

# Historical Patterns and Variation in Treatment of Injuries in NFL (National Football League) Players and NCAA (National Collegiate Athletic Association) Division I Football Players

Eric C. McCarty, MD, Matthew J. Kraeutler, MD, Paula Langner, MS, Shane Cook, MD, Byron Ellis, MD, and Jenna M. Godfrey, MD, MPH

## Abstract

We conducted a study to identify and contrast patterns in the treatment of common injuries that occur in National Football League (NFL) players and National Collegiate Athletic Association (NCAA) Division I football players. Orthopedic team physicians for all 32 NFL and 119 NCAA Division I football teams were asked to complete a survey regarding demographics and preferred treatment of a variety of injuries encountered in football players. Responses were received from 31 (97%) of the 32 NFL and 111 (93%) of the 119 NCAA team physicians.

Although patellar tendon autograft was the preferred graft choice for both groups of team physicians, the percentage of NCAA

physicians who allowed return to football 6 months or less after anterior cruciate ligament reconstruction was significantly ( $P = .03$ ) higher than that of NFL physicians. Prophylactic knee bracing, which may prevent medial collateral ligament injuries, was used at a significantly ( $P < .0001$ ) higher rate by NCAA teams (89%) than by NFL teams (28%). Ketorolac injections were given by a significantly ( $P < .01$ ) higher percentage of NFL teams (93%) than of NCAA teams (62%).

Understanding the current trends in the management of these injuries is beneficial in designing studies that may help improve the treatment and prevention of injuries in football players.

Among National Football League (NFL) and National Collegiate Athletic Association (NCAA) team physicians, there is no consensus on the management of various injuries. At national and regional meetings, the management of football injuries often is debated.

Given the high level of interest in the treatment of elite football players, we wanted to determine treatment patterns by surveying orthopedic team physicians. We conducted a study to determine the demographics of NFL and NCAA team physicians and to identify patterns and variations in the management of common injuries in these groups of elite football players.

## Materials and Methods

The study was reviewed by an Institutional Review Board before data collection and was classified as exempt. The study population consisted of head or orthopedic team physicians for NFL teams and NCAA Division I universities. The survey (**Appendix**), which included questions about team physician experience, team medical coverage, reimbursement issues, and management of common football injuries, was emailed to the head orthopedic team physicians (a paper version of the survey was mailed to those who had no known email address or who preferred a hard copy). Data were collected from May 1, 2007 through July 15, 2008.

**Authors' Disclosure Statement:** The authors report no actual or potential conflict of interest in relation to this article.

Chi-square tests were used to determine significant differences between groups.  $P < .05$  was considered statistically significant.

## Results

Responses were received from 31 (97%) of the 32 NFL and 111 (93%) of the 119 NCAA team phy-

sicians. The 2 groups' surveys were identical with the exception of question 3, regarding NFL division or NCAA conference.

### Team Physician Demographics

All survey respondents were the head orthopedic physicians for their teams. Seventy-one percent were the head team physicians as well; another 25% named a primary care physician as the head team physician. Thirty-nine percent of the NFL team physicians had been a team physician at the NFL level for more than 15 years, and 58% of the NCAA team physicians had been a team physician at the Division I level for more than 15 years. Eighty-one percent of NFL and 66% of NCAA team physicians had fellowship training in sports medicine. For away games, 10% of NFL vs 65% of NCAA teams traveled with 2 physicians; 90% of NFL and 28% of NCAA teams traveled with 3 or more physicians.

Only a small percentage of respondents (NFL, 10%; NCAA, 14%) indicated they had received advertising in exchange for services. Most respondents (NFL, 93%; NCAA, 89%) did not pay to provide team coverage. In contrast, 97% of NFL vs only 31% of NCAA physicians indicated they received a monetary stipend for providing orthopedic coverage.

### Anterior Cruciate Ligament Reconstructions

Eighty-seven percent of NFL and 67% of NCAA respondents indicated that patellar tendon autograft was their preferred graft choice (Table 1). The percentage of NCAA physicians who allowed return to football 6 months or less after anterior cruciate ligament (ACL) reconstruction was significantly ( $P = .03$ ) higher than that of NFL physicians (Figure 1).

### Anterior Shoulder Dislocations (Without Bony Bankart)

Sling use after reduction of anterior shoulder dislocation was varied, with most physicians using a sling 2 weeks or less (Table 2). Ninety-three percent of the team physicians in each group had athletes play with a harness when they returned from an in-season injury. For anterior stabilization, most team physicians (NFL, 79%; NCAA, 69%) performed arthroscopic repair. A minority indicated that, after anterior stabilization, they always required use of a harness; a higher proportion based their decision on the player's position (Table 3). Return to contact was similarly allowed by both groups, and 90% allowed return to contact within 4 to 6 months (Figure 2).

Table 1. Preferred Graft Choice for Anterior Cruciate Ligament Reconstruction<sup>a</sup>

Graft	NFL	NCAA
Autograft		
Hamstring	6.7%	20.9%
Patellar tendon	86.7%	67.3%
Quadriceps tendon	0.0%	1.8%
Allograft		
Hamstring or posterior/anterior tibialis	0.0%	5.5%
Achilles tendon	13.3%	5.5%
Patellar tendon	0.0%	6.4%

Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.  
<sup>a</sup>Some physicians responded with more than one graft type preference.

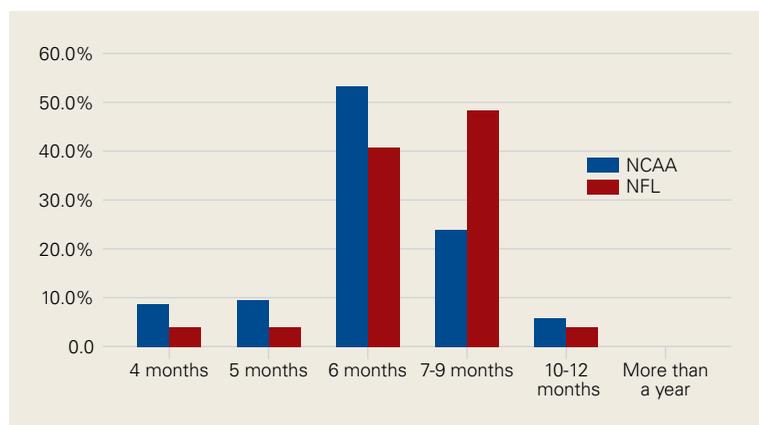


Figure 1. Return to play after anterior cruciate ligament reconstruction.  
 Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.

Table 2. Use of Sling After Reduction of Anterior Shoulder Dislocation<sup>a</sup>

Duration of Sling Use	NFL	NCAA
Does not use a sling	0.0%	5.6%
<1 wk	55.2%	35.2%
1-2 wk	34.5%	43.5%
3-4 wk	10.3%	14.8%
>4 wk	0.0%	0.9%

Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.  
<sup>a</sup>Team physicians were asked how long they required athletes to wear a sling after reduction.

**Acromioclavicular Joint Injuries**

Roughly two-thirds of respondents (NFL, 60%; NCAA, 69%) indicated that, during a game, they managed acute acromioclavicular (AC) joint injuries (type I/II) with injection of a local anesthetic that allowed return to play. In addition, a majority (NFL, 90%; NCAA, 87%) indicated they gave such athletes pregame injections that allowed them to play. About half the physicians (NFL, 57%; NCAA, 52%) injected the AC joint with cortisone during the acute/subacute period (<1 month) to decrease inflammation.

No significant difference was found between the 2 groups in terms of proportion of surgeons electing to treat type III AC joint injuries operatively versus nonoperatively (Table 4).

**Medial Collateral Ligament Injuries**

There was a significant ( $P < .0001$ ) difference in use of prophylactic bracing for medial collateral ligament (MCL) injuries (NFL, 28%; NCAA, 89%). Bracing was most commonly used in offensive linemen (Figure 3).

**Posterior Cruciate Ligament Injuries**

The percentage of physicians who allowed athletes to return to play after a grade I/II posterior cruciate ligament (PCL) injury was significantly ( $P = .01$ ) higher in NFL physicians (22%) than in NCAA physicians (7%). The amount of time varied up to more than 4 weeks (Figure 4). When athletes returned to play after a grade I/II PCL injury, significantly ( $P < .01$ ) more NCAA physicians (64%) than NFL physicians (37%) required bracing.

Physicians varied in their responses about how often grade III PCL injuries would be managed (Table 5). Both groups' preferred method of operative repair was the arthroscopic single-bundle technique (Figure 5).

**Elbow Ulnar Collateral Ligament Tears**

A majority of respondents indicated they would treat a complete elbow ulnar collateral ligament (UCL) tear in a quarterback; a much smaller percentage preferred operative repair in athletes playing other positions (Table 6).

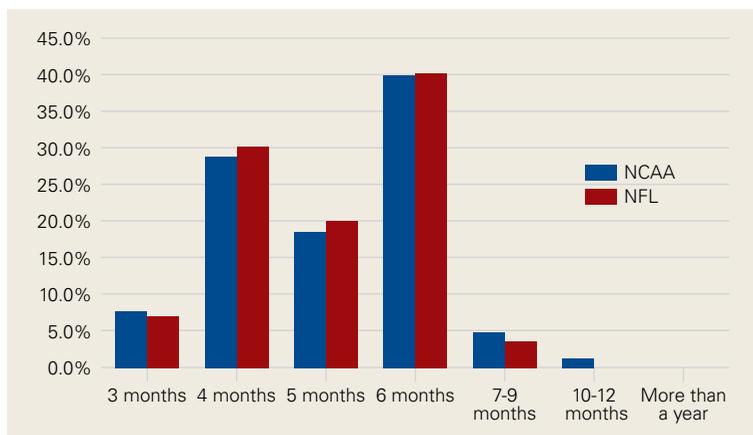
**Thumb Ulnar Collateral Ligament Tears**

For athletes with in-season thumb UCL tears, 63% of NFL and 54% of NCAA physicians indicated they cast the thumb and allowed return to play. Others recommended operative repair and either cast the thumb and allowed return to play (NFL, 30%;

**Table 3. Use of Harness After Anterior Shoulder Stabilization<sup>a</sup>**

Response	NFL	NCAA
Yes	3.3%	4.6%
No	73.3%	63.0%
Depends on player's position	23.3%	32.4%

Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.  
<sup>a</sup>Team physicians were asked if they required athletes to wear a harness after anterior shoulder stabilization.

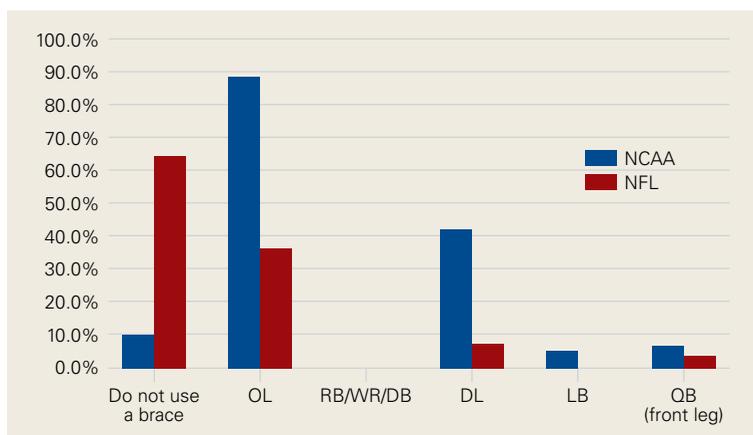


**Figure 2. Return to play after anterior shoulder stabilization.**  
 Abbreviations; NCAA, National Collegiate Athletic Association; NFL, National Football League.

**Table 4. Treatment of Type III Acromioclavicular Joint Injuries**

Treatment Method	NFL	NCAA
Nonoperative	72.4%	57.5%
Operate in all players	0.0%	17.9%
Operate only in quarterbacks	27.6%	24.5%

Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.



**Figure 3. Field positions in which medial collateral ligament knee prophylactic bracing is used.**  
 Abbreviations: DB, defensive back; DL, defensive lineman; LB, linebacker; NCAA, National Collegiate Athletic Association; NFL, National Football League; OL, offensive lineman; QB, quarterback; RB, running back; WR, wide receiver.

NCAA, 41%) or let the thumb heal before allowing return to play (NFL, 7%; NCAA, 5%).

### Fifth Metatarsal Fractures

For a large majority of physicians (NFL, 100%; NCAA, 94%), the preferred treatment for fifth

metatarsal fractures was screw fixation. The percentage of physicians who allowed return to play by 6 weeks was significantly ( $P < .01$ ) higher in NCAA (55%) than NFL (24%) physicians (**Figure 6**).

### Tibia Fractures

In the 5-year period before the survey, 43% of NFL and 75% of NCAA physicians managed at least one tibia fracture ( $P < .001$ ) (**Figure 7**). The treatment preferred by all NFL physicians and 96% of NCAA physicians was intramedullary nailing. Only 2 respondents, both in the NCAA, removed the nail before allowing return to play. Five physicians, all in the NCAA, reported nonunions occurring after tibia fractures. Reported complications (NFL, 8%; NCAA, 13%) included 4 cases of fatty embolism, 1 death, infection, compartment syndrome, muscular contracture, and persistent pain.

### Ketorolac Injections

Intramuscular ketorolac injections were frequently given to elite football players, significantly ( $P < .01$ ) more so in the NFL (93%) than in the NCAA (62%). The average number of injections varied among physicians, though a significantly ( $P < .0001$ ) higher percentage of NFL (79%) than NCAA (13%) physicians gave 5 or more injections per game.

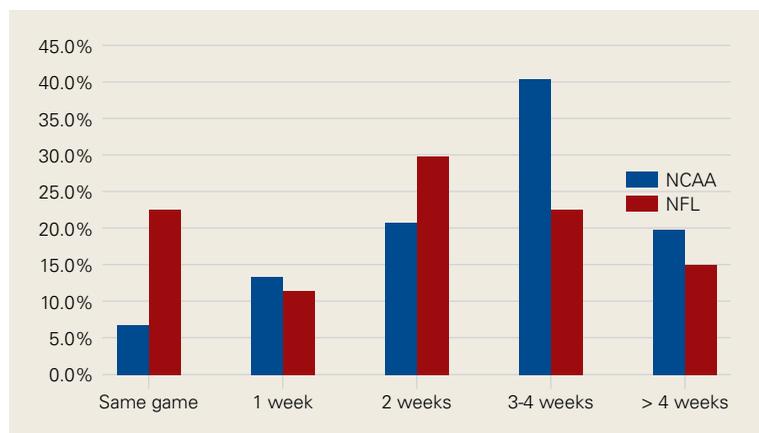
### Discussion

This survey on managing common injuries in elite football players had an overall response rate of 94%. All NFL divisions and NCAA conferences were represented in physicians' responses. Ninety percent of NFL and 65% of NCAA head team physicians were orthopedists. These findings differ from those of Stockard<sup>1</sup> (1997), who surveyed athletic directors at Division I schools and reported 45% of head team physicians were family medicine-trained and 41% were orthopedists.

Given the high visibility of team coverage and the economics of college football's highest division, one might expect team physicians to receive financial remuneration. This was not the case, according to our survey: Only 30% of physicians received a monetary stipend for team coverage, and only 14% received advertising in exchange for their services. Twelve NCAA team physicians indicated they pay to be allowed to provide team coverage.

### Injury Management

**Anterior Cruciate Ligament Injuries.** For NFL and NCAA team physicians, the preferred graft choice for ACL reconstruction was patellar tendon

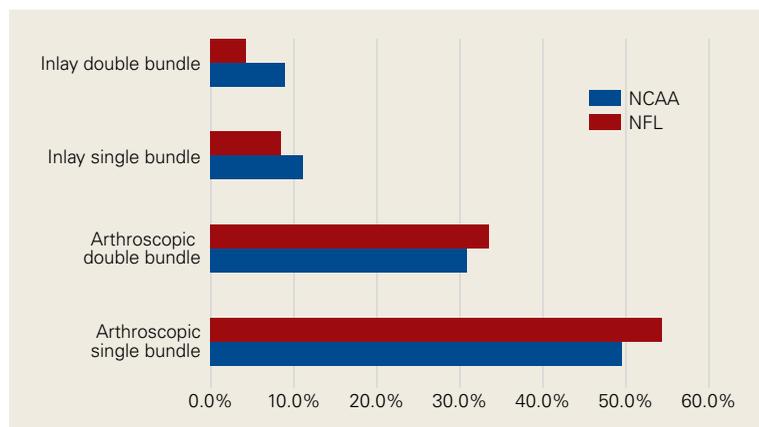


**Figure 4.** Amount of time to return to game after grade I/II posterior cruciate ligament injury. Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.

**Table 5. Frequency of Managing Grade III Posterior Cruciate Ligament Injuries<sup>a</sup>**

Frequency	NFL	NCAA
Never	57.1%	38.5%
One-third of the time	32.1%	40.4%
Two-thirds of the time	7.1%	12.5%
Always	3.6%	8.7%

Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.  
<sup>a</sup>Team physicians were asked how often they treated isolated grade III posterior cruciate ligament injuries in football players.



**Figure 5.** Technique used for posterior cruciate ligament reconstruction. Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.

**Table 6. Frequency of Managing Complete Elbow Ulnar Collateral Ligament Tears<sup>a</sup>**

Position	NFL	NCAA
Never treat in football players	26.7%	18.6%
Treat in all players	3.3%	13.7%
Quarterback	76.7%	67.6%
Running back, wide receiver, defensive back	3.3%	5.9%
Offensive lineman	0.0%	2.0%
Defensive lineman	0.0%	1.0%
Linebacker	0.0%	2.9%

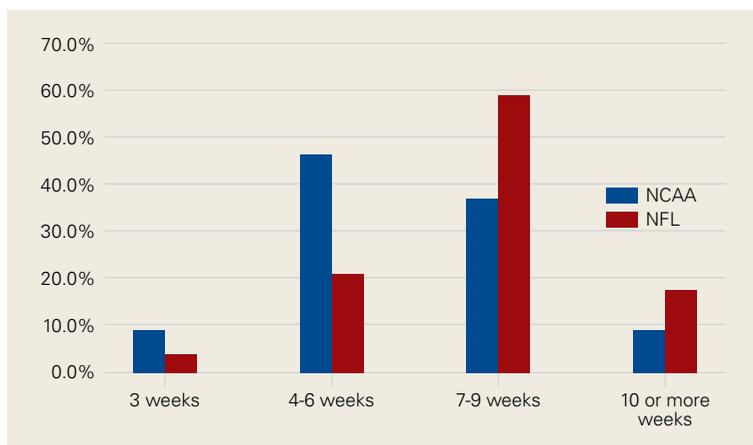
Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.  
<sup>a</sup>Team physicians were asked in which players they treated complete elbow ulnar collateral ligament tears. Some physicians responded to more than one option.

autograft. This finding is similar to what Erickson and colleagues<sup>2</sup> reported from a survey of NFL and NCAA team physicians: 86% of surgeons preferred bone–patellar tendon–bone (BPTB) autograft. However, only 1 surgeon (0.7%) in that study, vs 16% in ours, preferred allograft. Allograft use may be somewhat controversial, as relevant data on competitive athletes are lacking, and it has been shown that the graft rupture rate<sup>3</sup> is higher for BPTB allograft than for BPTB autograft in young patients. However, much of the data on higher failure rates with use of allograft in young patients<sup>4,5</sup> has appeared since our data were collected.

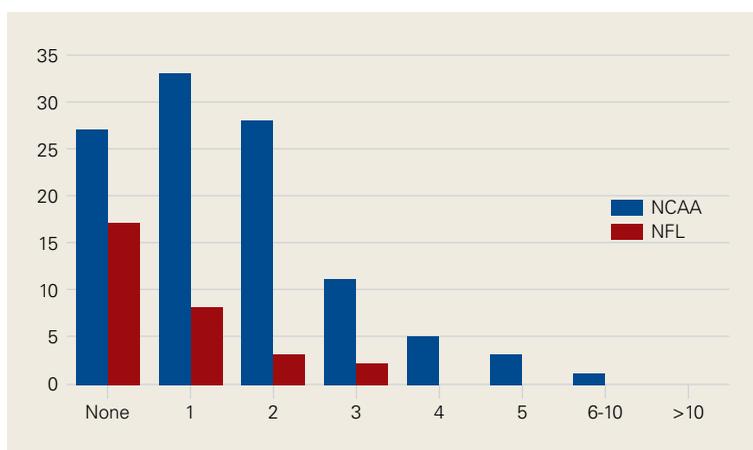
Our return-to-play data are similar to data from other studies.<sup>2,6</sup> According to our survey, the most common length of time from ACL reconstruction to return to football was 6 months, and 94% of team physicians allowed return to football by 9 months. In the survey by Erickson and colleagues,<sup>2</sup> 55% of surgeons waited a minimum of 6 months before returning athletes to play, and only 12% waited at least 9 months. In the study by Bradley and colleagues<sup>6</sup> (2002), 84% of surgeons waited at least 6 months before returning athletes to play. Of note, we found a significantly higher percentage of NCAA football players than NFL players returning within 6 months after surgery. The difference may be attributable to a more cautious approach being taken with NFL players, whereas most NCAA players are limited in the time remaining in their football careers and want to return to the playing field as soon as possible.

**Shoulder Dislocations.** Responses to the 5 survey questions on anterior shoulder dislocation showed little consensus with respect to management. The exception pertained to use of a harness for in-season return to play with a dislocation—92% of physicians preferred management with a harness. Of note, 7 of 10 team surgeons performed anterior stabilization through an arthroscopic approach. Despite historical recommendations to perform open anterior stabilization in collision athletes, NFL and NCAA physicians' practice patterns have evolved.<sup>7</sup> Although return to contact activity was varied among responses, 94% of physicians allowed return to contact within 6 months.

**Acromioclavicular Joint Injuries.** For college football players, AC joint injuries are the most common shoulder injuries.<sup>8</sup> In the NFL Combine, the incidence of AC joint injuries was 15.7 per 100 players.<sup>8</sup> Several studies have cited favorable results with nonoperative management of type III AC joint injuries.<sup>9-12</sup> Nonoperative management



**Figure 6. Return to play after treatment of fifth metatarsal fracture.**  
 Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.



**Figure 7. Number of tibia fractures encountered in past 5 years.**  
 Abbreviations: NCAA, National Collegiate Athletic Association; NFL, National Football League.

was the preferred treatment in our study as well, yet 26% of surgeons still preferred operative treatment in quarterbacks. Opinions about opera-

tive repair of type III injuries in overhead athletes vary,<sup>13</sup> but nonoperative management clearly is the preferred method for elite football players. A 2013 study by Lynch and colleagues<sup>14</sup> found that only 2 of 40 NFL players with type III AC joint injuries underwent surgery.

For type I and II AC joint injuries that occur during a game, more than two-thirds of the NCAA team physicians in our study favored injecting a local anesthetic to reduce pain and allow return to play in the same game. An even larger majority indicated they gave a pregame injection of an anesthetic to allow play. Similar use of injections for AC joint injuries has been reported in Australian-rules football and rugby.<sup>15</sup>

**Medial Collateral Ligament Injuries.** Whether bracing is prophylactic against MCL injuries is controversial.<sup>16</sup> Some studies have found it effective.<sup>17,18</sup> According to our survey, 89% of Division I football teams used prophylactic knee bracing, mainly in offensive linemen but frequently in defensive linemen, too. No schools used bracing in athletes who played skill positions, except quarterbacks. Six schools used bracing on a quarterback's front leg.

The percentage of teams that used prophylactic MCL bracing was significantly higher in the NCAA than in the NFL. NCAA team physicians generally have more control over players and therefore can implement widespread use of this bracing.

**Posterior Cruciate Ligament Injuries.** These injuries are infrequent. According to Parolie and Bergfeld,<sup>19</sup> only 2% of college football players at the NFL Combine had a PCL injury. Treatment in athletes remains controversial. Our survey showed physicians' willingness to return players to competition within 4 weeks after grade I/II PCL injuries. There is no consensus on management or on postinjury bracing. In operative cases, however, the preferred graft is allograft, and the preferred repair method is the arthroscopic single-bundle technique. These findings mirror those of a 2004 survey of the Herodicus Society by Dennis and colleagues.<sup>20</sup>

**Elbow Ulnar Collateral Ligament Tears.** In throwing athletes with UCL tears, operative treatment has been recommended.<sup>21,22</sup> A majority of our survey respondents preferred operative treatment for quarterbacks. However, operative treatment is still controversial, and quarterbacks differ from baseball players in their throwing motions and in the stresses acting on the UCLs during throwing. Two systematic reviews of UCL reconstruction have affirmed the positive outcomes of operative treatment in throwing athletes.<sup>21,22</sup> However, most

of the studies covered by these reviews focused on baseball players. In athletes playing positions other than quarterback, these injuries were typically treated nonoperatively.

**Thumb Ulnar Collateral Ligament Tears.** Our survey respondents differed in their opinions on treating thumb UCL tears. About half recommended cast treatment, and the other half recommended operative treatment. Previous data suggest that delaying surgical treatment may be deleterious to the eventual outcome.<sup>23,24</sup>

**Fifth Metatarsal Fractures.** For fifth metatarsal fractures, screw fixation was preferred by 90% of our survey respondents—vs 73% of NFL team physicians in a 2004 study by Low and colleagues.<sup>25</sup> What remains controversial is the length of time before return to play. Our most frequent response was 4 to 6 weeks, and 46% of our respondents indicated they would wait 7 weeks or longer. These times differ significantly from what Low and colleagues<sup>25</sup> reported: 86% of their physicians allowed return to competition after 6 to 12 weeks.

**Tibia Fractures.** Management of tibia fractures in US football players has not been reported. Chang and colleagues<sup>26</sup> described 24 tibial shaft fractures in UK soccer players. Eleven fractures (~50%) were treated with intramedullary nails, 2 with plating, and 11 with conservative management. All players returned to activity, the operative group at 23.3 weeks and the nonoperative group at 27.6 weeks. Our respondents reported treating at least 150 tibial shaft fractures in the 5-year period before our survey, demonstrating the incidence and importance of this type of injury. A vast majority of team surgeons (96%) opted for treatment with intramedullary nailing. This choice may reflect an ability to return to play earlier—the ability to move the knee and maintain strength in the legs. Some have suggested it is important to remove the nail before the player returns to the football field, but this was not common practice among our groups of team surgeons. Other studies have not found any advantage to tibial nail removal.<sup>27</sup>

**Ketorolac Injections.** Authors have described using ketorolac for the treatment of acute or pregame pain in professional football players.<sup>28-30</sup> According to a 2000 survey, 93% of NFL teams used intramuscular ketorolac, and on average 15 players per team were treated, primarily on game day. Our survey found frequent use of ketorolac, with almost two-thirds of team orthopedists indicating pregame use. Ketorolac use was popular, particu-

larly because of its effect in reducing postoperative pain and its potent effect in reducing pain on game day. However, injections by football team physicians have declined significantly in recent years, ever since an NFL Physician Society task force published recommendations on ketorolac use.<sup>31</sup>

## Conclusion

There is a wide variety of patterns in treating athletes who play football at the highest levels of competition. Our findings can initiate further discussion on these topics and assist orthopedists providing game coverage at all levels of play in their decision-making process by helping to define the standard of care for their injured players.

Dr. McCarty is an Associate Professor and Chief of Sports Medicine and Shoulder Surgery, Dr. Kraeutler is a Professional Research Assistant, and Dr. Ellis is a Resident Physician, University of Colorado School of Medicine, Aurora, Colorado. Ms. Langner is a Health Data Analyst at Colorado Foundation for Medical Care, Englewood, Colorado. Dr. Cook is a Hand and Upper Extremity Fellow, OrthoCarolina, Charlotte, North Carolina. Dr. Godfrey is a Pediatric Orthopedic Surgeon, Integrus Orthopedics, Oklahoma City, Oklahoma.

Address correspondence to: Matthew J. Kraeutler, MD, CU Sports Medicine and Performance Center, 2150 Stadium Dr, 2nd Floor, Boulder, CO 80309 (tel, 303-315-9900; fax, 303-315-9902; email, matthew.kraeutler@ucdenver.edu).

*Am J Orthop.* 2016;45(6):E319-E327. Copyright Frontline Medical Communications Inc. 2016. All rights reserved.

## References

1. Stockard AR. Team physician preferences at National Collegiate Athletic Association Division I universities. *J Am Osteopath Assoc.* 1997;97(2):89-95.
2. Erickson BJ, Harris JD, Fillingham YA, et al. Anterior cruciate ligament reconstruction practice patterns by NFL and NCAA football team physicians. *Arthroscopy.* 2014;30(6):731-738.
3. Kraeutler MJ, Bravman JT, McCarty EC. Bone-patellar tendon-bone autograft versus allograft in outcomes of anterior cruciate ligament reconstruction: a meta-analysis of 5182 patients. *Am J Sports Med.* 2013;41(10):2439-2448.
4. Bottoni CR, Smith EL, Shaha J, et al. Autograft versus allograft anterior cruciate ligament reconstruction: a prospective, randomized clinical study with a minimum 10-year follow-up. *Am J Sports Med.* 2015;43(10):2501-2509.
5. Sun K, Tian S, Zhang J, Xia C, Zhang C, Yu T. Anterior cruciate ligament reconstruction with BPTB autograft, irradiated versus non-irradiated allograft: a prospective randomized clinical study. *Knee Surg Sports Traumatol Arthrosc.* 2009;17(5):464-474.
6. Bradley JP, Klimkiewicz JJ, Rytel MJ, Powell JW. Anterior cruciate ligament injuries in the National Football League: epidemiology and current treatment trends among team physicians. *Arthroscopy.* 2002;18(5):502-509.
7. Rhee YG, Ha JH, Cho NS. Anterior shoulder stabilization in collision athletes: arthroscopic versus open Bankart repair. *Am J Sports Med.* 2006;34(6):979-985.
8. Brophy RH, Barnes R, Rodeo SA, Warren RF. Prevalence of musculoskeletal disorders at the NFL Combine—trends from 1987 to 2000. *Med Sci Sports Exerc.* 2007;39(1):22-27.
9. Bishop JY, Kaeding C. Treatment of the acute traumatic acromioclavicular separation. *Sports Med Arthrosc.* 2006;14(4):237-245.
10. Mazzocca AD, Arciero RA, Bicos J. Evaluation and treatment of acromioclavicular joint injuries. *Am J Sports Med.* 2007;35(2):316-329.
11. Schlegel TF, Burks RT, Marcus RL, Dunn HK. A prospective evaluation of untreated acute grade III acromioclavicular separations. *Am J Sports Med.* 2001;29(6):699-703.
12. Spencer EE Jr. Treatment of grade III acromioclavicular joint injuries: a systematic review. *Clin Orthop Relat Res.* 2007;455:38-44.
13. Kraeutler MJ, Williams GR Jr, Cohen SB, et al. Inter- and intraobserver reliability of the radiographic diagnosis and treatment of acromioclavicular joint separations. *Orthopedics.* 2012;35(10):e1483-e1487.
14. Lynch TS, Saltzman MD, Ghodasra JH, Bilimoria KY, Bowen MK, Nuber GW. Acromioclavicular joint injuries in the National Football League: epidemiology and management. *Am J Sports Med.* 2013;41(12):2904-2908.
15. Orchard JW. Benefits and risks of using local anaesthetic for pain relief to allow early return to play in professional football. *Br J Sports Med.* 2002;36(3):209-213.
16. Salata MJ, Gibbs AE, Sekiya JK. The effectiveness of prophylactic knee bracing in American football: a systematic review. *Sports Health.* 2010;2(5):375-379.
17. Albright JP, Powell JW, Smith W, et al. Medial collateral ligament knee sprains in college football. Effectiveness of preventive braces. *Am J Sports Med.* 1994;22(1):12-18.
18. Sittler M, Ryan J, Hopkinson W, et al. The efficacy of a prophylactic knee brace to reduce knee injuries in football. A prospective, randomized study at West Point. *Am J Sports Med.* 1990;18(3):310-315.
19. Parolie JM, Bergfeld JA. Long-term results of nonoperative treatment of isolated posterior cruciate ligament injuries in the athlete. *Am J Sports Med.* 1986;14(1):35-38.
20. Dennis MG, Fox JA, Alford JW, Hayden JK, Bach BR Jr. Posterior cruciate ligament reconstruction: current trends. *J Knee Surg.* 2004;17(3):133-139.
21. Purcell DB, Matava MJ, Wright RW. Ulnar collateral ligament reconstruction: a systematic review. *Clin Orthop Relat Res.* 2007;455:72-77.
22. Vitale MA, Ahmad CS. The outcome of elbow ulnar collateral ligament reconstruction in overhead athletes: a systematic review. *Am J Sports Med.* 2008;36(6):1193-1205.
23. Fricker R, Hintermann B. Skier's thumb. Treatment, prevention and recommendations. *Sports Med.* 1995;19(1):73-79.
24. Smith RJ. Post-traumatic instability of the metacarpophalangeal joint of the thumb. *J Bone Joint Surg Am.* 1977;59(1):14-21.
25. Low K, Noblin JD, Browne JE, Barnhouse CD, Scott AR. Jones fractures in the elite football player. *J Surg Orthop Adv.* 2004;13(3):156-160.
26. Chang WR, Kapasi Z, Daisley S, Leach WJ. Tibial shaft fractures in football players. *J Orthop Surg Res.* 2007;2:11.
27. Karladani AH, Ericsson PA, Granhed H, Karlsson L, Nyberg P. Tibial intramedullary nails—should they be removed? A retrospective study of 71 patients. *Acta Orthop.* 2007;78(5):668-671.
28. Eichner ER. Intramuscular ketorolac injections: the pregame Toradol parade. *Curr Sports Med Rep.* 2012;11(4):169-170.
29. Nepple JJ, Matava MJ. Soft tissue injections in the athlete. *Sports Health.* 2009;1(5):396-404.
30. Powell ET, Tokish JM, Hawkins RJ. Toradol use in the athletic population. *Curr Sports Med Rep.* 2002;1(4):191.
31. Matava M, Brater DC, Gritter N, et al. Recommendations of the National Football League physician society task force on the use of toradol® ketorolac in the National Football League. *Sports Health.* 2012;4(5):377-383.

## Appendix. Team Physician Questionnaire

1. How many years have you been a team physician at your current level of play?  

<1 year	1-2 years	3-5 years	6-9 years	10-15 years	>15 years
---------	-----------	-----------	-----------	-------------	-----------
2. Are you fellowship-trained in sports?  

Yes	No
-----	----
3. [For NCAA team physicians] Which college football conference does your team belong to?  

ACC	Big 12	Big East
Big Ten	Conference USA	Independent
Mid-America	Mountain West	Pacific Ten
Southeastern	Sun Belt	WAC
3. [For NFL team physicians] Which NFL division does your team belong to?  

AFC East	AFC North	AFC South	AFC West
NFC East	NFC North	NFC South	NFC West
4. Do you or your group receive a monetary stipend for providing orthopedic coverage for the team?  

Yes	No
-----	----
5. Do you or your group receive any advertising from the team in exchange for your services?  

Yes	No
-----	----
6. Do you or your group pay (either directly or indirectly in the form of advertising) to provide coverage for the team?  

Yes	No
-----	----
7. Do you and the athletic trainers use electronic medical records in the training room?  

Yes	No
-----	----
8. For away travel games, how many physicians travel?  

0	1	2	3	4 or more
---	---	---	---	-----------
9. What type of healthcare providers travel? How many?  

Orthopedist	Family/Internal Medicine	Emergency Physician
Neurosurgeon	Dentist	Chiropractor
		Psychologist
10. What type of physician is the head team physician?  

Orthopedist	Primary Care	Other (please specify)
-------------	--------------	------------------------

### Anterior Cruciate Ligament (ACL) Reconstruction

11. In your players undergoing ACL reconstruction, what is your graft preference?  

Autograft:	Hamstring	Patellar tendon	Quadriceps tendon
Allograft:	Hamstring or posterior/anterior tibialis	Achilles tendon	Patellar tendon
12. When do you allow them to return to football with contact?  

4 months	5 months	6 months	7-9 months	10-12 months	More than a year
----------	----------	----------	------------	--------------	------------------
13. Do you use functional bracing after an isolated ACL reconstruction (no collateral ligament injury) when the athlete returns to training and/or competition?  

Yes	No
-----	----
14. With which field positions do you use ACL bracing?  

Do not use bracing	Offensive lineman	Running back/wide receiver/defensive back
Defensive lineman	Linebacker	Quarterback (front leg)
15. How long do you have the athlete wear the bracing?  

Do not use bracing	<6 months	6-12 months
1-2 years	Until career is over	

### Anterior Shoulder Dislocation (Without Bony Bankart)

16. After reduction, how long do you have the athlete wear a sling?  

Do not use a sling	<1 week	1-2 weeks	3-4 weeks	>4 weeks
--------------------	---------	-----------	-----------	----------
17. When in season and the athlete returns to play (without surgery), do you have the athlete play:  

With a harness?	Without a harness?
-----------------	--------------------
18. When you perform anterior shoulder stabilization, how do you do it?  

Open repair	Arthroscopic stabilization
-------------	----------------------------
19. After anterior shoulder stabilization, when do you allow return to contact activity?  

3 months	4 months	5 months	6 months	7-9 months	10-12 months
More than a year					
20. After performing anterior stabilization, do you require your athletes to wear a harness?  

Yes	No	Depends on player's position
-----	----	------------------------------

### Acromioclavicular (AC) Joint Injury

21. If a player has a type I/II AC joint injury during a game, will you inject with a local anesthetic (lidocaine/bupivacaine) and allow return to the game?  

Yes	No
-----	----

Appendix. **Team Physician Questionnaire (continued)**

**Acromioclavicular (AC) Joint Injury**

22. In this athlete, do you inject before games to allow play?  
 Yes No
23. Do you inject cortisone into the AC joint during the acute/subacute period (<1 month) to decrease inflammation?  
 Yes No
24. If you have a type III AC joint injury, what do you do?  
 Treat nonoperatively Fix Fix in quarterback

**Medial Collateral Ligament (MCL) Injuries**

25. Do you use prophylactic bracing for MCL injuries?  
 Yes No
26. With which field positions do you use MCL bracing?  
 Do not use bracing Offensive lineman Running back/wide receiver/defensive back  
 Defensive lineman Linebacker Quarterback (front leg)

**Posterior Cruciate Ligament (PCL) Injury**

27. After a grade I/II PCL injury, when do you allow return to the game?  
 Same game 1 week 2 weeks 3-4 weeks >4 weeks
28. Do you use bracing on return to play?  
 Yes No
29. How often do you fix isolated grade III PCL injuries in your football player?  
 Never 1/3 of the time 2/3 of the time Always
30. If you fix it, which technique do you use?  
 Arthroscopic single-bundle Arthroscopic double-bundle  
 Inlay single-bundle Inlay double-bundle
31. Which graft do you prefer?  
 Autograft Allograft

**Elbow Medial Collateral Ligament (MCL) Tears**

32. If you have a football player with a complete MCL injury of the elbow, who do you fix it in?  
 Never fix in a football player Fix in all players Quarterback  
 Running back/wide receiver/defensive back Offensive lineman  
 Defensive lineman Linebacker

**Thumb Ulnar Collateral Ligament (UCL) Tears**

33. In a thumb UCL ligament tear during the season, do you:  
 Cast and let play? Fix, cast, and let play? Fix, let it heal, and then let play?

**Fifth Metatarsal Fractures**

34. What is your preferred treatment for fifth metatarsal fractures?  
 Cast Screw fixation
35. When do you allow return to play?  
 3 weeks 4-6 weeks 7-9 weeks 10 or more weeks

**Tibia Fractures**

36. How many tibia fractures have you treated on your football team in the past 5 years?  
 None 1 2 3 4 5 6-10 >10
37. How do you treat tibia fractures?  
 Intramedullary nailing Casting
38. Have you had any nonunions?  
 Yes No
39. Have any of your players had any complications after operative tibia fracture management?  
 No Fatty embolism Deep vein thrombosis Death  
 Other (please specify)
40. Do you remove the nail before the player returns to the football field?  
 Yes No N/A

**Use of Ketorolac**

41. Do you give ketorolac injections before a game to help with a nagging injury?  
 Yes No
42. How many on average will you administer before a game?  
 0 1 2 3 4 5 or more