

Cigna Medical Coverage Policies – Musculoskeletal Hip Surgery-Arthroscopic and Open Procedures

Effective August 1, 2024



Instructions for use

The following coverage policy applies to health benefit plans administered by Cigna. Coverage policies are intended to provide guidance in interpreting certain standard Cigna benefit plans and are used by medical directors and other health care professionals in making medical necessity and other coverage determinations. Please note the terms of a customer's particular benefit plan document may differ significantly from the standard benefit plans upon which these coverage policies are based. For example, a customer's benefit plan document may contain a specific exclusion related to a topic addressed in a coverage policy.

In the event of a conflict, a customer's benefit plan document always supersedes the information in the coverage policy. In the absence of federal or state coverage mandates, benefits are ultimately determined by the terms of the applicable benefit plan document. Coverage determinations in each specific instance require consideration of:

1. The terms of the applicable benefit plan document in effect on the date of service
2. Any applicable laws and regulations
3. Any relevant collateral source materials including coverage policies
4. The specific facts of the particular situation

Coverage policies relate exclusively to the administration of health benefit plans. Coverage policies are not recommendations for treatment and should never be used as treatment guidelines.

This evidence-based medical coverage policy has been developed by eviCore, Inc. Some information in this coverage policy may not apply to all benefit plans administered by Cigna.

CPT® (Current Procedural Terminology) is a registered trademark of the American Medical Association (AMA). CPT® five digit codes, nomenclature and other data are copyright 2024 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.

CMM-314: Hip Surgery-Arthroscopic and Open Procedures

Definitions

General Guidelines

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

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 (CMM-314)

References (CMM-314)

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, the following: relative rest/activity modification; weight loss; supervised physiotherapy modalities and therapeutic exercises; prescription and non-prescription medications; assistive devices; and/or, intra-articular injections.
- **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**
- For salvage procedures refer to **CMM 313: Hip Replacement/Arthroplasty**

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

- Hip arthroscopic or open procedures may be considered **medically necessary** when 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 have been met:

- Imaging shows **BOTH** of the following findings:
 - ◆ An advanced diagnostic imaging study confirming labral pathology amenable to surgical management
 - ◆ Presence of Tönnis grade 0-1 osteoarthritis
- Physical exam demonstrates intra-articular hip pathology on **ANY** of the following positive provocative tests:
 - ◆ 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)

- Subjective symptoms include mechanical symptoms of the hip (e.g., catching, locking, or giving way) associated with groin-dominant hip pain that significantly limits activities
- Unresponsive to at least three (3) months of provider-directed non-surgical treatment which **must include** the following (unless contraindicated):
 - ◆ An image-guided intra-articular hip injection with local anesthetic (with or without corticosteroid) to which there was a positive response (i.e., any degree of pain reduction achieved within 2 weeks after the injection)

Labral Repair or Reconstruction Non-Indications

- Labral repair or reconstruction is considered **not medically necessary** for **ANY** other indication or condition.
- Labral repair or reconstruction is considered **not medically necessary** if there is presence of Tönnis grade 2-3 osteoarthritis.

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:

- Imaging shows **BOTH** of the following findings:
 - ◆ FAI confirmation with X-ray, MRI, or CT showing **ANY** of the following findings:
 - Alpha angle greater than 50 degrees
 - Pistol-grip deformity
 - Decrease of femoral head-neck offset
 - Acetabular retroversion (i.e., crossover sign, ischial spine sign)
 - Coxa profunda
 - ◆ Presence of Tönnis grade 0-1 osteoarthritis
- Physical exam demonstrates **BOTH** of the following findings:
 - ◆ Positive anterior impingement sign (i.e., groin-dominant hip pain with forced hip flexion, adduction, and internal rotation)
 - ◆ Limited passive hip internal rotation
- Symptoms include groin-dominant hip pain that is worsened by flexion (e.g., squatting or prolonged sitting) and significantly limits activities
- Unresponsive to at least three (3) months of provider-directed non-surgical treatment which **must include** the following (unless contraindicated):
 - ◆ An image-guided intra-articular hip injection with local anesthetic (with or without corticosteroid) to which there was a positive response (i.e., any degree of pain reduction achieved within 2 weeks after the injection)

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, condition, or when **ANY** of the following radiographic findings are present on plain x-ray:
 - ◆ Joint space narrowing <2mm along the sourcil
 - ◆ Presence of Tönnis grade 2 or higher osteoarthritis
 - ◆ 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 **ALL** of the following criteria have been met:

- **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 physical exam findings:
 - ◆ 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:

- MRI or CT arthrogram shows evidence of synovitis
- Presence of **ANY** of the following:
 - ◆ Inflammatory arthritis (i.e., rheumatoid arthritis, gout, pseudogout, psoriatic arthritis)
 - ◆ Pigmented villonodular synovitis (PVNS)
 - ◆ Synovial chondromatosis
 - ◆ Lyme synovitis
 - ◆ Hemochromatosis
 - ◆ Recurrent hemarthrosis (e.g., secondary to sickle cell anemia, bleeding diathesis, hemophilia)
- Physical exam demonstrates **ANY** of the following findings:
 - ◆ Limited range of motion
 - ◆ Evidence of joint swelling/effusion
- Symptoms include 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)
- Failure of provider-directed non-surgical management for at least three (3) months in duration

Synovectomy Non-Indications

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

Procedures and Conditions Not Addressed Elsewhere

Procedures and Conditions Not Addressed Elsewhere Indications

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

Procedures and Conditions Not Addressed Elsewhere Non-Indications

- 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 (CMM-314)

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
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
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.
27050	Arthrotomy, with biopsy; sacroiliac 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
27060	Excision; ischial bursa
27062	Excision; trochanteric bursa or calcification
27080	Coccygectomy, primary
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
27170	Bone graft, femoral head, neck, intertrochanteric or subtrochanteric area (includes obtaining bone graft)
27175	Treatment of slipped femoral epiphysis; by traction, without reduction
27177	Open treatment of slipped femoral epiphysis; single or multiple pinning or bone graft (includes obtaining graft)
27185	Epiphyseal arrest by epiphysiodesis or stapling, greater trochanter of femur
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
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 (CMM-314)

- 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.
- Ayeni OR, Wong I, Chien T, Musahl V, Kelly BT, Bhandari M. Surgical indications for arthroscopic management of femoroacetabular impingement. *Arthroscopy*. 2012;28(8):1170-1179. doi: 10.1016/j.arthro.2012.01.010.
- Barrientos C, Barahona M, Diaz J, et al. Is there a pathological angle for hip impingement? A diagnostic test study. *J Hip Preserv Surg*. 2016;3(3):223-228.
- Beall D, Sweet C, Martin H, et al. Imaging findings of femoroacetabular impingement syndrome. *Skeletal Radiol*. 2005;34(11):691-701.
- 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.
- 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.
- Bredella M, Stoller D. MR imaging of femoroacetabular impingement. *Magn Reson Imaging Clin N Am*. 2005;13(4):653-664.
- Burnett R, Della Rocca G, Prather H, et al. Clinical presentation of patients with tears of the acetabular labrum. *J Bone Joint Surg Am*. 2006;88(7):1448-1457.
- 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.
- Chládek P, Trc T. Femoroacetabular impingement syndrome--pre-arthritis of the hip. *Acta Chir Orthop Traumatol Cech*. 2007;74(5):354-358.
- Chughtai M, Piuzzi 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.
- Clohisy J, McClure J. Treatment of anterior femoroacetabular impingement with combined hip arthroscopy and limited anterior decompression. *Iowa Orthop J*. 2005;25:164-171.
- Clohisy JC, St. John LC, Schutz AL. Surgical Treatment of Femoroacetabular Impingement: A systemic review of the literature. *Clin Orthop Relat Res*. 2010;468(2):555-564. doi:10.1007/s11999-009-1138-6.
- 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*. 2014;22(4):812-821. doi: 10.1007/s00167-013-2678-6.
- 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;44(10):2505-2517.
- 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.
- Espinosa N, Rothenfluh DA Beck M, et al. Treatment of femoro-acetabular impingement: Preliminary results of labral refixation. *J Bone Joint Surg*. 2006;88(5):925-935.
- Flanum 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.
- 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.
- 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.
- Grant AD, Sala DA, Schwarzkopf R. Femoro-acetabular impingement: the diagnosis-a review. *J Child Orthop*. 2012;6(1):1-12.
- Guanche C, Bare A. Arthroscopic treatment of femoroacetabular impingement. *Arthroscopy*. 2006;22(1):95-106.
- 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.
- 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;470(12):3524-3529. doi: 10.1007/s11999-012-2450-0. Epub 2012 Jul 6.
- Hoppe DJ, Bozzo A, Karlsson J, et al. Chapter: 7: Evidence Based Indications for FAI Surgery. In: Philippon M, Safran M, Karlsson J, eds. *Evidence Based Strategies for the Diagnosis and Management of Femoroacetabular Impingement*. 2016.
- Ilizaliturri V Jr, Nossa-Barrera J, Acosta-Rodriguez E, Camacho-Galindo J. Arthroscopic treatment of femoroacetabular impingement secondary to pediatric hip disorders. *J Bone Joint Surg Br*. 2007;89-B(8):1025-1030.

27. 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.
28. 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.
29. 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.
30. Kakaty DK, Fischer AF, Hosalkar HS, Siebenrock KA, Tannast M. The ischial spine sign: does pelvic tilt and rotation matter? *Clin Orthop Relat Res*. 2010;468(3):769-774. doi: 10.1007/s11999-009-1021-5.
31. 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*. 2008;466(3):677-683. doi: 10.1007/s11999-007-0058-6.
32. Kassarian A, Belzile E. Femoroacetabular impingement: presentation, diagnosis, and management. *Semin Musculoskelet Radiol*. 2008;12(2):136-145.
33. Kassarian A, Brisson M, Palmer W. Femoroacetabular impingement. *Eur J Radiol*. 2007;63(1):29-35.
34. Katz J, Gomoll A. Advances in arthroscopic surgery: Indications and outcomes. *Curr Opin Rheumatol*. 2007;19(2):106-110.
35. 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.
36. 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. doi: 10.1177/2325967115601030.
37. Khanduja V, Villar R. The arthroscopic management of femoroacetabular impingement. *Knee Surg Sports Traumatol Arthrosc*. 2007;15(8):1035-1040.
38. 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.
39. 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.
40. Krueger A, Leunig M, Siebenrock K, Beck M. Hip arthroscopy after previous surgical hip dislocation for femoroacetabular impingement. *Arthroscopy*. 2007;23(12):1285-1289.
41. Larson C, Giveans M. Arthroscopic management of femoroacetabular impingement: Early outcomes measures. *Arthroscopy*. 2008;24(5):540-546.
42. Larson CM, Givens R, Taylor M. Does arthroscopic FAI correction improve function with radiographic arthritis? *Clin Orthop Relat Res*. 2011;469:1667-1676. doi: 10.1007/s11999-010-1741-6.
43. Laude F, Boyer T, Nogier A. Anterior femoroacetabular impingement. *Joint Bone Spine*. 2007;74(2):127-132.
44. 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.
45. 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.
46. 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.
47. 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.
48. McCarthy J, Lee J. Hip arthroscopy: indications, outcomes, and complications. *Instr Course Lect*. 2006;55:301-308.
49. 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.
50. 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.
51. 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. doi: 10.1097/01.blo.0000150307.75238.b9.
52. 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.
53. 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.

54. 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;44(10):2499-2504. doi: 10.1177/0363546516650888.
55. Nötzli HP, Wyss TF, Stoecklin CH, Schmid MR, Treiber K, Hodler J. The contour of the femoral head-neck junction as a predictor for the risk of anterior impingement. *J Bone Joint Surg Br.* 2002;84(4):556-560. doi: 10.1302/0301-620x.84b4.12014.
56. 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;364:l185. doi: 10.1136/bmj.l185.
57. Parvizi J, Leunig M, Ganz R. Femoroacetabular impingement. *J Am Acad Orthop Surg.* 2007;15(9):561-570.
58. 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.
59. 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.
60. Pfirrmann C, Mengiardi B, Dora C, et al. Cam and pincer femoroacetabular impingement: characteristic MR arthrographic findings in 50 patients. *Radiology.* 2006;240(3):778-785.
61. 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.
62. 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.* 2009;91(1):16-23. doi: 10.1302/0301-620X.91B1.21329.
63. 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* 2012;28(9):1255–1261. doi: 10.1016/j.arthro.2012.02.006.
64. Philippon M, Maxwell R, Johnston T, et al. Clinical presentation of femoroacetabular impingement. *Knee Surg Sports Traumatol Arthrosc.* 2007;15(8):1041-1047.
65. Philippon M, Schenker M. A new method for acetabular rim trimming and labral repair. *Clin Sports Med.* 2006;25(2):293-297.
66. Philippon M, Schenker M. Arthroscopy for the treatment of femoroacetabular impingement in the athlete. *Clin Sports Med.* 2006;25(2):299-308.
67. 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.
68. Philippon MJ, Schroder E, Souza BG, Briggs KK. Hip arthroscopy for femoroacetabular impingement in adults aged 50 years or older. *Arthroscopy.* 2012;28(1):59-65. doi: 10.1016/j.arthro.2011.07.004.
69. 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.
70. 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.
71. Pulido L, Parvizi J. Femoroacetabular impingement. *Semin Musculoskelet Radiol.* 2007;11(1):66-72.
72. Robertson W, Kadmas 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.
73. 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.* 2014;42(6):1487-1495. doi: 10.1177/0363546513500766.
74. Sampson T. Arthroscopic treatment of femoroacetabular impingement: A proposed technique with clinical experience. *Instr Course Lect.* 2006;55:337-346.
75. Sampson T. Arthroscopic Treatment of Femoroacetabular Impingement. Techniques in Orthopaedics. *Hip Arthro.* 2005;20(1):56-62.
76. Sampson T. Complications of hip arthroscopy. *Clin Sports Med.* 2001;20(4):831-835.
77. 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 Int.* 2002;12(2):142-149.
78. 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(2):278-286.
79. 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.
80. 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.
81. 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.

82. Tanzer M, Noiseux N. Osseous abnormalities and early osteoarthritis: the role of hip impingement. *Clin Orthop Relat Res.* 2004;(429):170-177.
83. Tijessen 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.* 2012;28(6):860-871. doi: 10.1016/j.arthro.2011.12.004.
84. Zaltz I, Kelly BT, Larson CM, Leunig M, Bedi A. Surgical treatment of femoroacetabular impingement: What are the limits of hip arthroscopy? *Arthroscopy.* 2014;30(1):99-110. doi:10.1016/j.arthro.2013.10.005. Zebala L, Schoenecker P, Clohisy J. Anterior femoroacetabular impingement: a diverse disease with evolving treatment options. *Iowa Orthop J.* 2007;27:71-81.