



CLINICAL GUIDELINES

CMM-314: Hip Surgery-Arthroscopic and Open Procedures

Version 1.0.2023
Effective May 31, 2023



eviCore healthcare Clinical Decision Support Tool Diagnostic Strategies: This tool addresses common symptoms and symptom complexes. Requests for individuals with atypical symptoms or clinical presentations that are not specifically addressed will require physician review. Consultation with the referring physician, specialist and/or individual's Primary Care Physician (PCP) may provide additional insight.

eviCore's Clinical Review Criteria ("CRC") and related content is made available for the limited uses of: reference; and individual use, only limited to facilitating the determination of medically necessary and appropriate clinical treatment by clinicians for specific delegated patients under their care. The CRC and related content is proprietary information of eviCore, and copyrighted to the full extent of the law. Except as expressly permitted, you may not modify, copy, reproduce, republish, upload, post, transmit, hyperlink to or from, or distribute in any way the CRC, nor may you sell, transfer, distribute, assign, lease, reproduce, or otherwise use the CRC in commerce, in a manner that competes with us or infringes upon our rights, or for any public or commercial endeavor without our prior and express written consent.

CPT® (Current Procedural Terminology) is a registered trademark of the American Medical Association (AMA). CPT® five digit codes, nomenclature and other data are copyright 2023 American Medical Association. All Rights Reserved. No fee schedules, basic units, relative values or related listings are included in the CPT® book. AMA does not directly or indirectly practice medicine or dispense medical services. AMA assumes no liability for the data contained herein or not contained herein.

Clinical guidelines for medical necessity review of Comprehensive Musculoskeletal Management Services.

© 2023 eviCore healthcare. All rights reserved.

CMM-314: Hip Surgery-Arthroscopic and Open Procedures

Definitions**General Guidelines****Labral Repair or Reconstruction****Arthroscopic or Open Hip Surgery for Femoroacetabular Impingement (FAI)****Arthroscopic or Open Hip Surgery for Avascular Necrosis (AVN)****Synovectomy****Procedures and Conditions Not Addressed Elsewhere****Procedure (CPT®) Codes****References**

Definitions

- **Femoroacetabular Impingement (FAI):** an anatomical mismatch between the head of the femur and the acetabulum resulting in 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 (for example, 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 FAI without symptoms, FAI 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.
 - ◆ It has been proposed that impingement with damage to the labrum and/or acetabulum is a causative factor in the development of hip osteoarthritis, and that as many as half of cases currently categorized as primary osteoarthritis may have an etiology of FAI.
 - ◆ There are two types of FAI that may occur alone or more frequently together: CAM impingement and pincer impingement.
 - **CAM impingement** is associated with an asymmetric or non-spherical contour of the head or neck of the femur jamming against the acetabulum, resulting in cartilage damage, delamination (detachment from the subchondral bone), and secondary damage to the labrum. 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 is most typically found in women of middle age. In cases of isolated pincer impingement, the labrum is affected primarily, and cartilage damage may be limited to a narrow strip of the acetabular cartilage.
- **Non-surgical management** (with regard to the treatment of hip pain): any provider-directed non-surgical treatment, which has been demonstrated in the scientific literature as efficacious and/or is considered reasonable care in the treatment of hip pain. The types of treatment involved can include, but are not limited to: relative rest/activity modification, weight loss, supervised physiotherapy modalities and therapeutic exercises, prescription and non-prescription medications, assistive devices (e.g., cane, crutches, walker, wheelchair), and/or intra-articular injections (e.g., steroid, ketorolac, and/or viscosupplementation).
- **Tönnis angle:** the inclination of the weight-bearing portion of the acetabulum.
- **Tönnis Classification System:** a commonly used system to describe the presence of osteoarthritis in the hips on plain x-rays with grading as follows:
 - ◆ Grade 0: No signs of osteoarthritis
 - ◆ Grade 1: Sclerosis of the joint with slight joint space narrowing and osteophyte formation, and no or slight loss of femoral head sphericity
 - ◆ Grade 2: Small cysts in the femoral head or acetabulum with moderate joint space narrowing and moderate loss of femoral head sphericity

- ◆ Grade 3: Large cysts in the femoral head or acetabulum, severe joint space narrowing or obliteration of the joint space, and severe deformity and loss of sphericity of the femoral head

General Guidelines

Application of Guideline

- The determination of medical necessity for the performance of arthroscopic or open hip surgery is always made on a case-by-case basis.
- For advanced imaging indications for labral tear refer to **MS-24: Hip**
- For advanced imaging indications for femoroacetabular impingement (FAI) refer to **MS-24: Hip**
- For advanced imaging indications for avascular necrosis of the femoral head refer to **MS-4: Avascular Necrosis (AVN)/Osteonecrosis** and **MS-24: Hip**

Arthroscopic or Open Procedure for Fracture, Tumor, Infection, or Foreign Body

- Hip arthroscopic or open procedures may be considered **medically necessary** for individuals for whom surgery is being performed for fracture, tumor, deformity, infection, or foreign body that has led to or will likely lead to progressive destruction.

Labral Repair or Reconstruction

Labral Repair or Reconstruction Indications

- Labral repair or reconstruction to address labral pathology is considered **medically necessary** when **ALL** of the following criteria are met:
 - ◆ Mechanical symptoms of the hip (e.g., catching, locking, or giving way) associated with groin-dominant hip pain that significantly limits activities
 - ◆ **ANY** of the following positive provocative tests for intra-articular hip pathology on physical examination:
 - Anterior impingement sign (i.e., hip or groin pain with forced hip flexion, adduction, and internal rotation)
 - FABER test (i.e., hip or groin pain with forced flexion, abduction, and external rotation)
 - Fitzgerald test (i.e., hip or groin pain with extension, internal rotation, and adduction from forced hip flexion, abduction, and external rotation or with extension, external rotation, and abduction from forced hip flexion, adduction, and internal rotation)
 - ◆ Unresponsive to at least three (3) months of provider-directed non-surgical treatment which must include an image-guided intra-articular hip injection with local anesthetic with or without corticosteroid to which there was not a negative response
 - ◆ An advanced diagnostic imaging study confirming labral pathology amenable to surgical management
 - ◆ Documented presence of **EITHER** of the following:

- Tönnis grade 0 osteoarthritis (i.e., no signs of osteoarthritis)
- Tönnis grade 1 osteoarthritis (i.e., sclerosis of the joint with slight joint space narrowing and osteophyte formation, and no or slight loss of femoral head sphericity)
- ◆ Documented absence of **BOTH** of the following:
 - Tönnis grade 2 osteoarthritis (i.e., small cysts in femoral head or acetabulum with moderate joint space narrowing [i.e., < 2mm wide on plain radiographs of the pelvis] and moderate loss of femoral head sphericity)
 - Tönnis grade 3 osteoarthritis (i.e., large cysts in the femoral head or acetabulum, severe joint space narrowing [e.g., bone-on-bone] or obliteration of the joint space, and severe deformity and loss of sphericity of the femoral head)

Labral Repair or Reconstruction Non-Indications

- Labral repair or reconstruction is considered **not medically necessary** for **ANY** other indication or condition.

Arthroscopic or Open Hip Surgery for Femoroacetabular Impingement (FAI)

Arthroscopic or Open Hip Surgery for Femoroacetabular Impingement (FAI) Indications

- Arthroscopic or open hip surgery for femoroacetabular impingement (FAI) is considered medically necessary when **ALL** of the following criteria have been met:
 - ◆ Groin-dominant hip pain that is worsened by flexion (e.g., squatting or prolonged sitting) and significantly limits activities
 - ◆ Positive anterior impingement sign (i.e., groin-dominant hip pain with forced hip flexion, adduction, and internal rotation) on physical examination
 - ◆ Limited passive hip internal rotation on physical examination
 - ◆ Unresponsive to at least three (3) months of provider-directed non-surgical treatment which must include an image-guided intra-articular hip injection with local anesthetic with or without corticosteroid to which there was not a negative response
 - ◆ **ANY** of the following radiographic findings to confirm FAI:
 - Alpha angle greater than 55 degrees
 - Pistol-grip deformity
 - Decrease of femoral head-neck offset
 - Acetabular retroversion (i.e., crossover sign, ischial spine sign)
 - Coxa profunda
 - ◆ Documented presence of **EITHER** of the following:
 - Tönnis grade 0 osteoarthritis (i.e., no signs of osteoarthritis)
 - Tönnis grade 1 osteoarthritis (i.e., sclerosis of the joint with slight joint space narrowing and osteophyte formation, and no or slight loss of femoral head sphericity)
 - ◆ Documented absence of **BOTH** of the following:

- Tönnis grade 2 osteoarthritis (i.e., small cysts in femoral head or acetabulum with moderate joint space narrowing [i.e., < 2mm wide on plain radiographs of the pelvis] and moderate loss of femoral head sphericity)
- Tönnis grade 3 osteoarthritis (i.e., large cysts in the femoral head or acetabulum, severe joint space narrowing [e.g., bone-on-bone] or obliteration of the joint space, and severe deformity and loss of sphericity of the femoral head)

Arthroscopic or Open Hip Surgery for Femoroacetabular Impingement (FAI) Non-Indications

- Arthroscopic or open hip surgery for femoroacetabular impingement (FAI) is considered **not medically necessary** for **ANY** other indication or condition, including **ANY** of the following radiographic findings on plain x-ray:
 - ◆ Joint space narrowing < 2mm along the sourcil
 - ◆ Tönnis grade 2 or higher
 - ◆ Severe femoral retroversion or anterversion with gait abnormality
 - ◆ Broken Shenton line
 - ◆ Inclination Tönnis angle > 13-15 degrees

Arthroscopic or Open Hip Surgery for Avascular Necrosis (AVN)

Arthroscopic or Open Hip Surgery for Avascular Necrosis (AVN) Indications

- Arthroscopic or open hip surgery for avascular necrosis (AVN) of the femoral head is considered **medically necessary** when an individual has **ALL** of the following criteria:
 - ◆ **ONE** of the following hip procedures is planned:
 - Core decompression
 - Varus rotational osteotomy
 - Valgus flexion osteotomy
 - Curettage and bone grafting through the Mont trapdoor technique or the Merel D'Aubigne light bulb technique
 - Free vascularized fibular graft (FVFG)
 - ◆ **ANY** of the following symptoms or examination findings of avascular necrosis of the femoral head:
 - Deep pain in groin
 - Pain associated with movement or weight-bearing
 - Limited rotation of hip in both extension and flexion
 - Antalgic gait
 - Mechanical symptoms of the hip (e.g., catching, locking, or giving way) associated with groin-dominant hip pain that significantly limits activities
 - ◆ Imaging shows **ONE** of the following:
 - For core decompression:
 - MRI or x-ray findings of cystic or sclerotic changes without subchondral fracture of the femoral head (i.e., pre-collapse)
 - For varus rotational osteotomy:

- MRI findings of a small lesion in which the lesion can be rotated away from a weight-bearing surface
- For valgus flexion osteotomy:
 - MRI findings of anterolateral disease
- For curettage and bone grafting through the Mont trapdoor technique or the Merel D'Aubigne light bulb technique:
 - MRI findings of pre-collapse
- For free vascularized fibular graft (FVFG):
 - MRI findings of either pre-collapse or collapsed avascular necrosis of the femoral head in young individuals with a reversible etiology

Arthroscopic or Open Hip Surgery for Avascular Necrosis (AVN) Non-Indications

- Arthroscopic or open hip surgery for avascular necrosis (AVN) of the femoral head is considered **not medically necessary** for **ANY** other indication or condition.

Synovectomy

Synovectomy Indications

- Synovectomy is considered **medically necessary** when **ALL** of the following criteria have been met:
 - ◆ Function-limiting pain (e.g., loss of hip function which interferes with the ability to carry out age appropriate activities of daily living and/or demands of employment)
 - ◆ Any **ONE** of the following physical examination findings:
 - Limited range of motion
 - Evidence of joint swelling/effusion
 - ◆ Failure of provider-directed non-surgical management for at least three (3) months in duration
 - ◆ MRI or CT arthrogram demonstrates evidence of synovitis
 - ◆ Presence of any **ONE** of the following:
 - Inflammatory arthritis (i.e., rheumatoid arthritis, gout, pseudogout, psoriatic arthritis)
 - Pigmented villonodular synovitis (PVNS)
 - Synovial chondromatosis
 - Lyme synovitis
 - Hemochromatosis
 - Recurrent hemarthrosis (i.e., secondary to sickle cell anemia, bleeding diathesis, hemophilia)

Synovectomy Non-Indications

- Synovectomy is considered **not medically necessary** for **ANY** other indication or condition.

Procedures and Conditions Not Addressed Elsewhere

- Arthroscopic or open hip surgery is considered **medically necessary** for **ANY** of the following:

- ◆ Acute fracture of the hip (femoral or acetabular)
- ◆ Malunion of a previous fracture
- ◆ Acute or post-traumatic injury in which there is a correlation between examination and diagnostic imaging findings confirming a condition which is reasonably suspected of producing the individual's severe pain and limitation in function
- ◆ Tumor, infection, foreign body, or other deformity (e.g., in conjunction with a periacetabular osteotomy for hip dysplasia) that has led to or will likely lead to progressive destruction
- ◆ Synovial biopsy
- ◆ Irrigation and debridement of an intra-articular joint space infection
- ◆ Removal of a radiographically-confirmed ossific or osteochondral loose body
- Arthroscopic or open hip surgery is considered **experimental, investigational, or unproven (EIU)** for **ANY** other indication or condition, including:
 - ◆ Capsular plication
 - ◆ Anterior inferior iliac spine/subspinous decompression
 - ◆ In-office diagnostic arthroscopy (e.g., Mi-Eye™, VisionScope®)

Procedure (CPT®) Codes

This guideline relates to the CPT® code set below. Codes are displayed for informational purposes only.

Any given code's inclusion on this list does not necessarily indicate prior authorization is required.

CPT®	Code Description/Definition
26990	Incision and drainage, pelvis or hip joint area; deep abscess or hematoma
26991	Incision and drainage, pelvis or hip joint area; infected bursa
26992	Incision, bone cortex, pelvis and/or hip joint (e.g. osteomyelitis or bone abscess)
27000	Tenotomy, adductor of hip, percutaneous (separate procedure)
27001	Tenotomy, adductor of hip, open
27003	Tenotomy, adductor, subcutaneous, open, with obturator neurectomy
27005	Tenotomy, hip flexor(s), open (separate procedure)
27006	Tenotomy, abductors and/or extensor(s) of hip, open (separate procedure)
27025	Fasciotomy, hip or thigh, any type
27027	Decompression fasciotomy(ies), pelvic (buttock) compartment(s) (e.g., gluteus medius-minimus, gluteus maximus, iliopsoas, and/or tensor fascia lata muscle), unilateral
27030	Arthrotomy, hip, with drainage (e.g. infection)
27033	Arthrotomy, hip, including exploration or removal of loose or foreign body
27035	Denervation, hip joint, intrapelvic or extrapelvic intra-articular branches of sciatic, femoral, or obturator nerves
27036	Capsulectomy or capsulotomy, hip, with or without excision of heterotopic bone, with release of hip flexor muscles (i.e. gluteous medius, gluteus minimus, tensor fascia latae, rectus femoris, sartorius, iliopsoas).
27040	Biopsy, soft tissue of pelvis and hip area; superficial
27041	Biopsy, soft tissue of pelvis and hip area; deep, subfascial or intramuscular
27043	Excision, tumor, soft tissue of pelvis and hip area, subcutaneous; 3 cm or greater
27045	Excision, tumor, soft tissue of pelvis and hip area, subfascial (e.g. intramuscular); 5 cm or greater
27047	Excision, tumor, soft tissue of pelvis and hip area, subcutaneous; less than 3 cm
27048	Excision, tumor, soft tissue of pelvis and hip area, subfascial (e.g. intramuscular); less than 5 cm
27049	Radical resection of tumor (e.g. sarcoma), soft tissue of pelvis and hip area; less than 5 cm
27050	Arthrotomy, with biopsy; sacroiliac joint
27052	Arthrotomy, with biopsy; hip joint
27054	Arthrotomy, with synovectomy, hip joint
27057	Decompression fasciotomy(ies), pelvic(buttock) compartment(s) (e.g. gluteus medius- minimus, gluteus maximus, iliopsoas, and/or tensor fascia lata muscle) with debridement of nonviable muscle, unilateral
27059	Radical resection of tumor (e.g. sarcoma), soft tissue of pelvis and hip area; 5cm or greater
27060	Excision; ischial bursa
27062	Excision; trochanteric bursa or calcification

27065	Excision of bone cyst or benign tumor, wing of ilium, symphysis pubis, or greater trochanter of femur; superficial, includes autograft, when performed
27066	Excision of bone cyst or benign tumor, wing of ilium, symphysis pubis, or greater trochanter of femur; deep (subfascial), includes autograft, when performed
27067	Excision of bone cyst or benign tumor, wing of ilium, symphysis pubis, or greater trochanter of femur; with autograft requiring separate incision
27070	Partial excision, wing of ilium, symphysis pubis, or greater trochanter of femur, (craterization, saucerization) (e.g. osteomyelitis or bone abscess); superficial
27071	Partial excision, wing of ilium, symphysis pubis, or greater trochanter of femur, (craterization, saucerization) (e.g. osteomyelitis or bone abscess); deep (subfascial or intramuscular)
27075	Radical resection of tumor; wing of ilium, 1 pubic or ischial ramus or symphysis pubis
27076	Radical resection of tumor; ilium, including acetabulum, both pubic rami, or ischium and acetabulum.
27077	Radical resection of tumor; innominate bone, total
27078	Radical resection of tumor; ischial tuberosity and greater trochanter of femur
27080	Coccygectomy, primary
27086	Removal of foreign body, pelvis or hip; subcutaneous tissue
27087	Removal of foreign body, pelvis or hip; deep (subfascial or intramuscular)
27097	Release or recession, hamstring, proximal
27098	Transfer, adductor to ischium
27100	Transfer external oblique muscle to greater trochanter including fascial or tendon extension (graft)
27105	Transfer paraspinal muscle to hip (includes fascial or tendon extension graft)
27110	Transfer iliopsoas; to greater trochanter of femur
27111	Transfer iliopsoas; to femoral neck
27140	Osteotomy and transfer of greater trochanter of femur (separate procedure)
27146	Osteotomy, iliac, acetabular or innominate bone
27147	Osteotomy, iliac, acetabular or innominate bone; with open reduction of hip
27151	Osteotomy, iliac, acetabular or innominate bone; with femoral osteotomy
27156	Osteotomy, iliac, acetabular or innominate bone; with femoral osteotomy and with open reduction of hip
27158	Osteotomy, pelvis, bilateral (e.g., congenital malformation)
27161	Osteotomy, femoral neck (separate procedure)
27165	Osteotomy, intertrochanteric or subtrochanteric including internal or external fixation and/or cast
27170	Bone graft, femoral head, neck, intertrochanteric or subtrochanteric area (includes obtaining bone graft)
27175	Treatment of slipped femoral epiphysis; by traction, without reduction
27176	Treatment of slipped femoral epiphysis; by single or multiple pinning, in situ
27177	Open treatment of slipped femoral epiphysis; single or multiple pinning or bone graft (includes obtaining graft)
27178	Open treatment of slipped femoral epiphysis; closed manipulation with single or multiple pinning
27179	Open treatment of slipped femoral epiphysis; osteoplasty of femoral neck (Heyman type procedure)
27181	Open treatment of slipped femoral epiphysis; osteotomy and internal fixation

27185	Epiphyseal arrest by epiphysiodesis or stapling, greater trochanter of femur
27187	Prophylactic treatment (nailing, pinning, plating or wiring) with or without methylmethacrylate, femoral neck and proximal femur
27299	Unlisted procedure, pelvis or hip joint
29860	Arthroscopy, hip, diagnostic with or without synovial biopsy (separate procedure)
29861	Arthroscopy, hip, surgical; with removal of loose body or foreign body
29862	Arthroscopy, hip, surgical; with debridement/shaving of articular cartilage (chondroplasty), abrasion Arthroplasty, and/or resection of labrum
29863	Arthroscopy, hip, surgical; with synovectomy
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
29999	Unlisted procedure, arthroscopy
HCPCS Level II	Code Description/Definition
S2325	Hip core decompression
This list may not be all inclusive and is not intended to be used for coding/billing purposes. The final determination of reimbursement for services is the decision of the health plan and is based on the individual's policy or benefit entitlement structure as well as claims processing rules.	

References

1. American Academy of Orthopaedic Surgeons (AAOS). *Management of Osteoarthritis of the Hip Evidence-based Clinical Practice Guideline*. Rosemont, IL: Am Acad Orthop Surg; 2017:1-850. https://www5.aaos.org/uploadedFiles/PreProduction/Quality/Guidelines_and_Reviews/OA%20Hip%20CPG_3.13.17.pdf.
2. Barrientos C, Barahona M, Diaz J, et al. Is there a pathological angle for hip impingement? A diagnostic test study. *J Hip Preserv Sug*. 2016; 3(3):223-228.
3. Beall D, Sweet C, Martin H, et al. Imaging findings of femoroacetabular impingement syndrome. *Skeletal Radiol*. 2005; 34(11):691-701.
4. Beck M, Kalhor M, Leunig M, Ganz R. Hip morphology influences the pattern of damage to the acetabular cartilage: femoroacetabular impingement as a cause of early osteoarthritis of the hip. *J Bone Joint Surg Br*. 2005; 87(7):1012-1018.
5. Bedi A, Chen N, Robertson W, Kelly B. The management of labral tears and femoroacetabular impingement of the hip in the young, active patient. *Arthroscopy*. 2008; 24:1135-1145.
6. Bredella M, Stoller D. MR imaging of femoroacetabular impingement. *Magn Reson Imaging Clin N Am*. 2005; 13(4):653-664.
7. Burnett R, Della Rocca G, Prather H, et al. Clinical presentation of patients with tears of the acetabular labrum. *J Bone Joint Surgery Am*. 2006; 88(7):1448-1457.
8. Byrd J, Bardowski E, Civils A, Parker S. The Safety of Hip Arthroscopy within 3 Months of an Intra-Articular Injection. *J Bone Joint Surg*. 2019;101(16):1467-1469. doi:10.2106/jbjs.19.00147.
9. Chládek P, Trc T. Femoroacetabular impingement syndrome--pre-arthritis of the hip. *Acta Chir Orthop Traumatol Cech*. 2007; 74(5):354-358.
10. Chughtai M, Piuze NS, Khlopas A, et al. An evidence-based guide to the treatment of osteonecrosis of the femoral head. *Bone Joint J*. 2017;99-B(10):1267-1279. doi: 10.1302/0301-620X.99B10.
11. Clohisy J, McClure J. Treatment of anterior femoroacetabular impingement with combined hip arthroscopy and limited anterior decompression. *Iowa Orthop J*. 2005; 25:164-171.
12. Clohisy JC, St. John LC, Schutz AL. Surgical Treatment of Femoroacetabular Impingement: A systemic review of the literature. *Clin Orthop Relat Res*. 468: 555-564.
13. De Sa D, Urquhart N, Philippon M, Y J-E, Simunovic N, Ayeni OR. Alpha angle correction in femoroacetabular impingement. *Knee Surg Sports Traumatol Arthrosc*. 22: 812-821.
14. Domb BG, Gui C, Hutchinson MR, Nho SJ, Terry MA, Lodhia P. Clinical outcomes of hip arthroscopic surgery: a prospective survival analysis of primary and revision surgeries in a large mixed cohort. *Am J Sports Med*. 2016 Oct; 44(10): 2505-2517.
15. Espinosa N, Beck M, Rothenfluh D, et al. Treatment of femoro-acetabular impingement: Preliminary results of labral refixation. Surgical technique. *J Bone Joint Surg Am*. 2007; 89 Suppl 2 Pt.1:36-53.
16. Espinosa N, Rothenfluh DA Beck M, et al. Treatment of femoro-acetabular impingement: Preliminary results of labral refixation. *Journal Bone Joint Surg*. 2006; 88(5):925-935.
17. Flannum M, Keene J, Blankenbaker D, Desmet A. Arthroscopic treatment of the painful "internal" snapping hip: results of a new endoscopic technique and imaging protocol. *Am J Sports Med*. 2007; 35(5):770-779.
18. Ganz R, Gill T, Gautier E, et al. Surgical dislocation of the adult hip: A technique with full access to the femoral head and acetabulum without the risk of avascular necrosis. *J Bone Joint Surg Br*. 2001; 83(8):1119-1124.
19. Ganz R, Parvizi J, Beck M., et al. Femoroacetabular impingement: a cause for osteoarthritis of the hip. *Clin Orthop Relat Res*. 2003; 417:112-120.
20. Grant AD, Sala DA, Schwarzkopf R. Femoro-acetabular impingement: the diagnosis-a review. *J Child Orthop*. 2012; 6(1):1-12.
21. Guanche C, Bare A. Arthroscopic treatment of femoroacetabular impingement. *Arthroscopy*. 2006; 22(1):95-106.
22. Gupta A, Redmond JM, Hammarstedt JE, Lindner D, Stake CE, Domb BG. Does obesity affect outcomes after hip arthroscopy? A cohort analysis. *J Bone Joint Surg Am*. 2015; 97(1):16-23.
23. Hananouchi T, Yasui Y, Yamamoto K, Toritsuka Y, Ohzono K. Anterior impingement test for labral lesions has high positive predictive value. *Clin Orthop Relat Res*. 2012 Dec;470(12):3524-3529. doi: 10.1007/s11999-012-2450-0. Epub 2012 Jul 6.
24. Hoppe DJ, Bozzo A, Karlsson J, et al. Chapter: 7: *Evidence Based Indications for FAI Surgery*. In: Evidence Based Strategies for the Diagnosis and Management of Femoroacetabular Impingement, Editors: M Philippon, M Safran, J Karlsson, 2016.
25. Ilizaliturri V Jr, Nossá-Barrera J, Acosta-Rodríguez E, Camacho-Galindo J. Arthroscopic treatment of femoroacetabular impingement secondary to pediatric hip disorders. *J Bone Joint Surg Br*. 2007; 89-B(8):1025-30.
26. Ilizaliturri V Jr, Orozco-Rodríguez L, Acosta-Rodríguez E, Camacho-Galindo J. Arthroscopic treatment of cam-type femoroacetabular impingement: preliminary report at 2 years minimum follow-up. *J*

- Arthroplasty*. 2008; 23(2):226-234.
27. Johnston T, Schenker M, Briggs K, Philippon M. Relationship between offset angle alpha and hip chondral injury in femoroacetabular impingement. *Arthroscopy*. 2008; 24(6):669-675.
 28. Jurgensmeier K, Jurgensmeier D, Kunz D, Fuerst P, Warth L, Daines S. Intra-articular Injections of the Hip and Knee With Triamcinolone vs Ketorolac: A Randomized Controlled Trial. *J Arthroplasty*. 2021;36(2):416-422. doi:10.1016/j.arth.2020.08.036.
 29. Kakaty DK, Fischer AF, Hosalkar HS, Siebenrock KA, Tannast M. The ischial spine sign: does pelvic tilt and rotation matter? *Clin Orthop Relat Res*. 468(3): 769-774.
 30. Kalberer F, Sierra RJ, Madan SS, Ganz R, Leunig M. Ischial spine projection into the pelvis: a new sign for acetabular retroversion. *Clin Orthop Relat Res*. 466(3): 677-683.
 31. Kassarian A, Belzile E. Femoroacetabular impingement: presentation, diagnosis, and management. *Semin Musculoskelet Radiol*. 2008; 12(2):136-145.
 32. Kassarian A, Brisson M, Palmer W. Femoroacetabular impingement. *Eur J Radiol*. 2007; 63(1):29-35.
 33. Katz J, Gomoll A. Advances in arthroscopic surgery: Indications and outcomes. *Curr Opin Rheumatol*. 2007; 19(2):106-110.
 34. Kelly B, Weiland D, Schenker M, Philippon M. Arthroscopic labral repair in the hip: surgical technique and review of the literature. *Arthroscopy*. 2005; 21(12):1496-1504.
 35. Khan W, Khan M, Alradwan H, et al. Utility of Intra-articular Hip Injections for Femoroacetabular Impingement. *Orthop J Sports Med*. 2015; 3(9):1-8.
 36. Khanduja V, Villar R. The arthroscopic management of femoroacetabular impingement. *Knee Surg Sports Traumatol Arthrosc*. 2007; 15(8):1035-1040.
 37. Kim K, Hwang D, Lee C, Kwon S. Influence of femoroacetabular impingement on results of hip arthroscopy in patients with early osteoarthritis. *Clin Orthop Relat Res*. 2007; 456:128-132.
 38. Kovalenko B, Bremjit P, Fernando N. Classifications in Brief. *Clin Orthop Relat Res*. 2018;476(8):1680-1684. doi:10.1097/01.blo.0000534679.75870.5f.
 39. Krueger A, Leunig M, Siebenrock K, Beck M. Hip arthroscopy after previous surgical hip dislocation for femoroacetabular impingement. *Arthroscopy*. 2007; 23(12):1285-1289.
 40. Larson C, Giveans M. Arthroscopic management of femoroacetabular impingement: Early outcomes measures. *Arthroscopy*. 2008; 24(5):540-546.
 41. Larson CM, Givens R, Taylor M. Does arthroscopic FAI correction improve function with radiographic arthritis? *Clin Orthop Relat Res*. 469: 1667-1676.
 42. Laude F, Boyer T, Nogier A. Anterior femoroacetabular impingement. *Joint Bone Spine*. 2007; 74(2):127-132.
 43. Leunig M, Beck M, Kalhor M, et al. Fibrocystic changes at anterosuperior femoral neck: prevalence in hips with femoroacetabular impingement. *Radiology*. 2005; 236(1):237-246.
 44. Lynch T, Minkara A, Aoki S et al. Best Practice Guidelines for Hip Arthroscopy in Femoroacetabular Impingement. *J Am Acad Orthop Surg*. 2020;28(2):81-89. doi:10.5435/jaaos-d-18-00041.
 45. Martin RL, Enseki KR, Dragovitch P, et al. Acetabular Labral Tears of the Hip: Examination and Diagnostic Challenges. *J Orthop Sports Phys Ther*. 2006; 36(7):503-515.
 46. Martin S, Abraham P, Varady N et al. Hip Arthroscopy Versus Physical Therapy for the Treatment of Symptomatic Acetabular Labral Tears in Patients Older Than 40 Years: A Randomized Controlled Trial. *Am J Sports Med*. 2021;49(5):1199-1208. doi:10.1177/0363546521990789.
 47. McCarthy J, Lee J. Hip arthroscopy: indications, outcomes, and complications. *Instr Course Lect*. 55:301-308, 2006.
 48. Min BW, Song KS, Cho CH, et al. Untreated Asymptomatic Hips in Patients with Osteonecrosis of the Femoral Head. *Clin Orthop Relat Res*. 2008; 466:1087-1092.
 49. Minkara AA, Westermann RW, Rosneck J, et al. Systematic review and meta-analysis of outcomes after hip arthroscopy in femoroacetabular impingement. *Am J Sports Med*. 2019;47(2):488-500. doi: 10.1177/0363546517749475.
 50. Murphy S, Tannast M, Kim Y, et al. Debridement of the adult hip for femoroacetabular impingement: Indications and preliminary clinical results. *Clin Orthopaed Relat Res*. 2004; 429:178- 181.
 51. National Institute for Health and Care Excellence (NICE). *Arthroscopic femoro-acetabular surgery for hip impingement syndrome. Interventional Procedure Guidance 213*. London, UK: NICE; March 2007b.
 52. National Institute for Health and Care Excellence (NICE). *Open femoro-acetabular surgery for hip impingement syndrome. Interventional Procedure Guidance 203*. London, UK: NICE; January 2011.
 53. Newman JT, Briggs KK, McNamara SC, Philippon MJ. Revision hip arthroscopy: a matched-cohort study comparing revision to primary arthroscopy patients. *Am J Sports Med*. 2016 Oct; 44(10): 2499-2504.
 54. Palmer A, Ayyar Gupta V, Fernquest S et al. Arthroscopic hip surgery compared with physiotherapy and activity modification for the treatment of symptomatic femoroacetabular impingement: multicentre randomised controlled trial. *BMJ*. 2019;l185. doi:10.1136/bmj.l185.
 55. Parvizi J, Leunig M, Ganz R. Femoroacetabular impingement. *J Am Acad Orthop Surg*. 2007;

- 15(9):561-570.
56. Pennock AT, Bomar JD, Johnson KP, et. al. Nonoperative Management of Femoroacetabular Impingement. *Am J Sports Med.* 2018;46(14):3415-3422. doi:10.1177/0363546518804805.
 57. Peters C, Erickson J. Treatment of femoro-acetabular impingement with surgical dislocation and debridement in young adults. *J Bone Joint Surg Am.* 2006; 88(8):1735-1741.
 58. Pfirrmann C, Mengiardi B, Dora Cet al. Cam and pincer femoroacetabular impingement: characteristic MR arthrographic findings in 50 patients. *Radiology.* 2006 Sep; 240(3):778-785.
 59. Philippon M. New frontiers in hip arthroscopy: the role of arthroscopic hip labral repair and capsulorrhaphy in the treatment of hip disorders. *Instr Course Lect.* 2006a; 55:309-316.
 60. Philippon MJ, Briggs KK, Yen YM, Kuppersmith DA. Outcomes following hip arthroscopy for femoroacetabular impingement with associated chondrolabral dysfunction: minimum two-year followup. *J Bone Joint Surg Br.* 91(1): 16-23.
 61. Philippon MJ, Ejnisman L, Ellis HB, Briggs KK (2012) Outcomes 2 to 5 years following hip arthroscopy for femoroacetabular impingement in the patient aged 11 to 16 years. *Arthroscopy.* 28(9), 1255–1261.
 62. Philippon M, Maxwell R, Johnston T, et al. Clinical presentation of femoroacetabular impingement. *Knee Surg Sports Traumatol Arthrosc.* 2007; 15(8):1041-1047.
 63. Philippon M, Schenker M. A new method for acetabular rim trimming and labral repair. *Clin Sports Med.* 2006 ;25(2):293-297.
 64. Philippon M, Schenker M. Arthroscopy for the treatment of femoroacetabular impingement in the athlete. *Clin Sports Med.* 2006; 25(2):299-308.
 65. Philippon M, Schenker M, Briggs K, Kuppersmith D. Femoroacetabular impingement in 45 professional athletes: associated pathologies and return to sport following arthroscopic decompression. *Knee Surg Sports Traumatol Arthrosc.* 2007; 15(7):908-914.
 66. Philippon MJ, Schroder E, Souza BG, Briggs KK. Hip arthroscopy for femoroacetabular impingement in adults aged 50 years or older. *Arthroscopy.* 28(1): 59-65.
 67. Philippon M, Stubbs A, Schenker M, et al. Arthroscopic management of femoroacetabular impingement: osteoplasty technique and literature review. *Am J Sports Med.* 2007; 35(9):1571-1580.
 68. Philippon M, Yen Y, Briggs K, et al. Early outcomes after hip arthroscopy for femoroacetabular impingement in the athletic adolescent patient: a preliminary report. *J Pediatr Orthop.* 2008; 28(7):705-710.
 69. Pulido L, Parvizi J. Femoroacetabular impingement. *Semin Musculoskelet Radiol.* 2007; 11(1):66-72.
 70. Robertson W, Kadrmas W, Kelly B. Arthroscopic management of labral tears in the hip: a systematic review of the literature. *Clin. Orthop. Relat. Res.* 2007; 455:88-92.
 71. Saddat E, Martin SD, Thornhill TS, Brownlee SA, Losina E, Katz JN. Factors Associated with the failure of surgical treatment of femoroacetabular impingement: Review of literature. *Am J Sports Med.* 42:1487-1495.
 72. Sampson T. Arthroscopic treatment of femoroacetabular impingement: A proposed technique with clinical experience. *Instr Course Lect.* 2006; 55:337-346.
 73. Sampson T. Arthroscopic Treatment of Femoroacetabular Impingement. Techniques in Orthopaedics. *Hip Arthro.* 2005; 20(1):56-62.
 74. Sampson T. Complications of hip arthroscopy. *Clin Sports Med.* 2001; 20(4):831-835.
 75. Scheerlinck T, Dezillie M, Monsaert A, et al. Bipolar versus total hip arthroplasty in the treatment of avascular necrosis of the femoral head in young patients. *Hip International.* 2002;12(2):142-149.
 76. Siebenrock K, Schoeniger R, Ganz R. Anterior femoro-acetabular impingement due to acetabular retroversion. Treatment with periacetabular osteotomy. *J Bone Joint Surg Am.* 2003; 85-A2:278- 286.
 77. Stähelin L, Stähelin T, Jolles B, Herzog R. Arthroscopic offset restoration in femoroacetabular cam impingement: accuracy and early clinical outcome. *Arthroscopy.* 2008; 24(1):51-57.
 78. Standaert C, Manner P, Herring S. Expert opinion and controversies in musculoskeletal and sports medicine: Femoroacetabular impingement. *Arch Phys Med Rehabil.* 2008; 89(5):890-893.
 79. Sutter R, Dietrich TJ, Zingg PO, et al. How Useful Is the Alpha Angle for Discriminating between Symptomatic Patients with Cam-type Femoroacetabular Impingement and Asymptomatic Volunteers? *Radiology.* 2012; 264(2):514-521.
 80. Tanzer M, Noiseux N. Osseous abnormalities and early osteoarthritis: the role of hip impingement. *Clin Orthop Relat Res.* 2004; 429:170-177.
 81. Tijssen M, vanCingel R, Willemsen L, de Visser E. Diagnostics of femoroacetabular impingement and labral pathology of the hip: A systematic review of the accuracy and validity of physical tests. *Arthroscopy.* 28(6): 860-871.
 82. Zaltz I, Kelly BT, Larson CM, Leunig M, Bedi A. Surgical treatment of femoroacetabular impingement: What are the limits of hip arthroscopy? *Arthroscopy.* 30(1): 99-110.
 83. Zebala L, Schoenecker P, Clohisy J. Anterior femoroacetabular impingement: a diverse disease with evolving treatment options. *Iowa Orthop J.* 2007; 27:71-81.