Shoulder and Elbow Injuries in Football

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Introduction

Shoulder and elbow injuries are commonly seen in football athletes. Approximately 80,000 shoulder injuries occur in high school football players annually, with around 9% of these injuries requiring surgical management [1]. During the 2004 NFL Combine, 49.7% of athletes reported having a shoulder injury during their playing time, with 34% requiring surgical management [2]. Shoulder instability, acromioclavicular (AC) injuries, sternoclavicular (SC) injuries, rotator cuff strains and sprains, and pectoralis injuries are the most common injuries encountered in the shoulder. In regard to the elbow, dislocations, ligamentous sprains, and fractures make up the most commonly encountered diagnoses. Physicians should always keep an eye out for the less commonly seen injuries such as coracoid fractures and physeal fractures, especially around the SC joint in young athletes. Return to play after fractures about the shoulder and elbow should follow sound orthopedic management and healing to avoid re-injury. This chapter focuses on the most commonly encountered in-season football injuries of the shoulder and elbow.

Shoulder

Shoulder Instability/Labral Tears

Shoulder instability is the most common shoulder injury seen on the football field, with anterior instability being more common than posterior instability. The degree of instability ranges from mild instability, or subluxations, to frank dislocations

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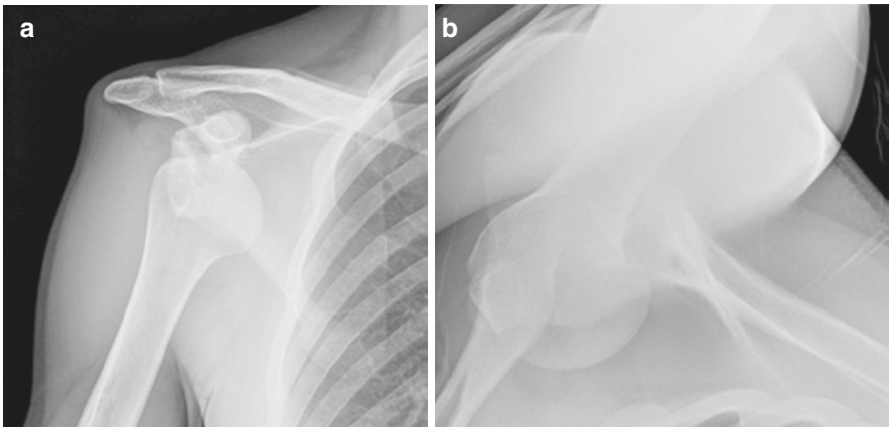

Fig. 1.1 (**a**, **b**) Grashey and axillary images of an anterior shoulder dislocation. Ideally, reduction is performed on the field. Return to play that season is an option based on imaging and degree of instability

requiring a reduction (Fig. 1.1). In collegiate football, the most common time for shoulder instability events occurs during spring practice, with an occurrence of 0.40 events per 1000 athlete exposures (AEs) [3]. During a 10-year time frame with a major Division 1 college team, authors performed 30 Bankart repairs, for around a 3% per year incidence [4]. During the 2004 NFL Combine, 14% of 336 athletes had had a previous Bankart repair during their playing days, indicating just how common this injury is [2].

When managing anterior instability in-season, there are numerous factors that go into the decision-making process, as recurrence rates are exceedingly high in this population, approaching 90%. In a multicenter study of collegiate athletes, 45 athletes were followed after an anterior instability event, and 73% of athletes were able to return that season, at a median of 5 days. Sixty-four percent had recurrent instability that season, and, of those who had recurrent instability, only 67% were able to complete the season. Athletes who had a subluxation were six times more likely to complete the season than those who had a frank dislocation. When looking at time lost and return to play, a Simple Shoulder Test (SST) and a Western Ontario Shoulder Instability Index (WOSI) score were most predictive of return to play, with the SST being inversely predictive of time to return [5]. In looking at off-season surgical repair, collegiate athletes were able to return the following season, with only a 10% recurrence rate. If, after the season, the decision was made to pursue continued nonoperative management, the athlete had a 60% recurrence the following season. This study indicates that the risk of recurrence is still very high, even if the instability is successfully managed for the current season [6]. In looking at management at the professional level, over a 9-year period, 92% of athletes in the NFL were able to return that season following an instability event. Return to play was, on average, the same game for a subluxation and 3 weeks for a dislocation. There was a 55% recurrence rate, which occurred, on average, two and a half weeks after return [7]. In a

study of high school athletes, 26 out of 30 (87%) athletes were able to return after shoulder instability, at an average of 10 days. Ten of the 26 athletes (37%) had recurrent events during that season, with an average of 1.4 events during the rest of the season [8].

Posterior instability, although less common than anterior instability, is still a common issue with football players (Fig. 1.2). In an MRI study, football players were 15 times more likely to have a posterior labral tear on MRI than the general population [9]. In an evaluation of athletes with posterior instability at the United States Military Academy, 82% eventually required surgical repair. All athletes who had pain and symptoms with bench press required repair, indicating that this activity may be a good test for those that will fail nonoperative management [10]. Fortunately, outcomes of posterior labral repairs are very good, with 93% returning to football and 96% having excellent American Shoulder and Elbow Surgeon scores and high satisfaction levels [11].

Superior labrum anterior to posterior (SLAP) tears are common injuries in football players (Fig. 1.3). In the NFL, SLAP tears are most common in the offensive lineman, with 28% occurring in this group in one study [12]. Treatment is directed to reducing pain and symptoms. Physical therapy, NSAIDs, and icing are first-line treatments. Modifying the end range of motion can help minimize symptoms, and a Sully brace or harness can often be helpful in that regard. Ultrasound-guided corticosteroid injections can help reduce pain and inflammation and may help in managing an in-season injury. During one NFL season, 60% of players with a SLAP tear were able to be treated nonoperatively initially [12]. If symptoms persist, surgery (arthroscopic repair) after the season has demonstrated good outcomes in football players. If symptoms limit ability to play despite maximizing nonoperative

Fig. 1.2 Axillary MR arthrogram image with a large posterior labral tear. Return to play is an option with rehab and bracing. Surgery is typically required after the season

Fig. 1.3 Coronal MR arthrogram image of a superior labral tear (SLAP). The dye can be seen imbibing under the superior labrum. Treatment is based on symptoms

management, in-season repair may be necessary. Wide receivers, quarterbacks, and defensive linemen were the most at-risk positions for needing surgical repair during an NFL season [12]. The time to return to play after a surgical repair is usually around 4–6 months.

Author's Preferred Approach

When dealing with a football player with an in-season shoulder instability event, the evaluation should start with a good history and physical examination. It is important to find out if this is a first-time event or if this has been a recurrent problem. It is also important to investigate the mechanism, as this may direct you toward an anterior or posterior instability. An evaluation of global laxity is important, because patients with increased generalized laxity are at a higher rate of recurrence. A physical examination including range of motion, strength, and tenderness to palpation should be performed. A thorough neurovascular exam should be performed of the upper extremity, and this should be compared to the contralateral side. An evaluation of stability is performed, including an anterior apprehension, a relocation test, and a load and shift, either anterior or posterior, depending on instability. Midrange signs of instability could be a concern for bony involvement, such as a bony Bankart on the glenoid or a large Hill-Sachs lesion on the humerus, and should be investigated further. In the case of a simple subluxation or dislocation, plain radiographs are the first-line imaging modality. Grashey anteroposterior and axillary views are typically all that are needed initially. In an athlete with no signs of fracture or subluxation on radiographs, magnetic resonance imaging (MRI) or, preferably, a magnetic resonance arthrogram (MRA) can be obtained in an elective manner based on schedule availability (Fig. 1.4). For athletes with signs

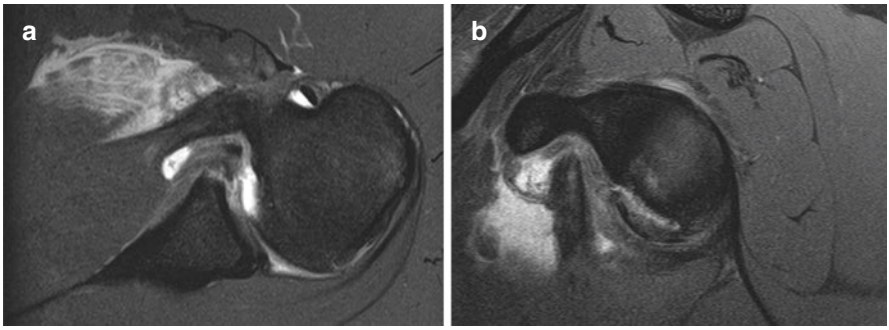

Fig. 1.4 (**a**, **b**) Axillary and sagittal MRI arthrogram images demonstrating an anterior-inferior labral tear and bony Bankart lesion

Fig. 1.5 Images of a shoulder harness (**a**) and a Sully brace (**b**) that are used in athletes with shoulder instability

of fracture or evidence of subluxation on radiographs or for concerning physical examination findings, such as midrange instability, further imaging such as MRI or computed tomography (CAT) scan should be obtained prior to returning to play.

Prior to returning to play, a physical therapy regimen should be instituted with the goal of reducing inflammation and achieving a full range of motion and strength. Once this has been achieved, a return to play program is instituted. I prefer a shoulder-stabilizing brace, such as a Sully brace or shoulder harness, and a graduated return to play (Figs. 1.5a. and 5b). That often entails a few "noncontact" practices, followed by a return to play based on progress.

As recurrence is common, it is important to have a plan in place to handle these events. For younger athletes and for teams not in contention for a major title, a "one recurrence rule" is a good rule of thumb. In athletes who do have a recurrence, especially a true dislocation, it is probably best to proceed to surgical repair. For athletes who are competing for a title or who wish to play for college or professional exposure, a conversation should be held with the athlete, their parents, the coaches, and the athletic trainers. All involved parties should be aware that recurrent events may lead to further injury, bone loss, or decreased success of operative repair. At that point, an informed decision can be made about returning. Multiple recurrent events should be discouraged, and surgical treatment should be recommended in those cases. In any case, off-season repair should be considered the gold standard for any athlete returning to contact sports the following season.

Acromioclavicular (AC) Injury

The AC joint is commonly injured from a direct blow to it, often from a tackle on the ground. In an evaluation of professional football players in the NFL, the incidence of AC injuries was 26 per 1000 AEs, with the majority being type 1 injuries (Fig. 1.6). The average return to play was 10 days, with quarterbacks being the most commonly injured, and only 1.7% required surgical intervention [13]. In collegiate football, the incidence was slightly lower, with 3.4 per 1000 AEs, with 96% being type 1 or type 2. Return to sport was 11 days for type 1 or type 2 and 32 days for type 3 or greater [14].

Return to play is typically based on symptoms and tolerability. Anti-inflammatories, physical therapy, icing, and modalities can be helpful in reducing

Fig. 1.6 Grade 2 AC separation treated conservatively during the season

symptoms. An intraarticular corticosteroid injection can also be helpful in reducing symptoms but often takes a few days to have an effect. Donut pads and special shoulder pads with AC cutouts can be helpful in reducing symptoms.

Local anesthetic injections, including longer-acting agents such as bupivacaine or ropivacaine, are commonly used at the highest levels, before or during games, to help reduce pain at the joint. Studies have shown little to no long-term detrimental effect on the AC joint by utilizing these injections. In one study of 50 rugby athletes, over ten seasons with an average 60-month follow-up, there were on average 4.6 injections per patient. Seventy-two percent of the athletes perceived the injections as helpful, 3% felt the injections were detrimental, and 0% would not have the injections again [15].

Author's Preferred Approach

For an in-game injury, a physical examination is performed with a special focus for crepitation or step-off of the AC joint, which would necessitate a radiograph of the AC joint to look for fracture or more severe separation. If, based on palpation or x-ray, it is determined to be a mild AC separation, then an intraarticular injection with bupivacaine is utilized. The AC joint is padded, and the athlete is taken through sideline drills to assess symptoms. If symptoms are mild, the athlete can return to play.

Following the game, symptoms are managed with anti-inflammatories, icing, and physical therapy after radiographs of the AC confirm a mild AC separation. A pregame local anesthetic can be considered in certain situations, typically reserved for the highest levels of collegiate and professional football. Donut pads are utilized until symptoms resolve. Although surgery is rarely needed, off-season surgery with a distal clavicle resection can be helpful in cases of type 1 or type 2 with persistent pain. More severe separations, such as type 4 or type 5, will often need acute surgical fixation.

Sternoclavicular Injuries

SC injuries are rare, with only a few cases reported in the literature in football players. Anterior subluxations can be treated symptomatically with rehab, NSAIDs, icing, and padding over the joint. Cortisone shots done under ultrasound can be helpful in minimizing symptoms. A posterior dislocation is an emergency, and prompt evaluation of airway and vascular status is necessary at the time of diagnosis. A CT scan is often necessary to help with diagnosis, and the addition of a CT angiogram can be helpful in assessing for vascular compromise (Fig. 1.7). Emergent reduction, closed versus open, with cardiothoracic backup is the recommended approach. After reduction, a sling for a few weeks and rehabilitation is utilized. Case reports in contact athletes report return to sport in around 4–6 weeks.

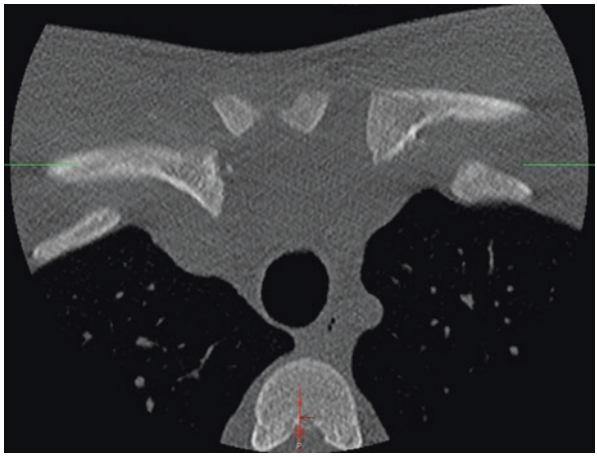

Fig. 1.7 CT scan demonstrating a right posterior SC dislocation

Clavicle Fractures

Clavicle fractures are a common fracture in football players, with football injuries accounting for 10% of clavicle fractures in the National Electronic Injury Surveillance System [16]. Depending on the fracture pattern, location, and displacement, treatment may be either surgical or nonsurgical. In a study of 17 NFL players with clavicle fractures, the average return to play was 3.47 months after injury, with a median missed time of eight games [17]. When looking at nonoperative management of clavicle fractures in NFL players, 96.9% were able to return to sport at a mean of 8 months (244.6 ± 119.6 days). Eight players (27.6%) returned within the same season as their injury [18]. In another study looking at clavicle fractures treated with open reduction and internal fixation, 15 of 17 NFL players (94.1%) were able to return to sport at a mean of two and half months (211.3 ± 144.7) days post surgery. Seven athletes (44%) were able to return in the same season. Operative treatment may slightly improve return to play times, and thus fractures early in the season may be amenable to operative fixation and return to sport toward the end of the season [19] (Fig. 1.8).

Other Soft-Tissue Injuries Around the Shoulder

Rotator cuff injuries are rare in football. In a survey of 86% of NFL team physicians, 51 rotator cuff tears were noted over a 10-year period. Forty-seven of those rotator cuff tears were treated operatively [20]. These injuries are rare in younger athletes, and most cases are rotator cuff contusions. Contusions can be managed with anti-inflammatories, physical therapy, and treatment. An occasional cortisone shot can be helpful, and return to sport is based on symptomatology. Shoulder weakness, pain at night, or failure to improve symptoms should lead to an MRI to evaluate for a tear, which may require surgical repair.

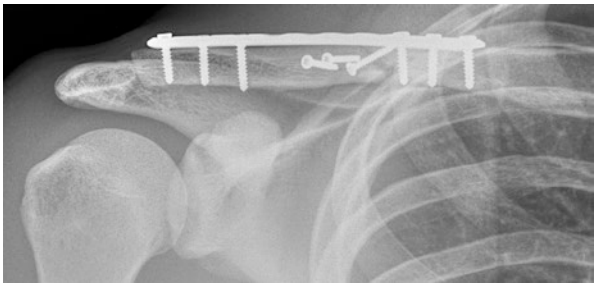

Fig. 1.8 AP clavicle radiograph 3-month status post open reduction and internal fixation of a fracture. The athlete was cleared to return for the last game of the season and play-offs

Pectoralis tears can occur in blocking or, most commonly, during the eccentric phase of bench press. Asymmetry of the pectoralis compared to the contralateral side, bruising, or a palpable defect at the pectoralis insertion may indicate a tear. If there is a suspicion for a pectoralis tear, an MRI should be obtained. An avulsion of the tendon from the humerus should be repaired surgically, as studies have demonstrated improved outcomes with surgical repair compared to nonoperative management. Partial thickness tears or musculotendinous injuries can be managed with physical therapy and modalities. Platelet-rich plasma has been reported in a few case reports. Return to play would be based on healing and symptoms and typically would take about 4–6 weeks.

Elbow

Elbow Dislocation

Around 50% of elbow dislocations in the United States occur during sports, with football being the most common, with an estimated 3000 per year [21] (Fig. 1.9). Between 2000 and 2011, 62 elbow dislocations were documented in professional football, with 65% occurring in defensive linemen. Seventy-six percent were able to return in the same season, at a mean of 25 days. Ninety-four percent were treated nonoperatively, as the vast majority were simple dislocations [22].

Author's Preferred Approach

Ideally, the elbow should be reduced on the field. Elbow radiographs should be obtained to assess reduction and to look for fracture or loose bodies. A lack of a concentric reduction or a displaced coronoid fracture should necessitate further imaging with an MRI or CT scan. If the radiographs are normal, a splint for a few days can be used to reduce the pain and swelling. Within a week, an elbow ROM brace is placed, and extension is gradually progressed to full over a 2–3-week period. Return to play in the brace can be considered once full, painless ROM in the brace is achieved. The brace should be utilized for football activities until 3 months post dislocation.

Fig. 1.9 AP and lateral of a posterolateral elbow dislocation. Ideally, these are reduced on the field. Return to play in a brace can be expected once in full range of motion and pain-free if no other pathology is noted

Ulnar Collateral Ligament (UCL) Injuries

UCL injuries have been described in various positions on the football field (Fig. 1.10). Offensive and defensive linemen can typically be treated in a brace, with return to sport as symptoms allow. Surgery is rarely indicated in football players. In a study of ten NFL quarterbacks with UCL tears in their throwing elbow, nine were successfully treated nonoperatively, with an average return to play of 26 days [23]. Treatment with physical therapy is usually the first line. Biologics, such as platelet-rich plasma, have been used with some success in baseball pitchers, but no evidence exists for quarterbacks. It appears that UCL injuries are not as devastating in quarterbacks as they are in pitchers, and nonoperative management should be considered the first-line treatment.

Shoulder and elbow injuries are common in football. Management can be complex and multifactorial. Team physicians must balance the athlete's safety and the pressures of the team. This chapter provides a framework based on the available literature that we have in managing these injuries. Every case is different, with different circumstances. The art of being a team physician entails combining the literature and individual experiences to address each case appropriately.

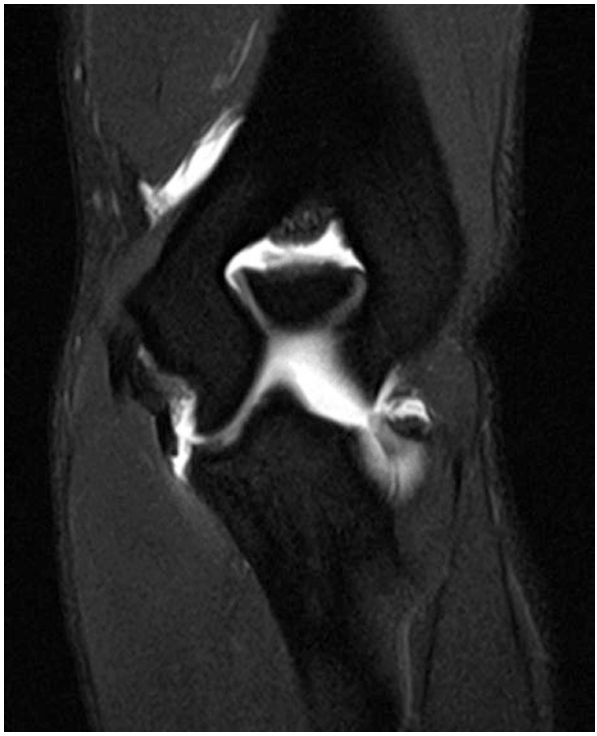

Fig. 1.10 Coronal MR arthrogram of the elbow, demonstrating a distal UCL tear in a defensive lineman. The player was able to return to play in 2 weeks in an elbow brace

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