.5% in men and 11.2% in women. A deep acetabular socket or a pistol-grip deformity was a significant risk factor in the development of hip osteoarthritis (relative risk, 2.4 and 2.2, respectively).

A study by Takeyama et al (2009) from Asia reviewed records of 817 patients (946 hips) who underwent primary surgery for osteoarthritis or other hip diseases to determine the prevalence of femoroacetabular impingement.[7] Most (73%) patients were diagnosed with osteoarthritis secondary to developmental hip dysplasia. Only 17 (1.8%) patients were considered to have had primary osteoarthritis. Of these, 6 patients (average age, 63 years; range, 32 to 79 years) were determined to have femoroacetabular impingement from preoperative radiographs, resulting in a possible etiology of femoroacetabular impingement for 0.6% of the total population undergoing surgery for osteoarthritis and 35% in the population with primary osteoarthritis.

Bardakos and Villar (2009) retrospectively examined 43 patients (43 hips) younger than 55 years of age with a history of symptomatic idiopathic arthritis, who exhibited pistol-grip deformity of the femur and mild-to-moderate osteoarthritis (Tonnis grade 1 or 2).[8] Radiographs showed progression of osteoarthritis in two-thirds of the patients, with 12 receiving hip replacement or resurfacing after more than 10 years. Logistic regression analysis showed the medial proximal femoral angle and the posterior wall sign as significant independent predictors for progression of osteoarthritis. A reduction of 1° in the medial proximal angle increased the odds of osteoarthritis progression by 21 times, while hip osteoarthritis with a positive posterior wall sign was 10 times more likely to progress than a hip that had a negative posterior wall sign. Of note, one-third of the patients with a pistol-grip deformity did not progress rapidly within the assessment period.

Kim et al (2007) reviewed outcomes for 43 patients (mean age, 40 years; range, 18 to 68 years) with labral tears and early osteoarthritis (Tonnis grade 0 to 1; average Japanese Orthopedic Association scores, <1 [Japanese Orthopedic Association scale ranges from 0 [severe pain] to 3 [no pain]) and symptoms lasting 3 months or more who had been treated with debridement.[9] At an average 50-month follow-up (range, 12 to 96 months), 74% of patients reported symptom improvement. Blinded evaluation of preoperative radiographs and magnetic resonance arthrograms indicated 42% of patients had femoroacetabular impingement. Patients treated only with debridement were less likely to improve if early-stage osteoarthritis or femoroacetabular impingement was present at the time of surgery (Japanese Orthopedic Association score, 1.67). Patients without either femoroacetabular impingement or osteoarthritis scored 2.6 while patients with femoroacetabular impingement scored 1.83.

A frequently cited paper by Beck et al (2005) with Ganz as coauthor has described the potential relation between hip morphology and acetabular damage.[10] In this report, 26 patients with pure pistol-grip deformity and 16 patients with isolated coxa profunda were identified from 302 hips treated for intra-articular pathology between 1996 and 2001. Among the 26 hips with isolated cam impingement on preoperative radiographs, all showed acetabular cartilage damage in the anterosuperior area of the acetabulum with separation between the acetabular cartilage and the labrum. In the 16 hips with isolated pincer impingement, the damage was located more circumferentially, usually including only a narrow strip of the acetabular cartilage. The report illustrated that, in carefully selected patients with early-stage osteoarthritis and well-defined hip configurations, a strong association exists between specific hip morphology and the pattern of cartilage damage.

Tanzer and Noiseux (2004) reported on 3 separate populations when investigating anterior hip impingement as a common etiology of hip disorders.[11] The 3 populations of interest were patients who had undergone hip arthroscopy for labral tears (n=38), patients who had undergone cheilectomy for anterior femoroacetabular impingement (n=10), and patients who had THA due to idiopathic arthritis (n=200). Radiographic findings showed a pistol-grip deformity in 97% of the patients with labral tears and 100% of the patients with idiopathic arthritis.

Section Summary: Adults With Asymptomatic Femoroacetabular Impingement

There is no direct evidence that performing femoroacetabular impingement surgery on asymptomatic adults with femoroacetabular impingement morphology will prevent the development of osteoarthritis. There is indirect evidence from retrospective studies that patients with cam-type impingement related to a pistol-grip deformity will experience labral damage, which can lead to the subsequent development of osteoarthritis.

Adults with Symptomatic Femoroacetabular Impingement

Clinical Context and Therapy Purpose

The purpose of femoroacetabular impingement surgery is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as conservative management, in adults with symptomatic femoroacetabular impingement.

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals who are adults with symptomatic femoroacetabular impingement. Symptoms of impingement typically occur in young to middle-aged adults before the onset of osteoarthritis but may be present in younger patients with developmental hip disorders.

Interventions

The therapy being considered is femoroacetabular impingement surgery. Femoroacetabular impingement results from localized compression in the joint due to an anatomic mismatch between the head of the femur and the acetabulum. The objective of surgical treatment of femoroacetabular impingement is to provide symptom relief and reduce further joint damage.

Comparators

Comparators of interest include conservative management. Conservative management includes activity changes, non-steroidal anti-inflammatory medications, and physical therapy.

Outcomes

The general outcomes of interest are symptoms, functional outcomes, health status measures, quality of life, and change in disease status.

The existing literature evaluating femoroacetabular impingement surgery as a treatment for patients who are adults with asymptomatic femoroacetabular impingement has varying lengths of follow up. At least 1 year of follow-up is desirable to assess outcomes.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess longer-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.

- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

Surgical options for the treatment of adults with symptomatic femoroacetabular impingement include: open, arthroscopic, mini-open, and mixed open/arthroscopic.

Surgery (nonspecific)

Systematic Reviews

A systematic review and meta-analysis by Reiman et al (2018) evaluated surgery for the treatment of femoroacetabular impingement among athletes as reported in 35 studies (1634 athletes; 1828 hips).[12] Evidence was graded limited to moderate strength. Athletes were reported to return to sport at preinjury level post-intervention at a rate of only 74% (95% confidence interval [CI], 67% to 81%). The mean follow-up post-surgery was 28.1 ± 15.5 months. Professional athletes returned to sport at a higher level than collegiate athletes (p=.0002). It is difficult to assess effects of surgery on athletic performance as only 14% of studies reported on athletic performance before and after surgery.

A Cochrane review by Wall et al (2014) evaluated surgery for the treatment of femoroacetabular impingement, conducting a literature search for randomized and quasi-randomized trials assessing surgical intervention compared with placebo treatment, nonoperative treatment, or no treatment in adults with femoroacetabular impingement.[13] No studies met these inclusion criteria. Four ongoing studies were identified at the time of publication.

A systematic review by Harris et al (2013) evaluating the treatment of femoroacetabular impingement included literature through April 2013, identifying 29 studies (N=2369 patients): 83% had level IV evidence (case series), 14% had level III (cohort), and 3.4% had level I (RCT).[14] An arthroscopic approach was used in 59% of studies. Study interventions included nonoperative treatment, arthroscopy, surgical open dislocation, mixed open/arthroscopic, and mini-open. Both Nonarthritic Hip Score and modified Harris Hip Score (mHHS) values improved significantly, regardless of the surgical procedure, compared with nonsurgical management. Differences between surgical techniques could not be assessed due to heterogeneity across surgical groups and inconsistent outcome measures.

Open Surgery

Systematic Reviews

A systematic review by Bedi et al (2008) evaluated the management of labral tears and femoroacetabular impingement.[15] Seven of the 19 studies assessed were case series of patients with femoroacetabular impingement treated with open hip dislocation.

Observational Studies

Espinosa et al (2006) compared the effect of reattaching (n=35) or removing (n=25) the labrum during treatment for femoroacetabular impingement.[16] Patients were 20 to 40 years of age and had no prior surgery; all had preoperative evidence of acetabular damage. Independent evaluations at 2-year follow-up indicated improved Merle d'Aubigné scores for both groups. The study also reported a reduction in osteoarthritis progression.

Peters and Erickson (2006) reported on 29 patients (30 hips) in a prospective study with minimum 2-year follow-up.[17] The specific diagnoses were primary femoroacetabular impingement in 25 patients (26 hips), Legg-Calve-Perthes disease (n=3), and slipped capital femoral epiphysis (slipped capital femoral epiphysis; n=1). The average age of the patients was 31 years (range, 16 to 51 years). Twenty-nine of the 30 hips had cam-type impingement (n=14) or mixed cam and pincer-type impingement (n=15). The Harris Hip Score improved from 70 at baseline to 87 at an average 32-month follow-up. No progression to osteoarthritis was observed in 68% of patients. There was nonunion in 8 (27%) hips; 5 (17%) hips were expected to convert to THA due to progressive pain, and 4 (13%) had progressed to osteoarthritis. Radiographic signs of progression of osteoarthritis and clinical failure requiring conversion to THA were seen only in patients with severe damage to the acetabular articular cartilage.

Beck et al (2004) reported on 19 of 22 patients (average age, 36 years; range, 21 to 52 years) with confirmed clinical, radiographic, and magnetic resonance arthrographic diagnosis of femoroacetabular impingement, treated with surgical dislocation of the hip.[18] Follow-up duration was at least 4 years. All had labral damage, and 18 had acetabular damage. Using the Merle d'Aubigné hip score, 13 of the hips were rated excellent to good and pain scores improved from 2.9 to 5.1. By the 4- to 5-year follow-up, 5 (26%) patients had undergone THA, due to cartilage damage.

Arthroscopic Surgery

The evidence on arthroscopic surgery for femoroacetabular impingement consists of systematic reviews, RCTs, and stand-alone observational studies.

Systematic Reviews

A systematic review by Jan et al (2023) evaluated 5-year outcomes and survival rate of hip arthroscopy for femoroacetabular impingement syndrome.[19] A total of 15 articles were included, and labral repair was the most commonly performed procedure. The survival rate of hip arthroscopy at 5 years was generally high, with ranges of 0.0% to 17.9% for conversion to total hip arthroplasty (duration, 28.8 to 87.1 months) and 1.3% to 26.7% for revision surgery (duration, 14.8 to 83.7 months). All studies reported statistically significant improvement ($p<.05$) in patient-reported outcomes at the 5-year time point, with the most frequent patient-reported outcome being the mHHS. The authors noted that a lack of prospective data limited the quality of this review and also prevented the meta-analysis of pooled data.

Lamo-Espinosa et al (2023) conducted a systematic review and meta-analysis comparing the efficacy and outcomes of patients with femoroacetabular impingement treated with hip arthroscopy versus physiotherapy with joint lavage.[20] The study included 6 RCTs (N=839). Results show that arthroscopy was superior to physiotherapy with joint lavage at 6 and 12 months in terms of the International Hip Outcome Tool (iHOT)-33 score (mean difference [MD], 3.98 [95% CI, 0.19 to 7.77] and MD, 10.65 [95% CI, 6.54 to 4.76], respectively) and Hip Outcome Score-Activities of Daily Living (HOS-ADL) subscale score (MD, 5.19 [95% CI, 0.77 to 9.61] and MD, 8.09 [95% CI 3.11 to 13.07], respectively). However, this superiority did not exceed the minimum clinically important difference for HOS-ADL. For the outcome of Hip Outcome Score-Sport subscale score (HOS S) at 6 and 12 months, arthroscopy did not exceed the minimum clinically important difference at 6 or 12 months (numerical results were not provided). Concerning safety, hip arthroscopy increased the risk of additional surgery (OR, 11.11; 95% CI, 1.42 to 86.89), osteoarthritis (OR, 6.18; 95% CI, 1.06 to 36.00), and numbness (OR, 73.73; 95% CI, 10.00 to 543.92), while there were no significant differences between groups in the rates of infection or nerve injury.

Dwyer et al (2020) published a systematic review and meta-analysis comparing the efficacy and outcomes of patients with femoroacetabular impingement treated with hip arthroscopy versus physical therapy alone.[21] Reviewers identified 3 RCTs that included 650 patients (323 randomized to surgery; 327 randomized to physical therapy) with a follow-up rate of 90% and mean duration of 11.5 months. Patients treated with arthroscopic surgery had improved scores on the iHOT-33 compared with the nonoperative group (standardized MD, 3.46; 95% CI, 0.07 to 6.86; $p<.05$). The degree of statistical heterogeneity for this result was low ($I^2=41\%$; $p=.18$). Pooled analyses of other outcome measures were conducted due to reporting in 2 or less studies. Casartelli and coworkers (2021) subsequently published a systematic review and meta-analysis assessing the iHOT-33 pooled MD in the same 3 RCTs (10.9; 95% CI, 4.7 to 17.0) and noted that this difference exceeded the minimum clinically important difference of 10 points, favoring hip arthroscopy.[22]

Minkara et al (2018) published a systematic review and meta-analysis analyzing risk factors and outcomes after patients with femoroacetabular impingement had undergone hip arthroscopy.[23] Reviewers identified 29 relevant articles that included 1911 patients (1981 hips). Reviewers conducted a meta-analysis assessing return to play, revision rate, surgical and nonsurgical complications, change in α-angle, intraoperative bone resection, and patient-reported outcome measures after hip arthroscopy in femoroacetabular impingement. However, all but 2 studies (1 RCT, 1 prospective cohort) in the meta-analysis were case series. Reviewers also sought to identify risk factors associated with intervention success and/or failure. The data on reoperation and complication rates are most relevant. The cumulative risk of reoperation after hip arthroscopy, including revision surgery or subsequent THA, was 5.5% (95% CI, 3.6% to 7.5%). For patients requiring a secondary procedure, 77% underwent THA, and 13% required revision arthroscopy. A single study was the source for 19% of patients requiring a second procedure, which assessed hip arthroscopy exclusively among patients who were 50 years of age and older (mean, 57 years; range, 50 to 77 years). The risk of clinically reported complications was 1.7% (95% CI, 0.9% to 2.5%) The most frequent complication was heterotopic ossification, followed by transient neurapraxia, typically of the lateral femoral cutaneous nerve and sciatic nerve.

Kierkegaard et al (2017) published a systematic review and meta-analysis of patients with femoroacetabular impingement who had undergone hip arthroscopy.[24] Outcomes were pain, activities of daily living (ADLs), and sports function. Databases were searched through September 2015. Nineteen studies were included in the meta-analysis (15 case series, 3 cohorts, 1 RCT). The RCT by Krych et al (2013) is described in the next section.[25] The total number of patients included in the 19 studies was 2322 (mean age, 36 years; range, 18 to 57 years) and 42% were women. Weighted MD between pre- and postoperative outcomes were evaluated in the meta-analysis. Detectable pain reduction was achieved in less than 3 months and maintained through 5 years. Improved ADLs were evident between 3 and 6 months and maintained through at least 3 years of follow-up. Sports function improvements were detected between 6 and 12 months after arthroscopy and were maintained through follow-up over several years. Patients who received femoroacetabular impingement continued to have some pain postsurgery.

Randomized Controlled Trials

An RCT comparing arthroscopic labral repair with labral debridement was reported by Krych et al (2013).[25] This nonblinded RCT included 36 females with pincer-type or combined-type femoroacetabular impingement. At a mean 32-month follow-up (range, 12 to 48 months), both treatment groups showed significant improvements in the Hip Outcome Score versus baseline. Compared with the debridement group, the arthroscopic repair group had better outcomes on the HOS-ADL scale (91.2 vs. 80.9) and HOS-S scale (88.7 vs. 76.3). Most patients in the arthroscopic repair group also rated their hip function as normal or nearly normal (94% vs. 78%).

Palmer et al (2025) conducted an assessor-blind RCT comparing arthroscopic surgery to physical therapy in patients (N=222) with femoroacetabular impingement.[26] The primary outcomes were minimum joint space width (mJSW) and HOS-ADL. At 38 months follow up, there was no difference in mJSW between groups. HOS-ADL was higher in the arthroscopy group than in the physical therapy group (84.2 vs 74.2; difference, 8.9; 95% CI, 7.0 to 10.8).

Open Surgery versus Arthroscopic Surgery

Systematic Reviews

Zhang et al (2016) published a systematic review of studies comparing the efficacy and safety of hip arthroscopy with open surgical dislocation for the treatment of femoroacetabular impingement.[27] Five comparative studies published through August 2016 were included, evaluating a total of 352 hips. All studies were considered good or high quality based on the Newcastle-Ottawa Scale. Length of follow-up among the studies ranged from 12 to 25 months. At the 3 month follow-up, patients undergoing open dislocation experienced significant improvements in alpha angle (-4.45; 95% CI, -8.22 to -0.67) compared with patients undergoing arthroscopy, while patients undergoing arthroscopy reported a significantly better Nonarthritic Hip Score (16.58; 95% CI, 9.54 to 23.61) compared with patients undergoing open dislocation. At 12 month follow-up, Nonarthritic Hip Score remained significantly better in the arthroscopy group, though the mHHS and Hip Outcome Score scales for ADLs and sports were equivalent between groups. Complications were also similar between groups, though reoperation rates were significantly lower in patients undergoing arthroscopy (relative risk, 0.4; 95% CI, 0.17 to 0.95).

Nwachukwu et al (2016) published a systematic review and meta-analysis comparing open with arthroscopic surgical techniques for the treatment of femoroacetabular impingement.[28] The literature search included studies published through October 2014, which had a mean follow-up of at least 3 years. Sixteen studies met inclusion criteria - 9 open surgical hip dislocation studies and 7 hip arthroscopy studies. Pooled cohort analyses were conducted on data from 600 hips with a mean follow-up of 58 months from the open surgery studies and 1 484 hips with a mean follow-up of 51 months from the arthroscopy studies. Conversion to THA was the outcome endpoint, with an overall survival rate of 93% for patients undergoing open surgery and 90.5% for patients undergoing arthroscopy (p=.06). Scores on the 12-Item Short Form Health Survey were significantly better among patients undergoing arthroscopy. Direct comparisons of other outcomes were limited by outcome instrument heterogeneity. Both surgical techniques demonstrated favorable outcomes using their respective measuring systems.

Several other systematic reviews comparing open with arthroscopic surgery for femoroacetabular impingement have been identified.[29,30,31] Matsuda et al (2011) included 18 level III or IV studies (controlled cohort or case series) with a minimum 1-year follow-up.[29] Selected were 6 studies using open surgical dislocation, 4 using mini-open procedures, and 8 using arthroscopic studies. All 3 approaches were effective in reducing pain and improving function in short-term to mid-term studies. Open dislocation surgery had a comparatively higher 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. Botser et al (2011) included 26 level II to IV articles totaling 1462 hips in 1 409 patients.[30] Of these, 900 hips were treated arthroscopically, 304 with the open dislocation method, and 258 by the mini-open method. The mean time from onset of symptoms to surgery was 28 months. Overall complication rates were 1.7% for the arthroscopic group, 9.2% for the open surgical dislocation group, and 16% for the combined approach group.

Mini-Open and Mixed Open/Arthroscopic Approaches

The evidence for mixed-open and open/arthroscopic approaches for the treatment of femoroacetabular impingement consists of observational studies. This technique permits direct visualization of the anterior femoral head-neck junction without dislocation.

Observational Studies

Wu et al (2019) reported on a study of anterolateral mini-open and arthroscopic osteochondroplasty in the treatment of cam-type femoroacetabular impingement (36 patients; 39 hips).[32] The mean Harris Hip Score significantly improved from 61.1 to 84.2 (p<.01). Due to the progression of hip osteoarthritis, 9 hips (23%) underwent THA at a mean of 22 months. A survival analysis with the end point of conversion to THA or any revision surgery indicated a 74.9% rate for hip preservation at 5-years.

A study of the mini-open surgical technique performed on 118 patients with femoroacetabular impingement was described by Chiron et al (2012).[33] Fifty-eight percent had cam-type impingement, and 42% had mixed-type impingement. The average follow-up was 2.2 years. Nonarthritic Hip Score, internal rotation, and alpha angles significantly improved following surgery. Eight revisions were performed, 2 patients experienced residual pain and eventually underwent THA, and 2 progressed rapidly to osteoarthritis.

A mixed open/arthroscopic approach for the treatment of femoroacetabular impingement was reported by Laude et al (2009) for 97 patients (100 hips).[34] The average age of patients was 33 years (range, 16 to 56 years). Ninety-one (94%) were available for follow-up at an average 58 months (range, 29 to 104 months). Scores on the Nonarthritic Hip Score improved from 55 at baseline to 84 at the last follow-up. One patient had a femoral neck fracture, 3 weeks postoperatively, and 13 (14%) required revision due to persistent pain. Eleven (12%) hips required THA at a mean of 40 months (range, 5 to 75 months). The best results were observed in patients younger than 40 years with Tonnis grade 0.

Section Summary: Adults With Symptomatic Femoroacetabular Impingement
The evidence for the use of open dislocation for the treatment of adults with symptomatic femoroacetabular impingement consists of systematic reviews of observational studies. The evidence for the use of arthroscopy to treat adults with symptomatic femoroacetabular impingement includes systematic reviews of RCTs and 2 additional RCTs. Systematic reviews comparing open dislocation and arthroscopy have shown that both procedures successfully reduce pain and improve functional outcomes, with arthroscopy showing more favorable satisfaction ratings. Although the evidence is mostly observational, cumulatively, the studies have reported on thousands of patients and outcomes have been positive.

Adolescents and Children with Symptomatic Femoroacetabular Impingement
Clinical Context and Therapy Purpose
The purpose of femoroacetabular impingement surgery is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as conservative management, in children ≤15 years of age with symptomatic femoroacetabular impingement.

The following PICO was used to select literature to inform this review.

Populations
The relevant population of interest is individuals who are children ≤15 years of age with symptomatic femoroacetabular impingement. Symptoms of impingement typically occur in young to middle-aged adults before the onset of osteoarthritis but may be present in younger patients with developmental hip disorders.

Interventions
The therapy being considered is femoroacetabular impingement surgery. Femoroacetabular impingement results from localized compression in the joint due to an anatomic mismatch between the head of the femur and the acetabulum. The objective of surgical treatment of femoroacetabular impingement is to provide symptom relief and reduce further joint damage.

Comparators
Comparators of interest include conservative management. Conservative management includes activity changes, non-steroidal anti-inflammatory medications, and physical therapy.

Outcomes
The general outcomes of interest are symptoms, functional outcomes, health status measures, quality of life, and change in disease status.

The existing literature evaluating femoroacetabular impingement surgery as a treatment for patients who are children ≤15 years of age with symptomatic femoroacetabular impingement has varying lengths of follow up, ranging from 2 to 5 years. At least 1 year of follow-up is desirable to assess outcomes.

Study Selection Criteria
Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;

- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess long-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

The evidence for the surgical management of adolescents and children with symptomatic femoroacetabular impingement consists of a meta-analysis and observational studies.

Systematic Reviews

Huang et al (2022) published a systematic review and meta-analysis evaluating the efficacy of arthroscopic treatment for femoroacetabular impingement syndrome in adolescents.[35] Data from 832 hips in 753 patients (mean age, 16.2 years; mean follow-up, 40.8 months) were retrieved from 6 prospective studies and 7 retrospective studies with moderate to high methodological quality. Following hip arthroscopy, all patient-reported outcomes improved significantly (p<.0001 for all measures). Specifically, 13 studies reported a 26.3-point improvement in the mean weighted mHHS, 9 studies reported a 37.0-point improvement in the HOS-S subscale, 7 studies reported a 23.7-point improvement in the HOS-ADL subscale, 4 studies reported a 23.0-point improvement in the Nonarthritic Hip Score (NAHS), and 5 studies reported a 42.7-point decrease in Visual Analogue Scale (VAS) pain scores. The alpha angle decreased by 22.0° from 62.9° to 40.9° following arthroscopic surgery. Across all studies, complications were reported for 10 hips (1.2%), including 3 cases of transient pudendal nerve neuropraxias, 4 cases of numbness, 2 minor infections, and 1 portal site wound dehiscence. Revision surgery was reported for 28 hips (3.4%), of which 8 (28.6%) were caused by new injuries and 20 (71.4%) were attributed to unrelieved symptoms or complications.

Observational Studies

Guindani et al (2017) published results from patients less than 18 years of age who were retrospectively identified as having undergone surgical dislocation for several indications at a single institution.[36] Among the 51 patients (53 hips) in the study, 18 (34%) hips had a diagnosis of femoroacetabular impingement. Patients with femoroacetabular impingement reported significant improvements in the following pre- and post-measurements: mHHS, Nonarthritic Hip Score, and 12-Item Short Form Health Survey. No significant improvements were found in sphericity deviation score or on alpha angles (both anteroposterior and Lauenstein views).

Nwachukwu et al (2017) reviewed an institutional hip preservation registry of patients with femoroacetabular impingement who underwent hip arthroscopy.[37] The authors sought to define the minimal clinically important difference and the substantial clinical benefit for adolescents undergoing hip arthroscopy. Data from 47 adolescents (68.1% female; mean age, 16.5 years) were obtained on the patients' mHHS, the Hip Outcome Score, and the iHOT. Overall, adolescent patients reported a minimal clinically important difference for the various patient-related outcomes but not substantial clinical benefit. The authors discussed the potential limitations of patient-related outcomes for adolescents compared with adults. They noted that adolescents might have higher expectations and greater physical activity demands that influence their scores.

Included in the Huang et al (2022) meta-analysis was a multicenter prospective study by Tran et al (2013) who assessed arthroscopic treatment for cam-type femoroacetabular impingement in 34 skeletally immature adolescents with open growth plates (41 hips).[38] At a mean follow-up of 14 months (range, 1 to 2 years), mHHS improved from 77.39 to 94.15 and Nonarthritic Hip Score improved from 76.34 to 93.18. Return to full sporting activity was reported by 78% of patients. No complications (e.g., avascular necrosis, slipped capital femoral epiphysis, fracture, growth plate arrest) were observed.

Section Summary: Adolescents and Children With Symptomatic Femoroacetabular Impingement
The evidence consists of a meta-analysis and observational studies. All studies reported favorable outcomes in pain reduction and functional improvements, but all had relatively small sample sizes ranging between 11 and 116 hips per study. No serious adverse events were reported. Studies comparing surgery to conservative management in this population are lacking.

Children with Slipped Capital Femoral Epiphysis-Associated Femoroacetabular Impingement

Clinical Context and Therapy Purpose
The purpose of femoroacetabular impingement surgery is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as surgical repair of slipped capital femoral epiphysis alone, in children ≤15 years of age with slipped capital femoral epiphysis associated femoroacetabular impingement.

The following PICO was used to select literature to inform this review.

Populations
The relevant population of interest is individuals who are children ≤15 years of age with slipped capital femoral epiphysis-associated femoroacetabular impingement.

Interventions
The therapy being considered is femoroacetabular impingement surgery. Femoroacetabular impingement results from localized compression in the joint due to an anatomic mismatch between the head of the femur and the acetabulum. Symptoms of impingement typically occur in young to middle-aged adults before the onset of osteoarthritis but may be present in younger patients with developmental hip disorders. The objective of surgical treatment of femoroacetabular impingement is to provide symptom relief and reduce further joint damage.

Comparators
Comparators of interest include surgical repair of slipped capital femoral epiphysis alone.

Outcomes
The general outcomes of interest are symptoms, functional outcomes, health status measures, quality of life, and change in disease status.

The existing literature evaluating femoroacetabular impingement surgery as a treatment for patients who are children ≤15 years of age with slipped capital femoral epiphysis associated femoroacetabular impingement has varying lengths of follow up. At least 1 year of follow-up is desirable to assess outcomes.

Study Selection Criteria
Methodologically credible studies were selected using the following principles:
- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess longer-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence
Systematic Reviews
Oduwole et al (2017) reviewed 15 case series identified in a literature search from 2005 to 2016 that reported on the efficacy of surgical management in patients with femoroacetabular impingement

secondary to slipped capital femoral epiphysis.[39] A total of 261 patients (266 hips) with mean age ranging between 10.8 to 19 years underwent both arthroscopic and open procedures (arthroscopic osteochondroplasty, 85 patients [88 hips]; surgical hip dislocation, 131 patients [133 hips]; open osteotomy, 45 patients [45 hips]). Mean alpha angle corrections observed for arthroscopy were 32.14°; for surgical hip dislocation, 41.45°; and for open osteotomy, 6.0° ($p<.05$). Surgical hip dislocation resulted in the most improved correction of the alpha angle.

Observational Studies

Guindani et al (2017) published results for patients less than 18 years of age undergoing surgical dislocation for several indications.[36] Among the 51 patients (53 hips) in the study, 13 (24%) hips had the diagnosis of slipped capital femoral epiphysis. Mean age at surgery for the whole population was 14 years and mean follow-up was 3 years. Outcomes postsurgery differed by indication. Slipped capital femoral epiphysis patients reported significant improvements in the following pre- and postmeasurements: Nonarthritic Hip Score and alpha angles (both anteroposterior and Lauenstein views). No significant improvements were found in mHHS, 12-Item Short Form Health Survey, or sphericity deviation scores.

Sink et al (2010) retrospectively reviewed data from 2 United States centers evaluating 36 patients (39 hips) with stable slipped capital femoral epiphysis who were treated with open surgical hip dislocation for chronic symptoms.[40] The average time between in situ pinning and surgical hip dislocation was 20 months (range, 6 to 48 months). Most patients had partial or complete relief of symptoms immediately after initial pinning followed by a recurrence of symptoms consistent with impingement. All but 1 patient had either a labral or a cartilage injury, with labral injury observed in 34 of 39 hips and cartilage injury in 33 of 39 hips; the average depth of cartilage damage was 5 mm (range, 2 to 10 mm). There was no correlation between slip severity or duration of symptoms and the type of cartilage injury.

Ziebarth et al (2009) with Ganz as coauthor conducted a joint 2-center retrospective review that assessed data from their Swiss institution (n=30) and a children's hospital in Boston (n=10). Follow-up was 1 to 8 years for patients between 9 and 18 years of age with moderate-to-severe slipped capital femoral epiphysis who were treated with surgical dislocation.[41] No patients from either institution developed osteonecrosis, infection, deep venous thrombosis, or nerve palsies. Three patients developed delayed unions; none developed nonunions. Five patients required additional surgery for heterotopic ossification (n=1), residual impingement (n=1), or breakage of screw or wire fixation (n=3). The short-term postoperative clinical outcomes were found to be near normal, with similar scores between the operative and nonoperative hips.

As reported by Spencer et al (2006), the same United States institution evaluated 19 patients (age range, 12 to 43 years) who underwent femoral neck osteoplasty (n=13) or osteoplasty with intertrochanteric osteotomy (n=6) via Ganz-type surgical dislocation.[42] Of 12 patients with a history of slipped capital femoral epiphysis (age range, 12 to 38 years), 9 reported improved symptom control at 8- to 25-month follow-up. Of the 7 patients (age range, 17 to 43 years) without slipped capital femoral epiphysis who underwent open surgical dislocation for pistol-grip deformities, 5 reported worse symptoms or minimal relief. Outcomes for patients with a chondral flap were worse than for patients without a chondral flap.

Section Summary: Children with Slipped Capital Femoral Epiphysis-Associated Femoroacetabular Impingement

The evidence for the use of femoroacetabular impingement surgical management for children with slipped capital femoral epiphysis associated femoroacetabular impingement consists of a systematic review and observational studies. Currently, there is no method to determine which children with slipped capital femoral epiphysis will develop femoroacetabular impingement. While most patients experienced symptom relief following femoroacetabular impingement surgery, the surgery is invasive and complications (e.g., delayed union) have been reported.

Revision Arthroscopic Surgery

Clinical Context and Therapy Purpose

The purpose of revision arthroscopic surgery is to provide a treatment option that is an alternative to or an improvement on existing therapies, such as conservative management, in individuals with residual femoroacetabular impingement symptoms following primary surgery.

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with residual femoroacetabular impingement symptoms following primary surgery.

Interventions

The therapy being considered is revision arthroscopic surgery. The objective of surgical treatment of femoroacetabular impingement is to provide symptom relief and reduce further joint damage.

Comparators

Comparators of interest include conservative management. Conservative management includes activity changes, non-steroidal anti-inflammatory medications, and physical therapy.

Outcomes

The general outcomes of interest are symptoms, functional outcomes, health status measures, quality of life, and change in disease status.

The existing literature evaluating revision arthroscopic surgery as a treatment for residual femoroacetabular impingement symptoms following primary surgery has varying lengths of follow-up. While studies described below all reported at least 1 outcome of interest, longer follow-up was necessary to fully observe outcomes. At least 1 year of follow-up is desirable to adequately assess outcomes.

Study Selection Criteria

Methodologically credible studies were selected using the following principles:

- To assess efficacy outcomes, comparative controlled prospective trials were sought, with a preference for RCTs;
- In the absence of such trials, comparative observational studies were sought, with a preference for prospective studies.
- To assess longer-term outcomes and adverse events, single-arm studies that capture longer periods of follow-up and/or larger populations were sought.
- Studies with duplicative or overlapping populations were excluded.

Review of Evidence

Systematic Reviews

O'Connor et al (2020) published a systematic review and meta-analysis on revision hip arthroscopy, which included 15 studies for review identifying 4765 hips in 4316 patients.[43] The most common indication for revision surgery was inadequate bony resection during the index procedure. Meta-analysis indicated significant improvements of patient-reported outcomes from baseline to final follow-up after revision surgery based on the mHHS (increase of 17.20 points), the HOS-ADL (improvement by 13.98 points), and the VAS (decrease of 3.16 points). However, while patient-reported outcomes improved significantly after revision, they remained lower than those of patients undergoing primary hip arthroscopic surgery.

Sardana et al (2015) published a systematic review on revision hip arthroscopy, considering articles published through July 2014.[44] Three prospective case-control studies and 3 retrospective chart reviews, providing information on 448 hips, were selected. The most common indications for revision surgery were residual femoroacetabular impingement, labral tears, and chondral lesions. The mean interval between index and revision procedures was 25.6 months (range, 20.5 to 36 months). Patients most often requiring revision surgery were women (60%) and younger patients (mean age, 33.4 years). Revision hip arthroscopy improved functional outcomes (33.6% improvement in Harris Hip Score) and pain relief. Reviewers noted that the studies were low-quality (level III and IV).

A systematic review by Cvetanovich et al (2015) evaluated revision hip arthroscopy.[45] Reviewers included 5 studies, with a total of 348 revision hip arthroscopies. The mean age of patients was 31.4 years, and 60% were female. The mean interval between index and revision procedures was 27.8 months. The most common indication for revision surgery was residual femoroacetabular impingement (81%). At a mean of 22.4-month follow-up, revision hip arthroscopy resulted in improved functional outcomes, as measured by the Harris Hip Score (weighted MD, 56.8 preoperative vs. 72.0; p=.01), Nonarthritic Hip Score, Hip Outcome Score, and 12-Item Short Form Health Survey.

Section Summary: Revision Arthroscopic Surgery

The evidence for revision arthroscopic surgery for patients with residual femoroacetabular impingement symptoms consists of 3 systematic reviews of observational studies. The observational studies, although low-quality, showed consistently favorable functional outcomes following revision surgery. The evidence for revision arthroscopic surgery for children consists of 1 observational study. Results have shown that children receiving revision surgery have functional outcomes comparable to children receiving primary arthroscopic surgery.

Supplemental Information

The purpose of the following information is to provide reference material. Inclusion does not imply endorsement or alignment with the evidence review conclusions.

Clinical Input From Physician Specialty Societies and Academic Medical Centers

While the various physician specialty societies and academic medical centers may collaborate with and make recommendations during this process, through the provision of appropriate reviewers, input received does not represent an endorsement or position statement by the physician specialty societies or academic medical centers, unless otherwise noted.

2009 Input

In response to requests, input was received from 2 physician specialty societies (3 reviewers) and 2 academic medical centers while this policy was under review in 2009. All input supported the use of open or arthroscopic surgery as an appropriate treatment for femoroacetabular impingement in selected patients when conservative treatment has failed.

Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion in 'Supplemental Information' if they were issued by, or jointly by, a U.S. professional society, an international society with U.S. representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

American Academy of Orthopaedic Surgeons

In 2020, the American Academy of Orthopaedic Surgeons published a consensus-based best practice guidelines checklist for preoperative, intraoperative, and postoperative hip arthroscopy considerations in patients with femoroacetabular impingement.[46]

The guidelines define conservative care treatment as a trial of rest, non-steroidal anti-inflammatory drugs, activity modification or restriction, and physical therapy - without concomitant use of opioids. Prior to completion of the full duration of conservative treatment, assessment of the following joint parameters is recommended: high alpha angle, low Tönnis grade, cam or combined impingement, large range of motion limitations with pain, high baseline mental health status, large cam (>65° alpha angle) or combined deformity in absence of osteoarthritis changes. A shorter duration of conservative treatment is permissible in professional or out-of-season athletes, patients completing physical therapy with no or marginal improvement, high baseline mental health status, and/or successful surgery on the contralateral side. Contraindications for hip arthroscopy include: joint space narrowing <2 mm along the sourcil or osteoarthritis, Tönnis grade 2 or higher, severe femoral retroversion or anteversion with gait abnormality, obesity hindering access, broken Shenton line, pain not localizing to the hip or out of proportion due to psychiatric issue, inclination Tönnis angle >13 to 15°, or failed arthroscopy with dysplastic features. Hypermobility (Beighton Hypermobility Score ≥5) is not considered a contraindication for hip arthroscopy.

National Institute for Health and Care Excellence

In 2011, the NICE issued guidance on arthroscopic femoroacetabular surgery for hip impingement syndrome.[47] The NICE considered the evidence on the efficacy of arthroscopic femoroacetabular surgery for hip impingement syndrome to be adequate for symptom relief in the short and medium term.

The NICE (2011) guidance on open femoroacetabular surgery for hip impingement syndrome indicated that evidence for this procedure was adequate for symptom relief in the short and medium term.[48]

U.S. Preventive Services Task Force Recommendations

Not applicable.

Medicare National Coverage

There is no national coverage determination. In the absence of a national coverage determination, coverage decisions are left to the discretion of local Medicare carriers.

Ongoing and Unpublished Clinical Trials

Some currently ongoing and unpublished trials that might influence this review are listed in Table 1.

Table 1. Summary of Key Trials

NCT No.	Trial Name	Planned Enrollment	Completion Date
Ongoing			
NCT04243447	Identification of Predictors for Clinical Outcomes in Femoroacetabular Impingement Surgery (DoD FAI-2)	800	Sep 2025
NCT02692807	Arthroscopic Surgical Procedures Versus Sham Surgery for Patients with Femoroacetabular Impingement and/or Labral Tears: A Multicenter, International, Double-Blinded, Randomized Controlled Trial (HIPARTI)	140	Dec 2035
NCT05746533[a]	A Comparison of Total Hip Arthroplasty and Hip Preservation Outcomes	10,000	Jun 2053 (recruiting)

NCT: national clinical trial.
[a] Denotes industry-sponsored or cosponsored trial.

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Documentation for Clinical Review

Please provide the following documentation:

- History and physical and/or consultation report including:
  - Imaging reports for the past six months and any applicable reports prior to that time
  - Previous treatment/trial of conservative therapy and response
  - Radiological report documenting closure of growth plates, if applicable
  - Symptoms and findings supporting the diagnosis of FAI

Post Service (in addition to the above, please include the following):

- Operative report(s)

Coding

The list of codes in this Medical Policy is intended as a general reference and may not cover all codes. Inclusion or exclusion of a code(s) does not constitute or imply member coverage or provider reimbursement policy.

Type	Code	Description
CPT®	29914	Arthroscopy, hip, surgical; with femoroplasty (i.e., treatment of cam lesion)
	29915	Arthroscopy, hip, surgical; with acetabuloplasty (i.e., treatment of pincer lesion)
	29916	Arthroscopy, hip, surgical; with labral repair
HCPCS	None	

Policy History

This section provides a chronological history of the activities, updates and changes that have occurred with this Medical Policy.

Effective Date	Action
12/01/2025	New policy.
06/01/2026	Administrative update. Definitions of Decision Determinations section updated.

Definitions of Decision Determinations

Healthcare Services: For the purpose of this Medical Policy, Healthcare Services means procedures, treatments, supplies, devices, and equipment.

Medically Necessary or **Medical Necessity** means reasonable and necessary services to protect life, to prevent significant illness or significant disability, or alleviate severe pain through the diagnosis or treatment of disease, illness, or injury, as required under W&I section 14059.5(a) and 22 CCR section 51303(a). Medically Necessary services must include services necessary to achieve age-appropriate growth and development, and attain, maintain, or regain functional capacity.

For Members less than 21 years of age, a service is Medically Necessary if it meets the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) standard of Medical Necessity set forth in 42 USC section 1396d(r)(5), as required by W&I sections 14059.5(b) and 14132(v). Without limitation, Medically Necessary services for Members less than 21 years of age include all services necessary to achieve or maintain age-appropriate growth and development, attain, regain or maintain functional capacity, or improve, support, or maintain the Member's current health condition. Contractor must determine Medical Necessity on a case-by-case basis, taking into account the individual needs of the Child.

Criteria Determining Experimental/Investigational Status
Below is an excerpt of the language taken from California Children's Services Numbered Letter 05-1020.*

*Department of Healthcare Services Numbered Letter 05-1020. Accessed April 21, 2026, from https://www.dhcs.ca.gov/services/ccs/Documents/CCS-NL-05-1020-Experimental-and-Investigational-Services.pdf

Policy

A. The California Children's Services (CCS) Program and the Genetically Handicapped Persons Program (GHPP) will not provide coverage for experimental services unless specifically authorized by law.
B. The CCS Program and GHPP may provide coverage for an investigational service if:
   1. It is approved by the FDA under any Investigational New Drug (IND) Application; or
   2. It is authorized for use under the State of California's Right to Try Act; and

   3. Its use is consistent with its FDA-approved IND Application or the State of California's Right to Try Act;
- C. Additional criteria that will be considered in the adjudication process include:
   1. Conventional therapy will not adequately treat the intended patient's condition;
   2. Conventional therapy will not prevent progressive disability or premature death;
   3. The provider of the proposed service has a record of safety and success with it or equivalent to that of other providers of the investigational services;
   4. Other criteria (e.g., cost and availability) may be considered in the adjudication of a given request in cases in which more than one investigational service is available;
   5. There is reasonable expectation that the investigational service will significantly prolong the patient's life or will maintain or restore a range of physical and social function suited to activities of daily living; and
   6. The service is not being performed as part of a research study protocol. For a beneficiary with cancer who participates in a clinical trial for cancer, California Health and Safety Code (HSC) § 1370.6 requires that all routine patient care costs related to the clinical trial be covered if the beneficiary's CCS-paneled treating physician recommends participation in the clinical trial after determining that participation in the clinical trial has a meaningful potential to benefit the enrollee. The coverage does not include investigational services that have not been approved by the FDA and that are associated with the clinical trial.

Feedback

Blue Shield of California Promise Health Plan is interested in receiving feedback relative to developing, adopting, and reviewing criteria for medical policy. Any licensed practitioner who is contracted with Blue Shield of California Promise Health Plan is welcome to provide comments, suggestions, or concerns. Our internal policy committees will receive and take your comments into consideration. Our medical policies are available to view or download at www.blueshieldca.com/en/bsp/providers.

For medical policy feedback, please send comments to: MedPolicy@blueshieldca.com

Questions regarding the applicability of this policy should be directed to the Blue Shield of California Promise Health Plan Prior Authorization Department at (800) 468-9935, or the Complex Case Management Department at (855) 699-5557 (TTY 711) for San Diego County and (800) 605-2556 (TTY 711) for Los Angeles County or visit the provider portal at www.blueshieldca.com/en/bsp/providers.

Disclaimer: Blue Shield of California Promise Health Plan may consider published peer-reviewed scientific literature, national guidelines, and local standards of practice in developing its medical policy. Federal and state law, as well as member health services contract language, including definitions and specific contract provisions/exclusions, take precedence over medical policy and must be considered first in determining covered services. Member health services contracts may differ in their benefits. Blue Shield of California Promise Health Plan reserves the right to review and update policies as appropriate.