

From Dysplasia to Impingement

Keys to Evaluating and Treating Hip Conditions in the Athlete

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he recognition, understanding, and diagnosis of athletic hip conditions has tremendously expanded over the past decade. For patients with femoroacetabular impingement (FAI), arthroscopic correction and treatment leads to high rates of return to sport.¹





A recent systematic review of 1,296 patients revealed a return to sport rate of 85 percent at a mean of 74 months after surgical intervention. Isolated arthroscopic procedures should be avoided in athletes with dysplasia. In cases of borderline dysplasia (LCEA 20-25) a thoughtful approach to conservative care, rehabilitation, and surgical intervention must be employed.

Hip Impingement and FAI

Athletes with impingement will commonly present with groin pain (anterior) during cutting, pivoting movements, hip flexion activities, and also sedentary activities like sitting. Historically, these injuries were commonly misdiagnosed as hip flexor strains or adductor tears. FAI can be the result of an aspherical anterolateral head-neck junction that causes a pistol-grip or cam type deformity, or it can be the result of over-coverage of the acetabulum (commonly referred to as "pincer impingement"). Extra-articular impingement may also coexist such as sub-spinous (anterior inferior iliac spine) impingement. Treatment should begin with a rehabilitation program focused on core strength, lumbar mobility, and hip abductor strengthening. Non-steroidal anti-inflammatory medications can also be used, and occasionally intra-articular injections.

Surgical management of FAI has grown substantively over the past two decades.^{2,3} Arthroscopic and open techniques can be used to treat FAI with similar outcomes,⁴ however, radiographic outcomes including

correction of both cam and pincer lesions have been reported to be superior using an open surgical dislocation approach.^{5,6} Regardless of approach, good outcomes and reliable return to sport can be achieved when conservative measures fall short.¹⁷ Extensive high level research including two prospective multi-center randomized controlled trials have demonstrated the improvements for arthroscopy are much greater than best conservative care for patients with FAI.^{8,9} Patients and athletes with borderline dysplasia can present in different ways depending on if instability or impingement seems to be the driving pathologic issue. There are signs of impingement with limited internal rotation in flexion, normal to low hip range of motion, impingement positive, results of arthroscopic treatment can be favorable.

Extra-articular impingement can arise from a large sub-spine deformity. These pelvic deformities are thought to arise from old rectus avulsions that heal with a bony protuberance below the level of the acetabular sourcil. These deformities should be addressed concurrently during arthroscopic FAI correction. (Figure 5)

Dysplasia

There is a significant incidence of hip dysplasia in sports that require high range of hip motion such as dance (ballet),^{10,12} hockey (butterfly-style hockey goalies in particular),¹³⁻¹⁶ wrestling,¹⁸ and gymnastics.¹⁷ Acetabular dysplasia is often combined with femoral head-neck offset deformity with high hip motion; a complex pattern of instability and impingement.^{12,13} Higher activity levels and more severe deformity are associated with onset of symptoms at a younger age.¹⁸ Athletes with dysplasia and instability will more commonly present with lateral as well as anterior hip/groin pain, and pain with standing, running, and activities that involve hip extension. The first line treatment for an athlete with symptomatic hip dysplasia is a core and hip abductor focused physical therapy/rehabilitation program, non-steroidal anti-inflammatory medications, and activity modification.¹⁹ Individuals with more active lifestyles are more likely to choose surgical management despite these conservative treatments.



Figure 1: Preoperative AP pelvis of an 18-year-old wrestler with borderline hip dysplasia (LCEA 22 right and 20 left) and cam-type FAI. Femoral anteversion was 8 degrees on both sides.

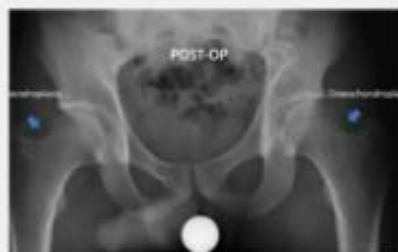


Figure 2: AP pelvis status post bilateral staged hip arthroscopies (4 weeks apart). Note the cam correction at the lateral head-neck junction.



Figure 3: The 45-degree Dunn lateral of the left hip. Note interval osteochondroplasty and restoration of femoral head-neck offset.



Figure 4: The 45-degree Dunn lateral of the right hip. Note interval osteochondroplasty and restoration of femoral head-neck offset.

Surgical treatment with periacetabular osteotomy (PAO) is the accepted treatment for hip dysplasia with a lateral center edge angle less than 20 degrees. In the challenging competitive dance population, over 80 percent have radiographic dysplasia or borderline dysplasia (LCEA <25).¹² Multiple clinical series report long standing symptom relief and return to previous activity levels when hip dysplasia is treated with PAO.^{20,21} Return to sport is a concern after any major orthopaedic procedure. After PAO, 80 percent of recreational and competitive athletes return to their sport at a median 9 months after surgery and 73 percent return to the same level, though this was less common in competitive athletes (58 percent).²² In dancers, 63 percent will return by an average of 8.8 months after surgery.¹⁰ Periacetabular osteotomy is often combined with hip arthroscopy or arthrotomy to address femoral head-neck offset deformity and labral/cartilage pathology.²³

Borderline or transitional hip dysplasia is defined as a LCEA 20-25 or sometimes 18-25 degrees. There are multiple recent selected clinical series reporting arthroscopic treatment of transitional hip dysplasia at early clinical follow up.²⁴⁻²⁷ These series highlight the importance of labral preservation and careful capsular management to prevent worsening hip instability. Recently, increased femoral anteversion has been shown to increase the risk of persistent or worsening symptoms with arthroscopic treatment only.²⁸ Decreased femoral version will predispose the femoral neck to impinge on the acetabulum and sub-spine region sometimes in the absence of a true cam lesion.²⁹ Conversely, excess femoral anteversion will exaggerate the symptoms and mechanics of hip instability. As such, femoral version can be a useful tool in deciding on proper arthroscopic or open treatment. The athlete with borderline dysplasia and decreased femoral version (<10 degrees and decreased internal rotation in flexion) is more likely to be treated with hip arthroscopy for femoral head/neck osteoplasty, and increased femoral version (>20 and increase internal rotation in flexion) may be better managed

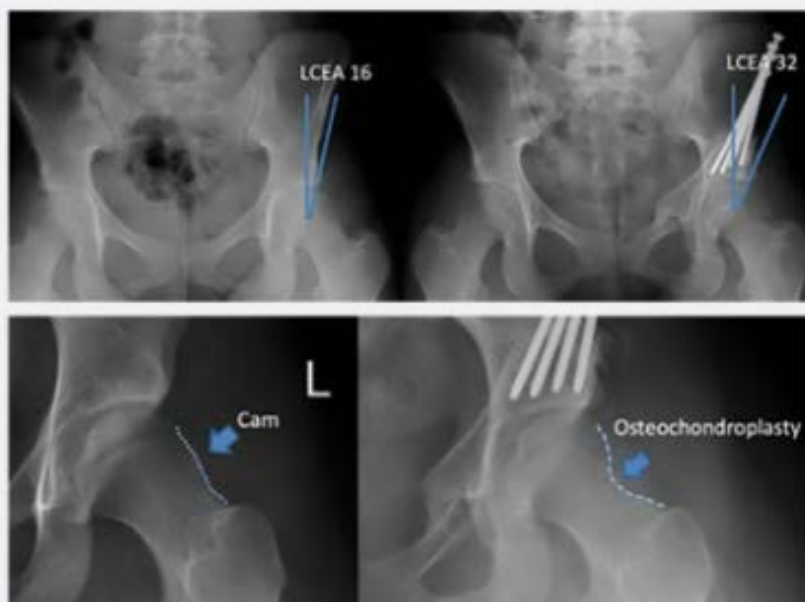


Figure 3, 4: 18-year-old female hockey goalie with LCEA 16 degrees treated with periacetabular osteotomy and hip arthroscopy. Femoral version measured 10 degrees on CT.

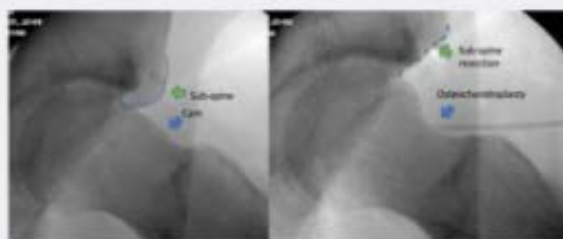


Figure 5: An 18-year-old football player with a history of a rectus injury with combined sub spine impingement (green arrow) and cam-type FAI (blue arrow) treated with arthroscopic resection.

with acetabular re-orientation with PAO.³⁰ Simple ways to screen for femoral version abnormalities are checking the internal rotation in flexion³¹ and a prone Craig's test. Further work needs to be performed to help us identify athletes with at risk transitional hip dysplasia. Figure 3 demonstrates a hockey athlete who was treated with hip arthroscopy and periacetabular osteotomy.

Core Muscle Injury (Athletic Pubalgia, Sports Hernia)

All athletes presenting with hip discomfort must be assessed for a core muscle injury. Core muscle injury involves a disruption of the pubic aponeurosis—the location where the rectus abdominus muscle, the internal and external oblique muscles and transversalis fascia, and the adductor

tendons attach. Athletes will often have discomfort with acceleration to their top speed, hyperextension or hyperabduction of the hip. Coughing, sit-ups, or kicking activities can reproduce symptoms in certain cases. Patients are generally treated with activity modification along with gradual return to sport specific exercised over a period of two to three months. When these measures fail surgical repair and or adductor tendon lengthening can be utilized. Often times, athletes with core muscle injury may have intra-articular hip conditions such as FAI or dysplasia. Consideration for treating all pathology can be considered in patients not responding to conservative measures. When patients have symptomatic hip impingement as well as core muscle injury, the most reliable return to sport has been demonstrated by addressing both conditions.³²

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