

Hip Injuries and Labral Tears in the National Football League

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Background: Injuries to the hip account for approximately 10% of all injuries in football, but definitive diagnosis is often challenging. Although these injuries are often uncomplicated contusions or strains, intra-articular lesions are increasingly found to be sources of hip pain.

Purpose: The objective was to define the incidence and etiologic factors of intra- and extra-articular hip injuries in the National Football League (NFL).

Study Design: Descriptive epidemiology study.

Methods: The NFL Injury Surveillance System was used to define all hip-related injuries from 1997 to 2006. Injuries were included if the athlete missed more than 2 days. All hip and groin injuries were included for evaluation. The authors also report on NFL players with intra-articular injuries seen at their institution outside of the NFL Injury Surveillance System.

Results: There were a total of 23 806 injuries from 1997 to 2006, of which 738 were hip injuries (3.1%) with an average of 12.3 days lost per injury. Muscle strains were the most common injury. Intra-articular injuries resulted in the most time lost. Contact injuries most likely resulted in a contusion, and noncontact injuries most often resulted in a muscle strain. In the authors' institutional experience, many of the athletes with labral tears have persistent adductor strains that do not improve despite adequate therapy.

Conclusion: Hip injuries represent a small but substantial percentage of injuries that occur in the NFL. A majority of these injuries are minor, with a return to play within 2 weeks. Intra-articular injuries are more serious and result in a significant loss of playing time. The "sports hip triad" (labral tear, adductor strain, and rectus strain) is described as a common injury pattern in the elite athlete.

Keywords: femoroacetabular impingement; hip labral tear; rectus injury; football

Athlete injuries about the hip and groin are relatively uncommon compared with injuries to other lower extremity joints. In professional athletes, hip injuries are most commonly reported in ice hockey^{19,24,36} and soccer players,^{11,14,33,38} but little data are available regarding elite American football players. Many types of injuries can occur about the hip in an athlete, including muscle strains, contusions, avulsion injuries, labral tears, and hip dislocations and subluxations.² The diagnosis and management of hip injuries is complex because of the challenging anatomy and biomechanics around the hip and groin.

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Football is a common sport in the United States and worldwide, with more than 60 000 collegiate athletes and 1 million high school athletes in the United States.^{26,27} Football players are at increased risk of all types of hip injuries. Iliac crest contusions (hip pointers) are commonly encountered secondary to a direct blow. Musculotendon strains are frequent, especially during the conditioning period of the season.^{1,34} Subluxation of the hip has been reported and is likely overlooked in many athletes with persistent hip pain.^{8,25} In addition, football players may be at higher risk for labral injuries due to the high-impact loading combined with increased peak axial and torsional forces that their hip must withstand.²⁰

Intra-articular lesions have increasingly been found to be the source of unexplained hip and groin pain.¹⁸ Symptoms include groin pain, anterior thigh pain, painful locking of the hip, and pain that is described as both sharp and dull.⁷ Patients are often misdiagnosed with a soft tissue injury rather than with intra-articular lesions. The acetabular labrum has an important role in joint stability

and joint congruity, creating a suction seal, and acting as a load-sharing structure.¹⁸ Injuries to the labrum likely will compromise the physiologic functions of the labrum.^{12,13} Labral tears typically occur as a result of some underlying bony abnormality such as femoroacetabular impingement, but in contact athletes they may occur as a result of traumatic subluxation or dislocation in the setting of normal bony anatomy.^{8,16,18} Labral injuries may occur in isolation or in combination with a labral tear, adductor strain, and a rectus strain.

To our knowledge, there have been no studies that have examined the specific incidence of hip injuries occurring in the National Football League (NFL). The purpose of this study was to identify the incidence of all types of hip injuries affecting players in the NFL. We also sought to determine the incidence of hip labral tears and determine if the rate of diagnosis has increased over the last 6 years as the understanding of this pathology has increased. Finally, we report on our experience with a single NFL team and suggest an algorithm for evaluation and treatment of an athlete with persistent hip pain.

METHODS

A retrospective review of all hip injuries that have been reported to the NFL from 1997 to 2006 was performed using the NFL Injury Surveillance System (NFLISS). The injury data are based on the primary clinical diagnosis made by the medical and training staff by each NFL team during the time period from training camp to the end of the season. The data are collected and submitted to a central office for data collection and interpretation. The injury is included in the database if it requires the player to be restricted for at least 1 practice or game day. The NFLISS has been used in multiple previous studies to document injury rates in the NFL.^{5,6,17,29}

Hip injuries were defined as any injury that occurred in the hip or groin region that resulted in at least 1 day off from practice or 1 game missed. They were subdivided into 5 groups: musculotendon strains (hip flexor, adductor, abductor, and external rotator), contusions, intra-articular injuries (fractures, dislocations/subluxations, labral tears, synovitis, capsulitis), sprains, and other injuries (bursitis, coccyx injuries, and neurovascular injuries).

The mechanism of injury was classified as contact (tackling, blocking, or collisions) or noncontact (sprinting, cutting, running, agility drills, or throwing). The athletes were divided by offense and defense, as well as by individual position. The injury rates were determined based on the exposure of an athlete to a game or practice event. An athlete-exposure (AE) was defined as 1 athlete participating in 1 practice or game. The injury rate was calculated as the ratio of injuries per 1000 AEs.

In addition to data collected by the NFLISS, we also report on a total of 19 NFL athletes seen over the past 7 years at our institution. Inclusion criteria for this aspect of the study was history of playing in the NFL, persistent groin or hip pain not relieved with a course of rest and physical therapy, and radiographic or MRI evidence of hip injury or groin strain. Athletes were evaluated for adductor

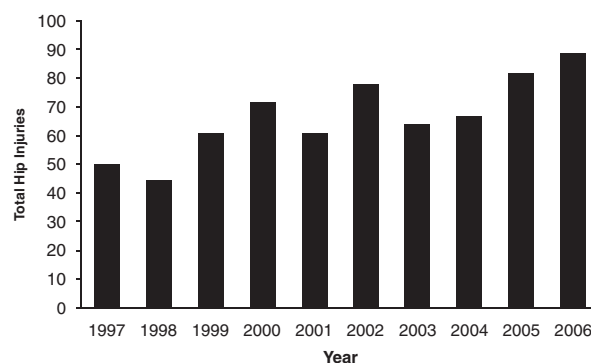


Figure 1. Yearly totals of hip injuries in the National Football League, 1997-2006.

and rectus strains by history and physical examination of the affected area. Athletes with a palpable defect in the rectus or adductor musculature, or with significant tenderness to palpation, were considered to have a possible muscle injury. Intra-articular hip lesions were identified with pain during flexion and internal rotation. All athletes in the study were examined with an anteroposterior (AP) pelvis, an AP of the affected hip, and a Dunn elongated neck view of the affected hip. Magnetic resonance imaging of the hip was performed using coronal inversion recovery and axial fast spin-echo body coil images, as well as high-resolution surface coil images of the right hip in the sagittal, axial, and oblique coronal planes using fast spin-echo techniques, for evaluation of intrinsic lesions.²³

Treatment of the athletes with internal coxa saltans or fracture/dislocations about the hip have been previously described.^{25,37} Athletes with a documented labral tear and pain with flexion and internal rotation of the hip were administered an injection of lidocaine with corticosteroid under ultrasound guidance. Those who continued to have persistent pain were treated with hip arthroscopy. This included examination of the peripheral compartment, labral debridement when indicated, and decompression of cam and/or pincer types of impingement if present. Postoperatively, the patient was placed in continuous passive motion daily for 4 weeks, with flexion of the hip from 30° to 70°. Weightbearing was restricted to 20-lb foot flat weightbearing on the affected leg for 4 weeks. Gradual physical therapy and strengthening was started at 4 weeks.

Statistical Analysis

The data are reported as total number of injuries, average days lost, and median days lost. Statistical analyses included the *t* test, analysis of variance, and a χ^2 test with Yates correction for values less than 5. Statistical significance was determined as a *P* value < .05.

RESULTS

The NFLISS was reviewed from 1997 to 2006. There were a total of 23 806 injuries, of which 738 were hip injuries in 678 NFL players. This represented 3.1% of all injuries in

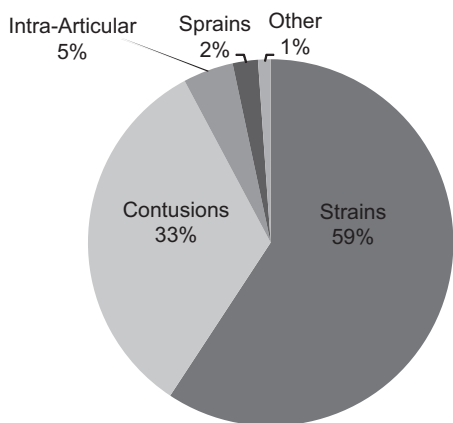


Figure 2. Hip injuries in the National Football League by type.

the NFL. The average days lost from a hip injury was 12.3 days, with a median of 4 days. The number of hip injuries per year ranged from 45 in 1998 to 89 in 2006 (Figure 1). There was a trend toward increased hip injuries per year ($R^2 = .84$) over the last 10 years.

Hip Injuries by Type

The most common type of hip injury was a muscle strain, followed by a contusion, intra-articular injury, and a sprain (Figure 2). The mean time lost for a specific injury was lowest for a contusion (5.3 days) and highest for an intra-articular injury (94.2 days, $P < .001$ vs other groups). Hip flexor strains were the most common type of muscle strain and the most common injury overall during the 10-year study period (268 occurrences). A hip contusion was the second most common injury (Table 1). Fractures and subluxation/dislocation events resulted in the greatest time lost (100.6 and 126.2 days, respectively).

Muscle strains were the most common overall hip injury, accounting for 59% of all injuries about the hip and 1.7% of all injuries in the NFL. The average time lost from all strains was 10.2 days, with a range of 1 to 197 days. Hip flexor strains accounted for 63% of all strains, with an average of 8.9 days lost per injury event. Interestingly, external rotator strains and proximal hamstring strains, although uncommon, resulted in a significantly longer period of days lost compared with other strains ($P < .01$ vs other strains).

Intra-articular injuries represented only 5% of all injuries about the hip, but accounted for the most time lost (Table 1). Fractures, of which all were posterior acetabular fractures, accounted for 45% of all intra-articular injuries. There were only 5 labral tears reported to the NFLISS, 1 each in 2004 and 2005 and 3 in 2006. No labral tears were reported in the NFLISS before 2004. Of note, 8 of 33 intra-articular injuries (24%) required surgery, including 4 of the 5 labral tears. Surgical intervention was highest for this group.

TABLE 1
Hip Injury Rates for National Football League Players, 1997-2006

Injury	Total	Mean Days Lost	Median	Range
Strains	268	8.9	4	1-82
Extensor strain	37	6.6	6	1-25
Rectus femoris strain	18	11.2	10	1-19
Adductor strain	17	14.2	5.5	1-197
Muscle (other)	17	15.9	5	1-139
External rotator strain	16	33.6 ^a	5	1-197
Abductor strain	15	8.4	7	1-20
Proximal biceps strain	9	29.3 ^a	14	3-149
Tensor fascia lata strain	5	6.4	2	1-11
Internal rotator strain	2	9	9	2-16
Contusions	237	5.28	3	1-30
Hip contusion	155	5.07	3	1-23
Hip pointer	82	5.6	3.5	1-30
Intra-articular injuries	32	94.2 ^a	94	3-283
Fracture	14	100.6	99.5	65-184
Dislocation/subluxation	9	126.2	122	16-283
Labral tear	5	64	63	3-127
Arthritis	2	63.5	63.5	5-124
Synovitis	2	11	11	6-16
Sprains	16	25	10	3-232
Other	8	10.3	6	2-11
Bursitis	5	5	4	2-11
Inflammation	3	5	5	5-5
Vascular trauma	1	21	21	

^a $P < .01$ vs all other groups.

Hip Injuries by Playing Position

Defense players were most commonly affected by hip injuries, followed by the offense and special teams. Strains were the most common type of injury for all groups, followed by contusions (Figure 2). However, although special teams account for relatively few plays per game and practice, they still account for 13% of all hip injuries. Among specific positions, hip injuries were most common in the secondary and among wide receivers (Table 2). Offensive linemen missed the most time from hip injuries, with an average time lost of 18.3 days. Strains were the most common at each position, accounting for 46% (wide receivers) to 70% (defensive line) of the injuries about the hip. Two labral tears were in tight ends, and 1 each in a linebacker, cornerback, and offensive lineman. Wide receivers accounted for 3 of the 7 posterior hip dislocations.

Hip Injuries by Mechanism

Blocking was the most common mechanism that resulted in a hip injury. The mean number of days lost from blocking was

TABLE 2
Hip Injuries by Playing Position

	Number	Mean Days Lost	Median
Offense	318	14.0	4
Quarterback	21	10.9	3
Running back	70	10.8	3.5
Tight end	44	12.8	4
Wide receiver	126	15	4
Offensive line	57	18.3	4
Defense	333	12.4	4
Defensive line	86	15.9	4
Linebackers	90	9.8	6
Secondary	157	11.7	4
Special teams	97	15.9	8

TABLE 3
Hip Injuries by Mechanism

Mechanism	Total	Mean Days Lost	Median Days Lost
Blocking	135	15.7	5
Sprinting	109	12.4	4.5
Tackled	108	18.5	4
Tackling	106	9.4	5
Cutting/changing direction	89	11.9	5.5
Collisions	76	8.8	3
Other noncontact	45	13.4	4
Unspecified	42	12.1	3
Kicking	16	37.8 ^a	20
Skill/agility drills	8	17.3	1
Throwing	2	2.5	2.5

^a*P* < .05 vs other groups.

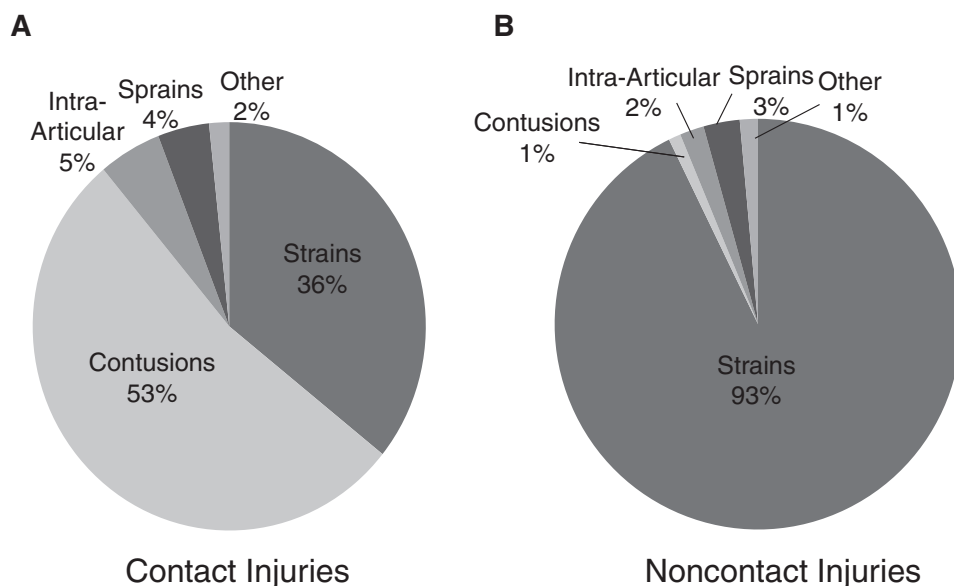


Figure 3. Hip injuries by mechanism. A, contact injuries most commonly resulted in a contusion, whereas almost all (93%) non-contact injuries resulted in a muscle strain (B).

15.7 days (Table 3). Contact injuries (blocking, tackling or being tackled, and collisions) resulted in a significantly higher rate of contusions than did noncontact injuries. Contusions accounted for 53% of contact injuries, compared with only 2% of noncontact injuries. Tackling or being tackled also resulted in 12 of the 23 acetabular fractures or subluxation/dislocations. A majority of the injuries that occurred with noncontact mechanisms were strains (Figure 3). Kicking resulted in the most time lost (37.8 days, *P* < .05 vs all other mechanisms), and all kicking injuries were muscle strains. The labral tears occurred secondary to noncontact mechanisms in 3 athletes, tackling in 1 athlete, and unknown in 1 athlete.

Institutional Experience with Intra-articular Lesions in the Hip

Our institution has treated a total of 19 NFL players over the past 7 years with intra-articular hip injuries. Many of these

athletes were seen during the off-season period and were therefore not included in the NFLISS. There were 13 athletes with labral tears, 3 with traumatic posterior subluxation of the hip, 2 with internal coxa saltans, and 1 athlete had a posterior wall acetabular fracture. The athletes with traumatic posterior subluxation have been previously reported.²⁵ The mechanism most commonly was a fall on a flexed knee with the hip adducted and flexed, although 1 athlete sustained the injury while changing direction. Two of the athletes recovered without sequelae and were able to return to playing. One developed osteonecrosis but was able to continue as a running back for 3 years. We have previously described internal coxa saltans as a result of overtraining in NFL athletes as well.³⁷ Two offensive linemen developed pain in the groin during training camp practices exacerbated by high-knee running, stance drills, and bucket steps. Both players were treated with ultrasound-guided injection of steroid and local anesthetic into the iliopsoas sheath. Both



Figure 4. Hip arthroscopy. A, a large labral tear present in a National Football League player. The tear originates off the anterior superior labrum. B, debridement of the labral tear with specialized hip arthroscopic instruments. C, after debridement of the labral tear, there is a stable rim with no evidence of cartilage injury.

were symptom-free by 4 weeks and were able to complete the season.

The majority of the players seen with intra-articular hip lesions had labral tears. Thirteen players were identified with labral tears based on a physical examination showing a loss of internal rotation and pain with flexion and internal rotation. Magnetic resonance imaging was used to confirm the diagnosis in all the athletes. Seven of the 13 players (54%) initially had a groin or hip flexor strain that continued to limit motion, especially internal rotation. Magnetic resonance imaging demonstrated both adductor strain and hip labral lesions in 6 (46%) of the athletes. Two athletes (15%) had evidence of a rectus tear, adductor strain, and associated hip labral lesion on MRI. In all 13 athletes with a labral tear, radiographic evidence of femoroacetabular impingement was present. In addition, cartilage loss was present on the anterosuperior femoral head in 9 of the 13 athletes, and 4 of the 13 athletes had additional cartilage loss on the acetabulum identifiable on MRI with the use of a fast spin-echo pulse sequence. Seven of the athletes with labral tears were evaluated with a Swiss axial MRI scan to determine the alpha angle. The average alpha angle in these athletes was 63.2° (range, 60.0° to 71.1°). There was no difference in alpha angle in those who required surgery (5 athletes, 61.2°) compared with those who did not (2 athletes, 65.8°). Five of the athletes required surgery, whereas the other 8 athletes with a labral tear did not require surgery and were able to return to play after a course of physical therapy.

One athlete who underwent surgery at our institution for a symptomatic labral tear and loose bodies had significant cartilage loss and erosive changes at the time of arthroscopy consistent with progressive cartilage wear secondary to primary cam-type femoroacetabular impingement. This patient underwent labral debridement and removal of loose bodies with cam decompression. The athlete subsequently retired from the NFL at 35 years of age, although he was able to play 1 season after recovery from the surgery. Three athletes underwent hip arthroscopy with focal labral debridement and rim decompression for primary pincer impingement with broken pincer lesions

(fragmentation of the anterosuperior rim at the primary site of impingement). The fifth athlete underwent labral debridement with combined rim and cam decompression for combined femoroacetabular impingement. Four of 5 of these athletes returned to play at the elite level by 6 months after surgery (Figure 4).

DISCUSSION

Hip injuries in the young athlete, especially in high-energy contact sports, have received considerably less attention than injuries to the knee, shoulder, and ankle joint. The complex anatomy about the hip makes assessment of both intra-articular and extra-articular injuries difficult. The hip must withstand loads of up to 8 times body weight with jogging, and likely encounters higher forces during vigorous athletic competition.⁹ Imaging the hip with MRI is difficult, but recent advances have made the diagnosis of labral tears and chondral injury significantly more accurate.²³ The purpose of this study was to examine the incidence and types of injury that occur about the hip in the NFL. We examined injury patterns about the hip for the past 10 years (1997-2006), and report on our institutional experience on the management of professional football players with intra-articular hip injuries that have been treated over the past 7 years.

Muscle strains were the most common injury that occurred about the hip in this series, accounting for 60% of all injuries. Strains were most likely to occur with sprinting and cutting/changing direction, although they did account for more than one-third of all contact injuries as well. Hip flexor strains were the most common injury overall, and represented 63% of muscle strains. Tyler et al³⁶ examined the risk factors for hip strains in professional hockey players. In 47 players tested, 8 players experienced 11 adductor muscle strains, and there were 4 hip flexor strains. Preseason hip adduction strength was 18% lower in the players who subsequently sustained an adductor muscle strain compared with that of uninjured players. They concluded that preseason hip strength testing can

identify athletes at risk for developing muscle strains about the hip. In a subsequent study, a dedicated hip strengthening program was found to lower the incidence of hip strains in these elite athletes.³⁵ Arnason et al³ found that a history of groin strains or limitation of abduction led to a higher rate of hip muscle strains in professional soccer players. Similar programs may be beneficial in the NFL to identify those players who are at risk for hip strains and treat them with a dedicated hip strengthening and stretching program in the preseason to decrease the rate of injury during the regular season.

Contusions about the hip were the second most common injury seen in this study. The incidence was similar in offensive, defensive, and special teams players. Not surprisingly, most hip contusions occurred because of a contact mechanism. The mean time lost from a contusion was only 5 days, suggesting that most players recover quickly and many will not miss more than 1 game. Only 1 player missed more than 4 weeks with a hip contusion. The term "hip pointer" was coined by Blazina⁴ in 1967 as a new type of hip injury due to direct contact to the iliac crest. There is usually an associated subperiosteal, intramuscular, or subcutaneous hematoma that can cause significant disability. In this series, hip pointers accounted for 32% of the contusions about the hip, but did not result in increased disability compared with generalized hip contusions. Other studies have found that hip pointers can result in a longer period of time lost.¹⁰ Although treatment strategies across the NFL differ, strategies to minimize time lost include rest, immobilization in knee flexion, ice, and compression to maintain motion and minimize hematoma formation.²

Fractures and dislocations of the hip have been described in multiple studies in the professional athlete.^{25,30} In addition to professional football, it has also been described in rugby and soccer.¹⁴ In our study, fractures of the posterior acetabulum accounted for 43% of the intra-articular hip injuries seen, and dislocations/subluxations for 28%. Overall, these represented 3% of all hip injuries, but accounted for the most time lost from practice and games. Moorman et al²⁵ reported on 9 dislocation/subluxation events that occurred over a 10-year period in the NFL. The mechanism was a fall on a flexed and adducted hip in a majority of the cases. In their study, 6 of the 9 athletes recovered after a period of toe-touch weightbearing and returned to the previous level of competition. Two players developed severe osteonecrosis and ultimately required total hip arthroplasty. A previous case report also described a traumatic dislocation that resulted in severe osteonecrosis in a professional football player.⁸ Although uncommon, fractures and dislocations of the hip can occur in the elite athlete. Because of the high risk of osteonecrosis, players suspected of having a fracture or dislocation, or with persistent pain in the setting of a presumed strain, should be evaluated with MRI to rule out a more serious injury.

Improved imaging techniques and a higher index of suspicion have increased the recognition and treatment of intra-articular injuries of the hip. Labral tears have classically been described after major trauma to the hip or, more recently, in patients with relatively minor injuries.² Groin pain is often the predominant symptom, along with activity-related pain

and night pain. There is almost always pain in the groin with the impingement position (flexion, adduction, and internal rotation) and oftentimes there will be a loss of internal rotation of the hip due to underlying bony impingement.¹⁸ There is often a considerable delay to diagnosis, likely due to the recent recognition of the labrum as a source for pain and the complex anatomy about the hip.⁷ A recent study demonstrated that the average time from injury to accurate diagnosis and treatment of labral injury was 21 months and required evaluation by 3.3 different health care providers.⁷

The current study demonstrates similar difficulties in the detection and reporting of labral lesions of the hip. The NFLISS, which has been used in multiple previous studies to document injury rates in the NFL,^{5,6,17,29} documented only 5 labral tears over the previous 10 years, and all of these presented within the last 2 years. In contrast, the senior authors have seen 13 labral tears at our institution over the previous 7 years. The discrepancy seen is likely due to the difficulty in diagnosing labral lesions in the hip, as well as the fact that it is a relatively new diagnosis that was not commonly encountered in the literature until recently. Increased awareness of the presence of labral tears in athletes should lead to more accurate diagnosis as well as prompt treatment of these injuries.

At our institution, 19 players were evaluated for intra-articular hip injuries over the past 7 years. Thirteen of these athletes had MRI-documented labral tears and 1 had a nondisplaced acetabular fracture secondary to a lateral impact mechanism. Many of the athletes seen at our institution were not included in the NFLISS as their injury developed during an off-season training program or did not require the athlete to miss time during the regular season. Over half had a lingering groin strain that was not improving as expected. Seven of the 13 athletes with labral tears had MRI documentation of concomitant adductor or hip flexor muscle-tendon injury. Five of the players with labral tears required surgery; the remaining 8 athletes were able to return to play without surgical intervention. The average alpha angle was 63.2° in the athletes studied, higher than normal as previously described.^{21,28,31} We concluded that most of these athletes had evidence of bony abnormalities on radiographic studies, suggesting that there is a strong association between labral pathology and impingement lesions even in the contact athlete.

The presence of a labral tear typically does not require immediate surgical management, as athletes have been able to return to play without surgical intervention. In-season management of the injury may be helped with an intra-articular injection of cortisone mixed with lidocaine and marcaine. This injection helps to confirm the diagnosis of an intra-articular source of hip pain, and may have the added benefit of improving symptoms. However, if symptoms persist despite nonsurgical management and the athlete is unable to function at the required level, arthroscopic treatment of the labrum with debridement or repair should be considered. If underlying bony impingement is present, it should be addressed at the same time, as studies have reported that the majority of failed hip arthroscopies are associated with unaddressed or inadequately addressed femoroacetabular impingement lesions.^{15,32}

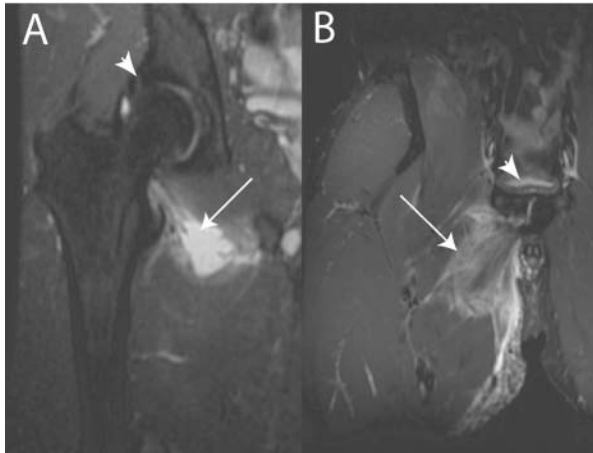


Figure 5. The sports hip triad. Athletes with hip pain often present with a characteristic combination of injuries about the hip. A, MRI demonstrating a labral tear with proximal muscle injury. Images were obtained using coronal inversion recovery and axial fast spin-echo body coil images, as well as high-resolution surface coil images of the right hip. There is evidence of right adductor magnus injury with a defined fluid collection of approximately 5 cm in the anterior aspect of the adductor magnus (arrow). There is also evidence of an anterior labral tear that begins at its base and extends through a fissure through the base of the superior labrum (arrowhead). B, coronal fast spin-echo MRI of the right groin in a National Football League running back with persistent groin pain. There is injury to the adductor tendon origin from the pubic symphysis (arrow), as well as degenerative changes of the pubic symphysis with insertional tendinosis of the rectus insertion (arrowhead).

Football players are subject to increased axial and rotational loads during competition, up to 12 times body weight.¹⁵ It has been our experience that these athletes with hip pain can present with a triad of hip injury including a labral tear, adductor strain, and a rectus strain; we call this a “sports hip triad” (Figure 5). Although these injuries may occur alone, they often are found in combination, particularly labral tears and adductor strains. Evaluation of these athletes should take into account all these areas, as it is often difficult to distinguish these entities by physical examination alone. The exact mechanism is unclear, but muscle strains across the hip may put the athlete at increased risk for altered mechanics, allowing for the development of labral tears in those athletes at risk. Once a muscle strain in the adductor occurs, the athlete may be at increased risk of a rectus strain or athletic pubalgia due to an imbalance of forces across the anterior hip musculature.²² Flexion, internal rotation, and adduction should be evaluated in these athletes because this impingement position is highly sensitive for intra-articular injury. If a labral tear is suspected, plain radiographs should be obtained to evaluate for underlying bony abnormalities such as femoroacetabular impingement or dysplasia that would predispose the athlete to labral injury.^{16,31} An AP pelvis and an elongated neck view (Dunn view) taken with the hip flexed at 45°, 20° of abduction, and

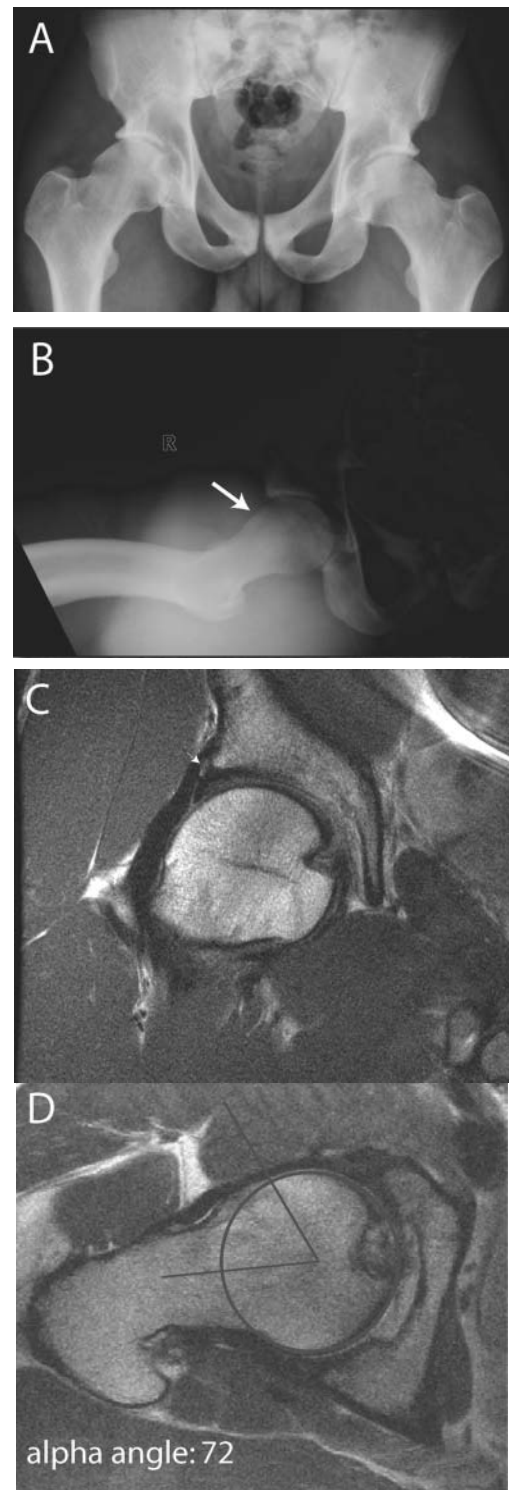


Figure 6. Radiographic evaluation of an athlete with hip pain. A, anteroposterior pelvis of a National Football League athlete with a pincer lesion. B, elongated neck/Dunn view of a hip demonstrating a cam lesion (arrow) indicative of femoroacetabular impingement. C, coronal MRI demonstrating a tear of the anterior labrum that extends to the base of the superior labrum (arrowhead). D, axial MRI demonstrating a cam-type lesion and an increased alpha angle as described by Nötzli et al.²⁸

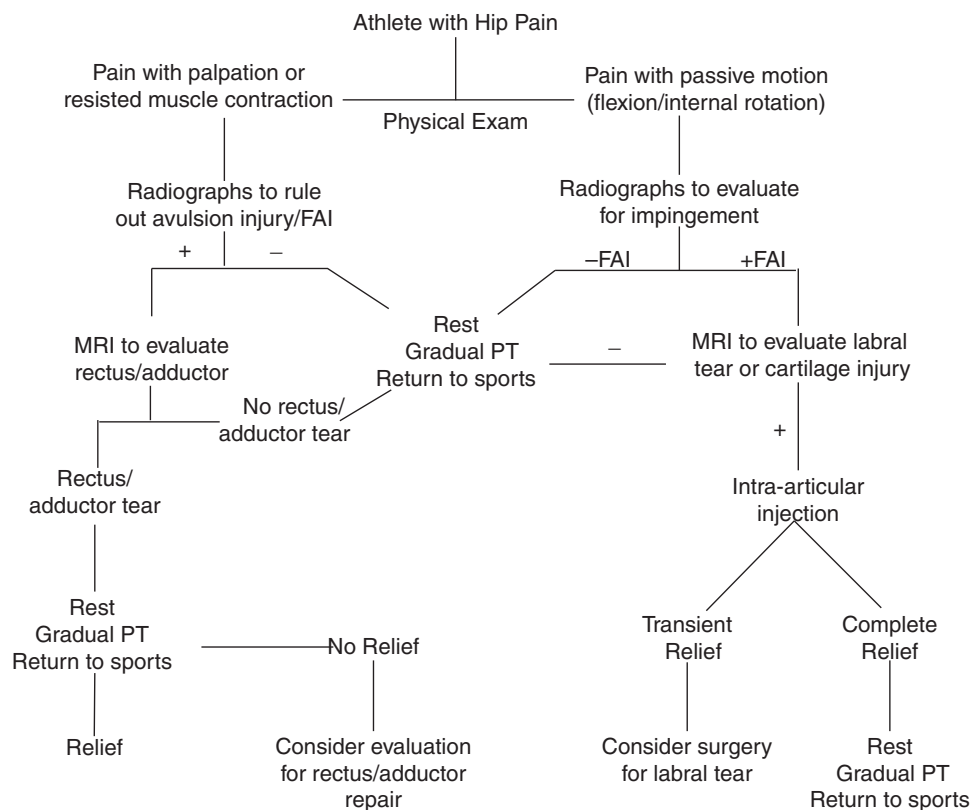


Figure 7. Algorithm for treatment. FAI, femoroacetabular impingement; PT, physical therapy.

neutral rotation should be obtained initially to evaluate for a cam lesion and acetabular retroversion (Figures 6A and 6B).²¹ Both high-quality cartilage-sensitive noncontrast MRI as well as magnetic resonance arthrography have been shown to be sensitive at detecting labral lesions and should be obtained to evaluate for intra-articular injury²³ (Figures 6C and 6D). Axial views obtained parallel to the femoral neck (Swiss protocol) allow for better evaluation of cam impingement and measurement of the alpha angle (Figure 6D).²⁸

Management of the sports hip triad depends on the symptoms present (Figure 7). After appropriate imaging evaluation, we recommend an intra-articular lidocaine and marcaine injection to confirm the intra-articular portion of the injury. Therapy should be focused on regaining flexibility and strength across the hip joint in all muscle groups. If conservative treatment fails, operative management should address all aspects of the sports hip triad to facilitate a full recovery.

CONCLUSION

Hip injuries, although not as common as shoulder and knee injuries in the NFL, do account for a significant proportion of injuries in this group of elite contact athletes.

The majority of injuries are to the soft tissues surrounding the hip and are usually self-limited. However, there is increasing evidence that labral injuries and other intra-articular injuries do occur in these elite athletes and result in a significant amount of time lost.

The sports hip triad consists of an intra-articular lesion (labral tear) with associated abnormalities of the surrounding musculature including the adductor and rectus abdominus, which share a common sheath. Deviations in the muscle tension across either the adductor or the rectus, by necessity of their anatomic arrangement, lead to subsequent injury to the corresponding muscle. These muscle imbalances associated with the classic definition of athletic pubalgia (rectus and adductor “strain”) have an effect on, or are caused by, intra-articular injury. Alterations in the mechanics of the hip joint due to labral lesions or underlying impingement lead to changes in the dynamic muscle forces across the pelvis. In cases where presumed primary adductor and rectus injuries do not respond to the typical course of recovery for muscle injury, a strict evaluation for an underlying intra-articular source should be examined as an alternative primary causative agent. If primary intra-articular pathologic changes are identified in these recalcitrant cases, then treatment of this injury may be required for full recovery from the constellation of symptoms (the sports hip triad). In cases where the muscle

dysfunction has progressed to defects in the rectus or adductor, or in cases where a primary muscle imbalance leads to intra-articular injury, then the muscle defects may need to be surgically addressed.

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