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Management of Elbow Dislocations in the National Football League

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Background: Although much literature exists regarding the treatment and management of elbow dislocations in the general population, little information is available regarding management in the athletic population. Furthermore, no literature is available regarding the postinjury treatment and timing of return to play in the contact or professional athlete.

Purpose: To review the clinical course of elbow dislocations in professional football players and determine the timing of return to full participation.

Study Design: Case series; Level of evidence, 4.

Methods: All National Football League (NFL) athletes with elbow dislocations from 2000 through 2011 who returned to play during the season were identified from the NFL Injury Surveillance System (NFL ISS). Roster position, player activity, use of external bracing, and clinical course were reviewed. Mean number of days lost until full return to play was determined for players with elbow dislocations who returned in the same season.

Results: From 2000 to 2011, a total of 62 elbow dislocations out of 35,324 injuries were recorded (0.17%); 40 (64.5%) dislocations occurred in defensive players, 12 (19.4%) were in offensive players; and 10 (16.1%) were during special teams play. Over half of the injuries (33/62, 53.2%) were sustained while tackling, and 4 (6.5%) patients required surgery. A total of 47 (75.8%) players who sustained this injury were able to return in the same season. For this group, the mean number of days lost in players treated conservatively (45/47) was 25.1 days (median, 23.0 days; range, 0.0-118 days), while that for players treated operatively (2/47) was 46.5 days (median, 46.5 days; range, 29-64 days). Mean return to play based on player position was 25.8 days for defensive players (n = 28; median, 21.5 days; range, 3.0-118 days), 24.1 days for offensive players (n = 11; median, 19 days; range, 2.0-59 days), and 25.6 days for special teams players (n = 8; median, 25.5 days; range, 0-44 days).

Conclusion: Elbow dislocations comprise less than a half of a percent of all injuries sustained in the NFL. Most injuries occur during the act of tackling, with the majority of injured athletes playing a defensive position. Players treated nonoperatively missed a mean of 25.1 days, whereas those managed operatively missed a mean of 46.5 days.

Keywords: elbow dislocation; football (American); return to play; NFL

The elbow is the second most commonly dislocated joint in the body (the shoulder being the first) in the adult population.² Elbow dislocations are categorized as simple or complex.⁸ Simple dislocations are defined as dissociation of the ulnohumeral joint without associated fracture, while complex dislocations are associated with concomitant fracture.⁶ The most common mechanism of injury is a fall on an outstretched hand resulting in valgus, supination, and axial forces upon the joint. The majority of patients with a simple dislocation are successfully managed with a short

period of immobilization followed by early range-of-motion activity.^{1,4,7,9}

Elbow dislocation in the athletic population is not an uncommon injury, particularly in contact sports. A recent epidemiological study showed that nearly 50% of all elbow dislocations in the United States occurred during sport-related activities, with American football being the most common.¹⁰ Although much literature has been published regarding treatment and outcomes in simple and complex dislocations, little information is available regarding management of the athletic population.^{5,8} Furthermore, the clinical course in professional athletes playing contact sports is even more limited, with no consensus regarding management of this specific athletic population.⁵

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The purpose of this study was to follow the clinical course of elbow dislocations in the National Football League (NFL) and determine the timing regarding return to full contact participation. We aimed to provide physicians with more information on the clinical course of elbow dislocations in athletes and on counseling these specific patients regarding return to play.

METHODS

This study was approved by our local institutional review board. A retrospective review was performed on all elbow dislocations in the NFL from 2000 to 2011. These patients were identified through the NFL Injury Surveillance System database (NFL ISS; Quintiles Outcome). The NFL ISS documents all injuries occurring in NFL athletes year-round and records the information into its database. Prior to 2012, data entry was generally completed by the athletic trainer. With regard to surgery required, an unfilled surgical form was entered as “unknown.” For the purposes of this study, all patients with an unfilled surgical form were entered as “unknown” and considered as being treated nonoperatively.

Particular attention was paid to 2 categories: injury-specific data and athlete-specific data. Injury-specific data included the incidence of elbow dislocations in the NFL, dislocation type, whether surgery was required, and time lost from injury. Athlete-specific data collected included roster position and activity at time of injury.

Time lost from injury was defined by the NFL ISS as the number of days missed from the date of injury until the player was cleared for full participation in practice or games. Days lost due to injury were recorded only in-season; therefore, determination of time missed in players injured at or near the end of the season was not accurate, as these days were not recorded.

Our inclusion criteria included all players sustaining an elbow dislocation and returning to play in the same season. Players who did not return to play in the same season were excluded for the reasons stated above.

RESULTS

From 2000 to 2011, a total of 35,324 injuries were documented by the NFL ISS. Of those, 22,699 (64%) occurred during game play. In the same time period, 62 elbow dislocations were noted, comprising 0.17% of all injuries. The majority of these (83.8%) also occurred during a game, while 16.2% occurred during practice (Table 1). Of the 62 dislocations,

TABLE 1
All Injuries and Elbow Dislocations From 2000 to 2011^a

Injury	Practice	Game	Total
Elbow dislocation, n	10	52	62
All injuries, n	12,725	22,699	35,324

^aThe table includes all reportable injuries that occurred in the NFL during preseason, regular season, and postseason.

TABLE 2
Elbow Dislocations and Surgical Procedures of Players by Positions

Player Position	Total No. of Elbow Dislocations	Total No. of Surgical Procedures
Total defensive	40	3
Defensive line	15	0
Linebacker	13	2
Secondary	11	1
Total offensive	12	1
Offensive line	4	0
Tight end	3	0
Running back	2	0
Wide receiver	2	1
Quarterback	1	0
Special teams	10	0
Total players	62	4

40 (64.5%) occurred on the left side (the database does not track data on dominance). Most dislocations (61/62) were simple, with only 1 dislocation reported as having an associated fracture (radial head).

Defensive players (64.5%) accounted for the majority of dislocations seen, compared with offensive players (19.4%) and special teams (16.1%) (Table 2). Most dislocations occurred via direct impact and, most commonly, during the act of tackling (53.2%) (Table 3). Being tackled (9.6%) or blocked (11.3%) less commonly caused a dislocation.

With respect to treatment, 4 of 62 patients (6.5%) were documented as having surgery, while the remaining 58 dislocations (93.5%) were treated nonoperatively.

Of the 62 players sustaining this injury, 47 (75.8%) were able to return in the same season. The mean time lost for patients returning the same season who were treated nonoperatively (n = 45) was 25.1 days (median, 23.0 days; range, 0.0-118 days), while the mean time lost for patients returning the same season who were treated with surgery

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Ethical approval for this study was obtained from Thomas Jefferson University Division of Human Subjects Protection.

TABLE 3
Player Activity at Time of Dislocation

Player Activity	No. of Elbow Dislocations (N = 62)
Tackling	33
Being tackled	6
Blocking	7
Being blocked	7
Contact	8
No contact	1

TABLE 4
Days Lost Due to Elbow Dislocations
by Surgery Status and Player Position

Surgery Status/ Player Position	No. of Players (n= 47)	Days Lost		
		Mean	Median	Range
Surgery	2	46.5	46.5	29-64
No surgery (unknown)	45	25.1	23.0	0.0-118
Total defensive	28	25.8	21.5	3.0-118
Defensive line	10	28.0	25.0	7.0-57
Defensive secondary	6	23.7	21.5	10.0-42
Linebacker	12	27.5	16.0	3.0-118
Total offensive	11	24.1	19.0	2.0-59
Offensive line	4	25.8	19.5	10-54
Quarterback	1	15.0	15.0	15-15
Running back	2	41.0	41.0	23-59
Tight end	2	8.5	8.5	2.0-15
Wide receiver	2	24.0	24.0	19-29
Total special teams	8	25.6	25.5	0.0-44
Overall	47	26.0	23.0	0.0-118

(n = 2) was 46.5 days (median, 46.5 days; range, 29-64 days) (Table 4). The days lost in the 15 patients who did not return the same season, which included 2 players treated surgically and 13 players treated nonoperatively, were not included in the time-loss data. These 15 athletes lost between 25 and 123 days of play time, with the higher end of the range being in players recorded as having undergone surgery. The mean time to return to play based on player position was 25.8 days for defensive players (n = 28; median, 21.5 days; range, 3.0-118 days); 24.1 days for offensive players (n = 11; median, 19 days; range, 2.0-59 days); and 25.6 days for special teams players (n = 8; median, 25.5 days; range, 0-44 days) ($P = .42$). Certain player positions appeared to return to play faster (ie, running backs returned to play at a mean of 41.0 days whereas tight ends returned at a mean of 8.5 days), but our limited numbers did not allow us to draw any definitive conclusions from these data. A more specific breakdown by player position can be found in Table 4.

DISCUSSION

Elbow dislocations in the general population are well documented. Stoneback et al¹⁰ conducted an epidemiological study to report the incidence of elbow dislocations in the

United States. The investigators estimated that the incidence of elbow dislocations in the US population was 5.21 per 100,000 person-years. Nearly half (45%) of the injuries occurred during sporting events, with football representing the highest risk (21.5%) activity.

The initial treatment of simple elbow dislocations in the general population has been nonoperative, entailing closed reduction followed by splinting or bracing. Patients remain immobilized for a short period of time (3-5 days) followed by range-of-motion exercises under careful supervision. Extension block bracing can be used initially if instability persists. By 3 to 4 weeks, bracing is generally discontinued.⁵

Mehlhoff et al⁴ reviewed 52 adult simple dislocations treated with closed reduction and immobilization. The investigators found that prolonged mobilization (>3 weeks) was associated with poorer outcomes and larger flexion contractures. Mehlhoff et al⁴ concluded that early active motion is the most important predictor of a successful outcome following dislocation.

Josefsson et al³ conducted a prospective, randomized study comparing operative and nonoperative treatment on 30 consecutive simple elbow dislocations. These investigators noted that at a minimum 1-year follow-up, no significant differences were found with regard to range of motion and perceived instability; the most common complaint in both groups was lack of terminal extension.

While the management of simple elbow dislocations in the general population is well understood, dislocations in athletes, in particular those who play contact sports, present a challenging problem. Little information is found in the literature to guide physicians regarding return to play without risk of recurrent dislocation. Unfortunately, we did not have data on recurrent injury or instability.

Uhl et al¹¹ described a case report in which a 21-year-old National Collegiate Athletic Association Division I American football player sustained an elbow dislocation during a game. The patient underwent closed reduction and was immobilized in a splint for 4 days. Gradual range of motion was implemented, and at 3 weeks the patient was cleared to play with a 10° extension block brace. He played the remainder of the season as well as the following season uneventfully in a brace; at the off-season he was noted to have regained full range of motion.

Much of the literature on management of elbow dislocations in athletes has come from military studies. Protzman⁷ followed 49 elbow dislocations that occurred in the United States Military Academy. Length of immobilization was determined by the treating physicians. Protzman⁷ noted that immediate treatment and a short period of immobilization (1-5 days) produced the best outcomes. In fact, prolonged immobilization was associated with increased disability and residual flexion contracture.

Drawing on the results of Protzman⁷ and Mehlhoff et al,⁴ Ross et al⁹ implemented early active range of motion (post-reduction day 1) in 20 consecutive patients with elbow dislocations at the United States Naval Academy. At 1-year follow-up, all patients achieved extension within 5° of the contralateral side at a mean of 19 days postinjury. One patient sustained a recurrent dislocation while playing

football and was treated with the same protocol uneventfully. These authors suggested that under close supervision, immediate, active motion allowed full final range of motion and excellent clinical outcomes.

This study is not without limitations. First, this is a retrospective database study. Many of these data points, including dislocation direction, use of bracing, and description of surgical procedure, were incomplete. In fact, prior to 2012, surgical forms that were not filled out by the athletic trainer were entered into the NFL ISS database as “unknown” with regard to having surgery. Therefore, we cannot assume that all patients considered “unknown” did not undergo surgery. Only 4 recorded patients had surgery, and only 2 could be included in the return-to-play analysis, thus making our numbers in the surgical subgroup low; any conclusions that are drawn should be done so with caution.

Second, no objective data such as length of immobilization, range of motion, or documented recurrent instability were recorded. Third, no patient-reported outcome measures were recorded. The database notes only when the athlete was cleared to return to full contact participation. With regard to determining return to play, 15 athletes were excluded from this analysis as they did not return within the same season. This may have affected our return-to-play results as some players may have missed a larger number of days, thus pushing their recovery into the offseason. However, it is impossible to draw any definitive conclusions using these data, and therefore we did not include this subset of players in our analysis. Additionally, we were unable to account for the effect of other potential confounding factors that could affect the speed of return to play, including time of season the athlete is injured, quality of the team, bye weeks, or player contractual influences. Fourth, as these data represent professional football players, they may not be generalizable to the general football population.

Despite these limitations, this study sheds light on the clinical course of elbow dislocations in the elite contact athlete. Treatment of athletes has generally been extrapolated from the general population.⁹ The initial treatment of closed reduction and brief immobilization is similar. However, the timing of return to play is unique to athletes, in particular those involved in contact sports. To the best of our knowledge, no study has previously established guidelines on returning to full contact participation. We believe that this study provides physicians with relevant

information on the treatment of elbow dislocations in elite athletes participating in contact sports.

CONCLUSION

Elbow dislocations comprised less than a half percent of all injuries sustained in the NFL. Most elbow dislocation injuries occurred during the act of tackling, with the majority of injured athletes playing a defensive position. Patients treated nonoperatively missed a mean of 25.1 days. The vast majority of elbow dislocations in the NFL were successfully treated nonoperatively. This study provides an epidemiological framework that may help guide management and counseling of elite-level contact athletes who incur a dislocation of the elbow.

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