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Hip Arthroscopy in Athletes

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Sports-related injuries to the hip joint have received relatively little attention. This trend is changing but, until recently, there have been few publications in peer-reviewed journals and the topic has rarely been presented at scientific meetings. There are three reasons. First, perhaps hip injuries are less common than injuries to other joints. Second, investigative skills for the hip including clinical assessment and imaging studies have been less sophisticated. Third, there have been fewer interventional methods available to treat the hip, including both surgical techniques and conservative modalities, and thus there has been little impetus to delve into this unrecognized area.

The evolution of arthroscopy has been intimately tied to sports medicine. The motivating principle has been a less-invasive technique that facilitates quicker return to unrestricted athletics. It is now recognized that this basic sports medicine principle applies well to all individuals, whether the goal is to accomplish an earlier return to the workplace or simply a return to normal daily activities.

However, hip arthroscopy has followed a distinctly different route. It began as a surgical alternative to only a few recognized forms of hip pathology. These indications included removal of loose bodies that could otherwise only be addressed by an extensive arthrotomy and arthroscopic debridement for degenerative arthritis to postpone the need for hip arthroplasty.[1,2]

Neither of these early indications found much application in an athletic population. However, as the basic methods of hip arthroscopy were developed, it began to be performed for select cases of unexplained hip pain. Arthroscopy revealed that there are numerous intraarticular sources of disabling hip symptoms that were previously unrecognized and are now potentially amenable to arthroscopic intervention[3,4]; these include tearing of the acetabular labrum, traumatic injury to the articular surface, and damage to the ligamentum teres among others.

The indications for hip arthroscopy fall into two broad categories. In one, arthroscopy offers an alternative to traditional open techniques previously employed for recognized forms of hip pathology such as loose bodies or impinging osteophytes. In the other, arthroscopy offers a method of treatment for disorders that previously went unrecognized including labral tears, chondral injuries, and disruption of the ligamentum teres. Most athletic injuries fall into this latter category. In the past, athletes were simply resigned to living within the constraints of their symptoms, often ending their competitive careers, with a diagnosis of a chronic groin injury. Based on the results of arthroscopy among athletes, it is likely that many of these careers could have been resurrected with arthroscopic intervention.[5]

MECHANISM OF INJURY

The mechanism of injury can be as varied as the sports in which athletes participate. In general, hip disorders attributable to a significant episode of trauma tend to respond better to arthroscopy.[6] This is because, other than the damage due to trauma, the athlete usually has an otherwise healthy joint. Individuals who simply develop progressive onset of symptoms in absence of injury tend to experience a less-complete response, because insidious onset of symptoms usually suggests either underlying disease or some predisposition to injury that cannot be fully reversed and may leave the joint vulnerable to further deterioration in the future. Even the presence of an acute injury such as a twisting episode, which is known to cause a tear of the acetabular labrum, may be more likely if the labrum was vulnerable to injury and may represent a less certain response to surgery. This vulnerability can result from abnormal labral morphology or underlying degeneration.

However, these broad generalizations must be tempered in the competitive athlete. Individuals who participate in contact and collision sports simply may not be able to recount which traumatic episode led to the onset of symptoms. Remember that significant intraarticular damage can occur from an episode without the athlete developing incapacitating pain. The athlete may be able to continue to compete and subsequently undergo workup only when symptoms fail to resolve. Injury can occur from any contact or collision sport or sports involving forceful or repetitive twisting of the hip. The aging joint may also be more vulnerable. These parameters do not exclude many sports.

A particular entity has been identified associated with acute chondral damage.[7] It is mostly encountered in physically fit young adult men. The characteristic feature is a lateral impact injury to the area of the trochanter (Figure 13.1). Young adult men are apt to be participating in contact and collision activities where this mechanism is frequent. With good body conditioning, they have little adipose tissue overlying the trochanter, so much of the force of the blow is delivered directly to the bone. This force is then transferred unchecked into the hip joint, resulting in either shearing of the articular surface on the medial aspect of the femoral head at the tidemark, or compression of the articular surface on the superior medial acetabulum, exceeding its structural threshold. The result is a full-thickness articular fragment from the femoral head or articular surface breakdown of the acetabulum, possibly with loose bodies, depending on the magnitude of acetabular chondral, or chondro-osseous cell death (Figures 13.2, 13.3). This mechanism is dependent on peak bone density, as otherwise the force would result in fracture rather than delivery of the energy to the surface of the joint. The injury usually results in immediate onset of symptoms, but may not be disabling. It may be assessed as a groin pull, with workup ensuing only when symptoms fail to resolve.

Ice hockey is a sport that seems to present a particularly high prevalence of hip pathology. Hip flexibility is a premium consideration in this sport. The joint is subjected to violent and repetitive torsional maneuvers and also subjected to relatively high-velocity impact loading. Thus, the labrum is susceptible to tearing from the twisting maneuvers, while the articular surface is vulnerable to impact injury. Often, acute episodes are simply superimposed on the cumulative effect of years of exposure (Figure 13.4A–C).

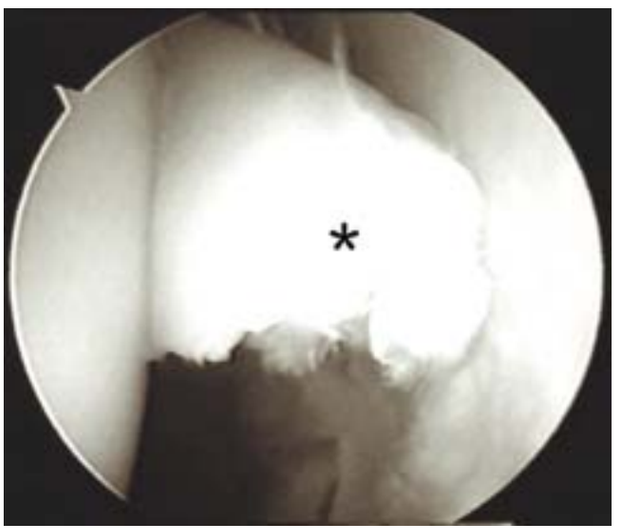

FIGURE 13.2. Arthroscopic view of the left hip of a 20-year-old collegiate basketball player demonstrates an acute grade IV articular injury (asterisk) to the medial aspect of the femoral head.

Golf is another illustrative sport that seems to have a predilection for precipitating hip symptoms. It is not a contact or collision sport, but the golf swing does incorporate a significant element of twisting on the hip joint. Additionally, it is a sport in which participants can compete with advancing age, even at the professional level. Thus, the greater susceptibility to injury of an aging hip exists, as well as the cumulative effect of repetitive trauma over a prolonged career. Tennis shares many of these same attributes.

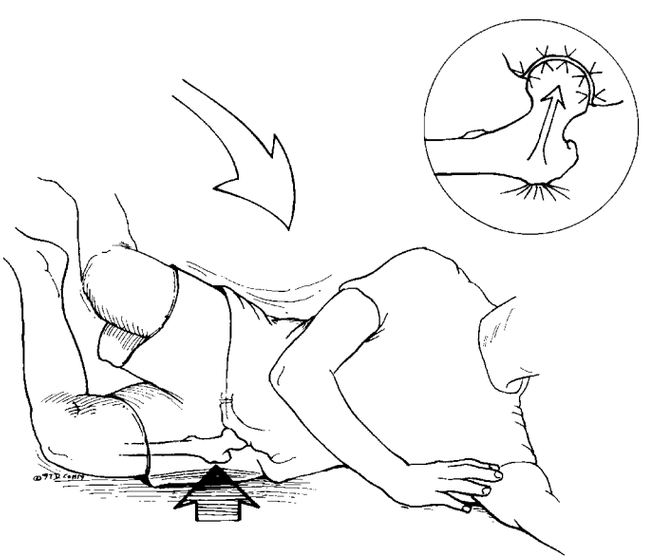

FIGURE 13.1. Fall results in direct blow to the greater trochanter and, in absence of fracture, the force generated is transferred unchecked to the hip joint.

FIGURE 13.3. Arthroscopic view of the left hip of a 19-year-old man who sustained a direct lateral blow to the hip, subsequently developing osteocartilaginous fragments (asterisks) within the superomedial aspect of the acetabulum.

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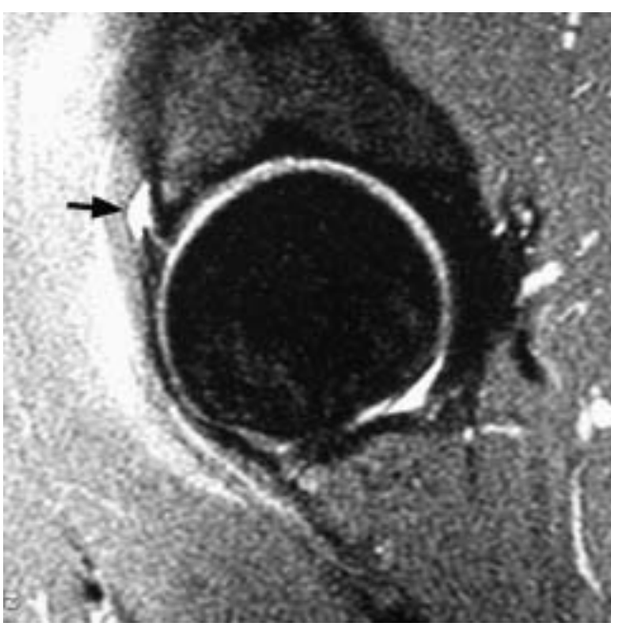


C

FIGURE 13.4. Three National Hockey League players were referred, each with a 2-week history of hip pain following an injury on the ice. Each case demonstrated magnetic resonance imaging (MRI) evidence of labral pathology (arrows). These cases were treated with 2 weeks of rest followed by a 2-week period of gradually resuming activities. Each of these athletes was able to return to competition and has continued to play for several seasons without needing surgery. (A) Coronal image of a left hip demonstrates a lateral labral tear (arrow). (B) Coronal image of a right hip demonstrates a lateral labral tear (arrow). (C) Sagittal image of a left hip demonstrates an anterior labral tear with associated paralabral cyst (arrow).

In our study of athletes undergoing arthroscopy, injury to the ligamentum teres was the third most common finding (Table 13.1).[5] Historically, rupture of the ligament is associated with hip dislocation. It has been recognized that injury can occur without dislocation, but this has been described only as case reports.[8–11] Disruption appears to be attributable to a twisting injury and is increasingly recognized as a source of intractable hip pain. In our review of 23 cases of traumatic injury to the ligamentum teres, 17 (74%) occurred without accompanying dislocation of the hip.[12]

TABLE 13.1. Diagnoses for Hip Arthroscopy.

Labral pathology (27)	Loose bodies (3)
Chondral damage (23)	Impinging osteophyte (2)
Ligamentum teres damage (11)	Avascular necrosis (1)
Arthritic disorder (7)	Synovitis (1)
Dysplasia (5)	Perthes disease (1)

Source: From Byrd and Jones,[5] with permission of Clinics in Sports Medicine.

PATIENT SELECTION

Successful hip arthroscopy is most clearly dependent on proper patient selection. A well-executed procedure fails when performed for the wrong reasons. Paramount among these is patient expectation. Be certain that the athlete has reasonable goals and knows what can be accomplished with arthroscopy, which is only partially dictated by the nature of the pathology. Remember that there is much we do not fully understand regarding the pathomechanics, pathoanatomy, and natural history of many of these lesions that are now being surgically addressed. However, with the increasing amount of clinical experience, patients can be offered reasonable statistical data on likely outcomes.

Athletes are often set apart by their drive, discipline, and motivation as they push their bodies to their physiologic limits. However, the most uniquely chal-

lenging aspect of deciding on surgical intervention in this population is time constraints: How quickly does the surgeon decide to operate and how quickly will the patient recover? This is a year-round issue, whether the athlete is attempting to return for the current season, preparing for the upcoming season, or simply resuming the necessary off-season conditioning regimen. Except for loose bodies, no literature suggests that harm is caused by not recommending early surgical intervention for most of the problems that are now being recognized.[13] Most of these disorders declare themselves over time through failure of response to conservative measures. Unfortunately, for athletes, time is often not an accepted ally.

Extraarticular injuries far outnumber intraarticular problems in the hip region. Thus, it is best to temper the interest in performing an extensive intraarticular workup for every athlete with pain around the hip. However, in our study of athletes who underwent arthroscopy with documented pathology, in 60% of cases the hip was not recognized as the source of symptoms at the time of initial treatment, and the patients were managed for an average of 7 months before the hip was considered as a potential contributing source.[5] The most common preliminary diagnoses were various types of musculotendinous strains (Table 13.2). Thus, it is prudent to at least consider possible intraarticular pathology in the differential diagnosis when managing a strain around the hip joint. Most important is thoughtful follow-up and reassessment when these injuries do not respond as expected.

A careful history and examination usually indicate whether the hip is the source of symptoms. Characteristic features are outlined in Table 13.3. Single-plane activities such as straight-ahead running are often well tolerated, whereas torsional and twisting maneuvers are more problematic in precipitating painful symptoms. Stairs and inclines may be more troublesome, and the same athlete who can run painfree on level surfaces may have more difficulty running hills. Prolonged hip flexion such as sitting can be uncomfortable, and catching symptoms are often experienced when rising from a seated or squatted position.

Hip symptoms are most commonly referred to the anterior groin and may radiate to the medial thigh. However, a characteristic clinical feature is the *C-sign*.[14] A patient describing deep interior hip pain will use a hand to grip above the greater trochanter, with the thumb lying posteriorly and the fingers cupped within the anterior groin. It may appear that the patient is describing lateral pain such as from the iliotibial band or trochanteric bursa, but characteristically, the patient is reflecting pain within the joint.

On examination, log rolling the leg back and forth is the most specific maneuver for hip pathology because this rotates only the femoral head in relation to the acetabulum and capsule, not stressing any of the surrounding neurovascular or musculotendinous structures. More sensitive examination maneuvers include forced flexion combined with internal rotation or abduction combined with external rotation. Sometimes these produce an accompanying click, but more important is simply whether the maneuvers reproduce the athlete's pain.

For long-standing conditions, athletes may secondarily develop extraarticular symptoms of tendonitis or bursitis or may have coexistent extraarticular pathology. A useful test for distinguishing the intraarticular origin of symptoms is a fluoroscopically guided intraarticular injection of anesthetic. The hallmark is temporary alleviation of symptoms during the anesthetic effect. With the more recent technology of gadolinium arthrography combined with magnetic resonance imaging (MRA), always be certain to include anesthetic with the injection to elicit this useful diagnostic response.

TABLE 13.2. Preliminary Diagnoses (Other Than the Hip).

Hip flexor strain (6)	Piriformis syndrome (1)
Lumbar disorder (5)	Sciatica (1)
Unspecified muscle strain (4)	SI disorder (1)
Adductor strain (3)	Stress fracture (1)
Iliopsoas tendonitis (2)	Contusion (1)
Trochanteric bursitis (2)	Malalignment (1)
Hamstring injury (2)	Don't know (1)

Source: From Byrd and Jones,[5] with permission of Clinics in Sports Medicine.

TABLE 13.3. Characteristic Exacerbating Features.

Straight plane activity relatively well tolerated
Torsional/twisting activities problematic
Prolonged hip flexion (sitting) uncomfortable
Pain/catching going from flexion to extension (rising from seated position)
Inclines more difficult than level surfaces

MANAGEMENT STRATEGY

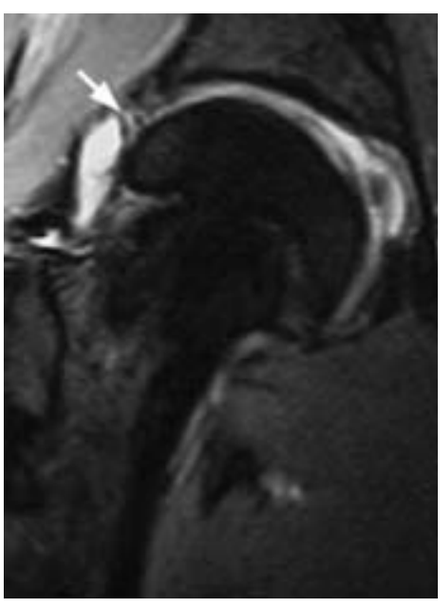
Labral lesions are the most common hip pathology, present in 61% of athletes undergoing arthroscopy.[5] Various studies have demonstrated that articular damage is present in association with more than half of all labral tears.[15–18] Often it is the extent of articular pathology that is the limiting factor as far as success of arthroscopic intervention. MRIs and MRAs are best at identifying labral lesions but poor at demonstrating accompanying articular pathology (Figures 13.5, 13.6, 13.7). Thus, the uncertain presence of articular damage is often the *wild card* in predicting the outcome of arthroscopy and should temper the surgeon's enthusiasm for predicting uniform success in the presence of imaging evidence of labral damage.

In our experience, in cases with documented arthroscopic evidence of joint pathology, MRI has a 42%

false-negative interpretation, which is reduced to 8% with MRA. However, with MRA, the false-positive interpretation doubles from 10% to 20%, with overinterpretation of labral lesions being the principal source of false-positive results.[19] Lecouvet et al. have also demonstrated MRI evidence of labral pathology among asymptomatic volunteers, and the incidence increases with age.[20] Thus, surgeons must still rely more on their clinical assessment of the athlete rather than simply MRI findings. With the increasing awareness of hip joint injuries in athletes and an increasing number of investigative studies being performed, a significant number of false-positive findings are likely, which could potentially lead the surgeon astray. It is also likely that many athletes participating in contact and collision sports over a long career may demonstrate MRI evidence of hip pathology even in absence of symptoms.

Also, much is not fully understood regarding the natural history of labral lesions. Seldes et al. demonstrated microvascular proliferation, suggesting a healing capacity of labral tears.[21] It is uncertain whether these will truly heal, but it is clear that some become clinically asymptomatic (see Figure 13.4). For the athlete with protracted mechanical symptoms in association with imaging evidence of hip pathology, the decision is simple; they can choose to live with their symptoms, or select arthroscopy with a reasonable expectation of success. The more difficult challenge is the athlete with more recent injury and MRI evidence of labral pathology. This situation is increasingly encountered as investigative studies are being performed earlier in the course of evaluation.

The following algorithm is proposed for athletes with recent injury, hip joint symptoms, and MRI evidence of labral pathology. The hip should be rested for 2 to 4 weeks to see if symptoms subside. If the pain subsides sufficiently, the athlete can then begin to resume activities and return to competition. If the symptoms are stable, it is unlikely that any further



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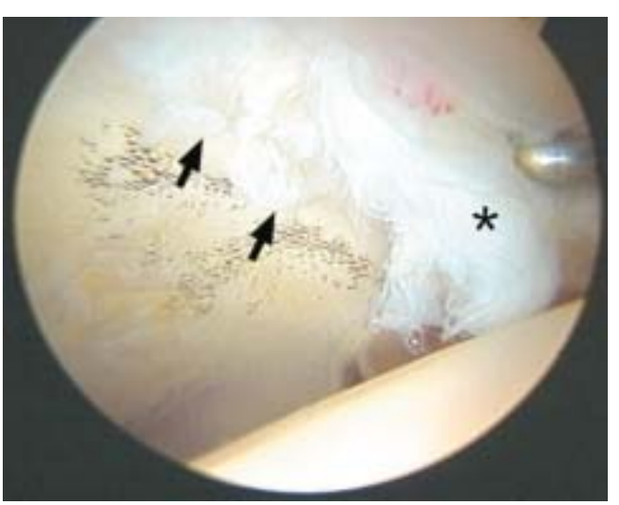

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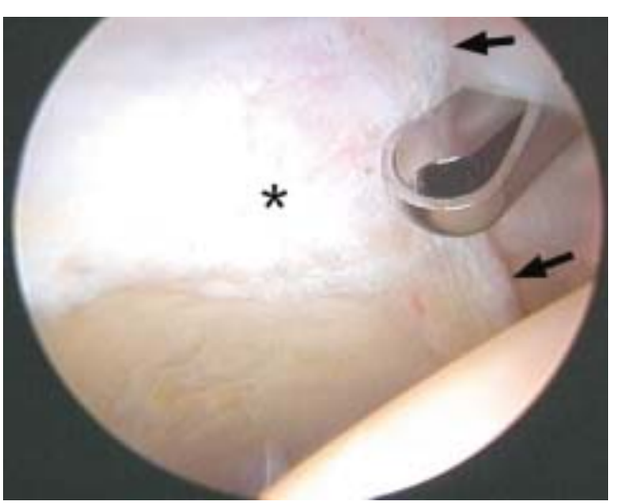

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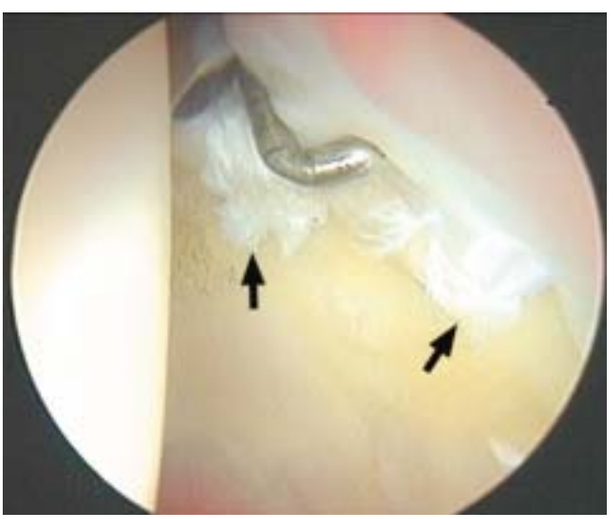
FIGURE 13.5. A 25-year-old top-ranked professional tennis player sustained a twisting injury to his right hip. (A) Coronal MRI demonstrates evidence of labral pathology (arrow). (B) Arthroscopy reveals extensive tearing of the anterior labrum (asterisk) as well as an adjoining area of grade III articular fragmentation (arrows). (C) The labral tear has been resected to a stable rim (arrows), and chondroplasty of the grade III articular damage (asterisk) is being performed.

A



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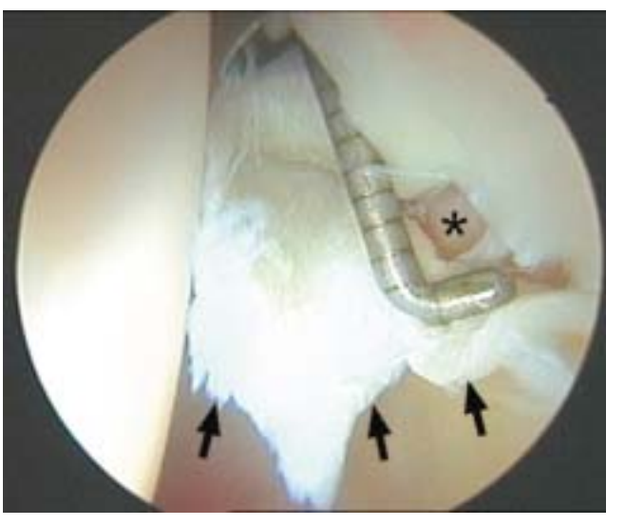

C

FIGURE 13.6. A 25-year-old top-ranked professional tennis player sustained a twisting injury to his left hip. (A) Coronal MRI demonstrates evidence of labral pathology (arrow). (B) Arthroscopy reveals the extent of labral pathology (arrows). (C) However, there was also an area of adjoining grade IV articular delamination (arrows) with exposed subchondral bone (asterisk). Chondroplasty was performed as the lesion was not amenable to microfracture. The athlete recovered successfully, but the length of recuperation was more protracted, with return to competition at 5 months.

harm is being created by not recommending surgery. If baseline symptoms persist, then surgical intervention can be undertaken at a more opportune time.

In general, for in-season injuries, a brief period of rest and a trial of conservative treatment is the most likely course to allow the athlete to return to competition during the current season. Preseason injuries present a greater dilemma. If surgery is still needed after a period of rest, then time is lost that could interfere with the upcoming season. Ultimately, the surgeon must call on his or her experience and that of others to make the best decision for the athlete under the particular circumstances.

It is unlikely that any harm is caused by not recommending surgery but, as with other joints, there are hip *abusers* who can cause further damage by neglecting the joint. Thus, the best perspective to offer an athlete is that it is unlikely that more harm or damage will occur in the absence of worsening symptoms.

RESULTS

In our study of 42 athletes, the average improvement using a modified Harris hip rating system (100-point maximum) was 35 points (preoperative, 57; postoperative, 92).[5] Ninety-three percent demonstrated at least 10 points of improvement. Also, of those questioned, 76% returned to their sport symptom free and unrestricted or at least at an increased level of performance, while 18% either chose not to return or were unable to return to their primary sport.

After understanding the potential benefits of an arthroscopic procedure, the next issue of paramount

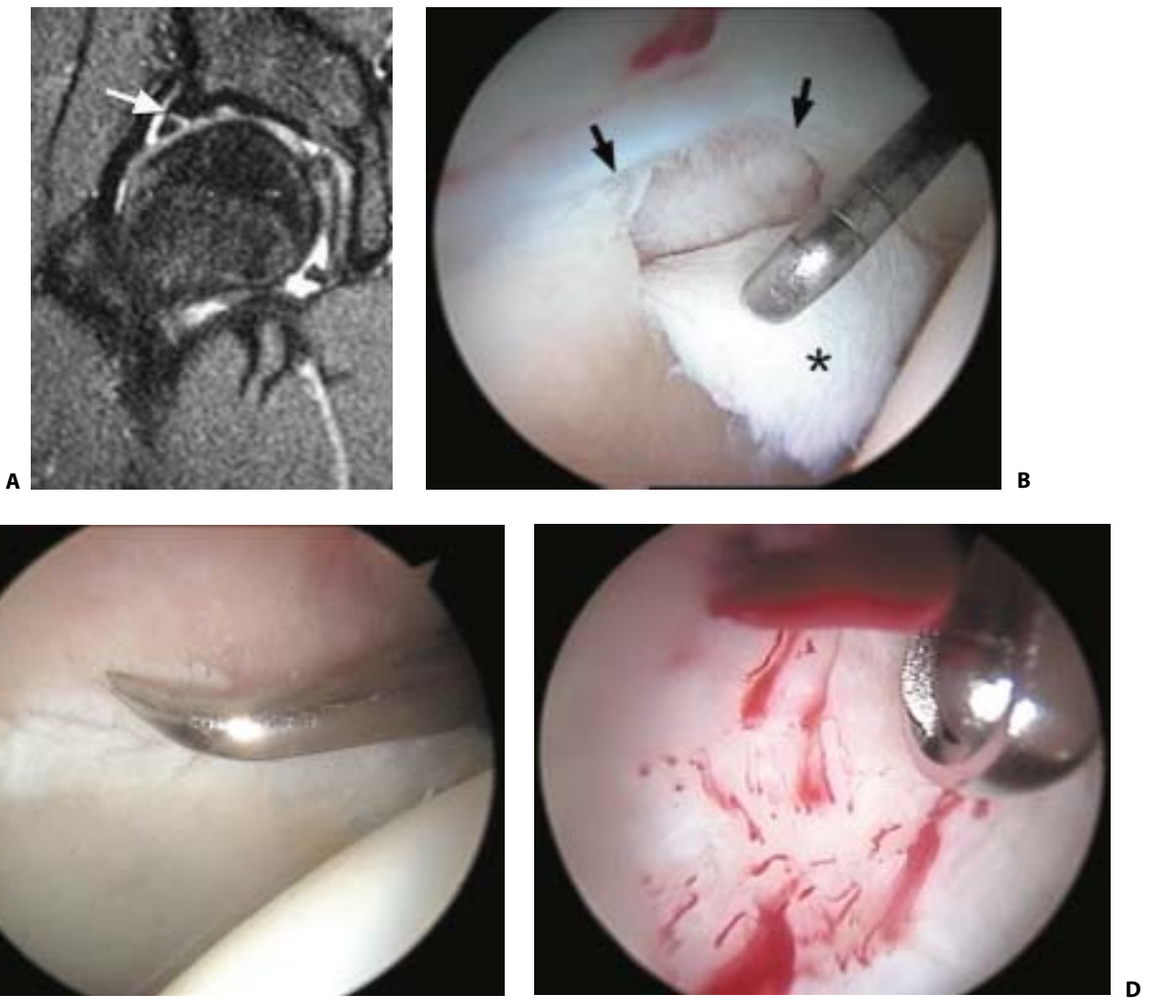

FIGURE 13.7. A 23-year-old elite professional tennis player sustained an injury to his right hip. (A) Coronal MRI demonstrates evidence of labral pathology (arrow). (B) Arthroscopy reveals the labral tear (arrows), but also an area of adjoining grade IV articular loss (asterisk). (C) Microfracture of the exposed subchondral bone is performed. (D) Occluding the inflow of fluid confirms vascular access through the areas of perforation. The athlete was maintained on a protected weight-bearing status emphasizing range of motion for 10 weeks, with return to competition at 3.5 months.

importance among athletes is how quickly they will recover. According to the same study, the greatest improvement (67%) was noted after the first month. Maximal improvement was achieved by 3 months, and these results were maintained among those athletes with 5-year follow-up (Figure 13.8).

Among athletes, the best results have been seen for impinging osteophytes, loose bodies, and rupture of the ligamentum teres (Figure 13.9). Impinging osteophytes are uncommon, but when recognized, the structural problem can be corrected, thus often resulting in pronounced symptomatic improvement. Loose bodies have traditionally been recognized as the clearest indication for arthroscopy. Predictable results have been further confirmed in the athletic population. Rupture of the ligamentum teres is an entity that has infrequently been reported in the literature. A propensity for this injury has been identified among athletes, being the third leading diagnosis, and it responds remarkably well to arthroscopic debridement. More average results have been reported for labral tearing and chondral injury. The results are poor in the presence of clinical evidence of arthritis, but those patients undergoing microfracture fared better than with simple chondroplasty.

The nature of the onset of symptoms seems at least partially to influence the results. Those with a specific history of a significant traumatic event fared the best (Figure 13.10), whereas those with insidious onset did the worst. Those of acute onset fared only slightly better than insidious, which suggests that, even in the presence of a modest explainable injury, some type of predisposition should be suspected and the results of arthroscopy may be less certain.

Among the reported group of athletes, one-third competed at the collegiate, elite, or professional

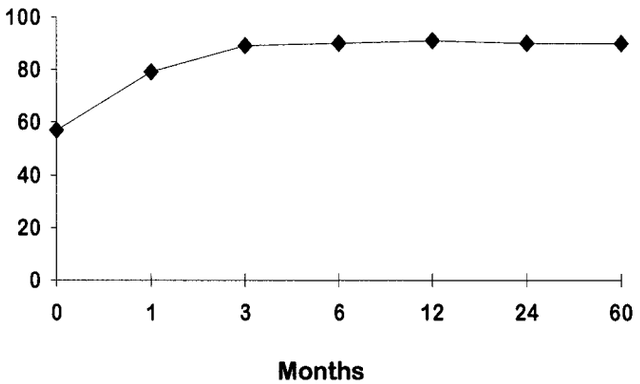

FIGURE 13.8. Average modified Harris hip scores among athletes at various intervals of follow-up.

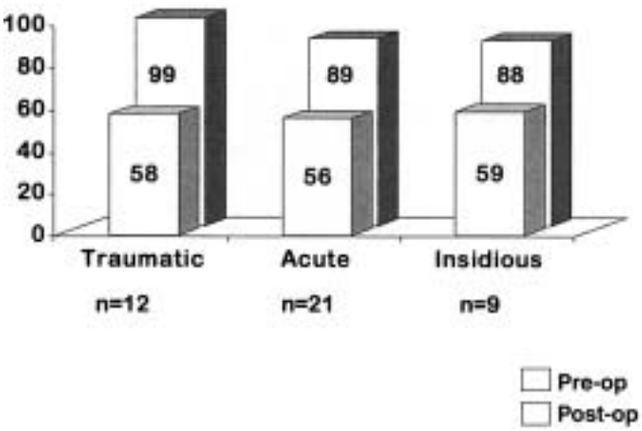

FIGURE 13.10. Results based on the onset of symptoms. (From Byrd and Jones,[5] with permission of Clin Sports Med.)

level (Figure 13.11). These groups had a higher baseline preoperative score than the recreational and high school athletes. This finding suggests that these athletes are functioning near the physiologic limits of the body and at a level at which small deficits may significantly influence the athlete's performance.

CONCLUSIONS

The indications for hip arthroscopy have been well established. The results among athletes appear to be favorable and, in fact, are somewhat better than those reported among a general population.

Intraarticular disorders in athletes may go unrecognized for a protracted period of time, most commonly being diagnosed as a strain. With an increasing awareness of these intraarticular problems and the intensity of services often available to athletes, joint injuries are now being diagnosed earlier. However, this emphasis for earlier diagnosis must be tempered. It is still likely that extraarticular injuries vastly outnumber injuries within the joint, and thus one should avoid the temptation for an extensive intraarticular workup for every simple muscle strain. Also, it is unknown whether early diagnosis necessitates early intervention. There is much that is not understood regarding the natural history of some of these intraarticular disorders. Thus, while it is difficult to say that a labral lesion identified by MRI will heal, it is uncertain how many of these may become clinically quiescent and asymptomatic or whether some of the signal changes evident on imaging may be caused by remote trauma that had previously become silent.

Nonetheless, arthroscopy has defined various sources of intraarticular hip pathology. In many cases, operative arthroscopy may result in significant symptomatic improvement. For some, arthroscopy offers a distinct advantage over traditional open techniques, but for many, arthroscopy now offers a method of treatment where none existed before.

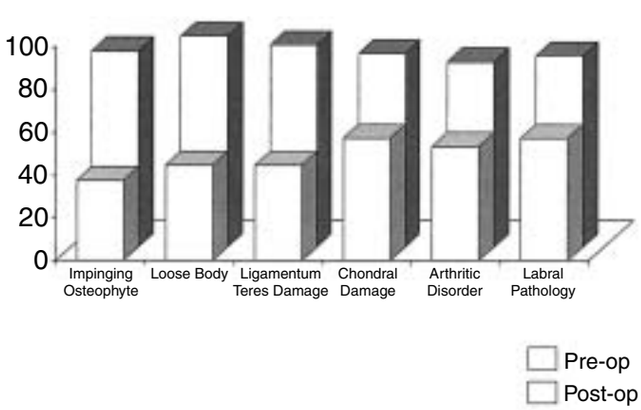

FIGURE 13.9. Results based on specific diagnoses. (From Byrd and Jones,[5] with permission of Clinics in Sports Medicine.)

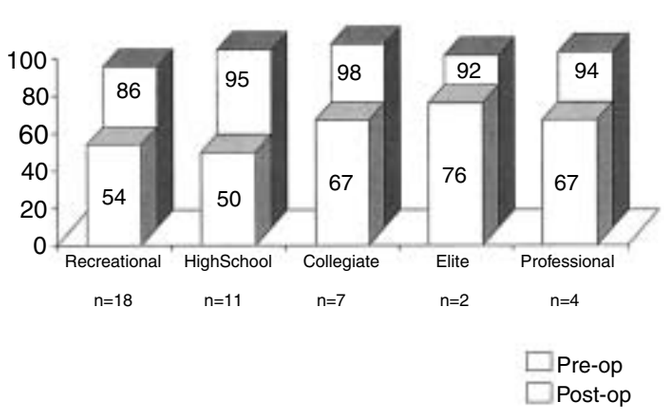

FIGURE 13.11. Results based on level of sport. (From Byrd and Jones,[5] with permission of Clinics in Sports Medicine.)

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