Injuries to Kickers in American Football

The National Football League Experience

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Background: Very little information is available regarding the incidence, causative mechanisms, and expected duration of time lost after injuries to kickers (placekickers and punters) in American football.

Hypothesis: Lower extremity musculotendinous injuries are the most common type of injury in American football kickers. The injuries related to punting differ from injuries related to placekicking.

Study Design: Descriptive epidemiologic study.

Methods: A retrospective review of all documented injuries to kickers in the National Football League over a 20-year period (1988-2007) was performed using the League's injury surveillance database. The data were analyzed from multiple perspectives, with emphasis on the type of kick or activity at the time of injury and the factors that affect return to play after injury.

Results: There were 488 total injuries over the 20-year period: 72% involved the lower extremity, 9% involved the lumbosacral spine, and 7% involved the head. Muscle-tendon injuries (49%) were the most common, followed by ligamentous injuries (17%). There was a significantly higher risk of injury in games (17.7 per 1000) than during practice (1.91 per 1000). Most injuries (93%) did not require surgery, and the mean time to return to play was 15 days if no surgery was necessary. Kickers over 30 years of age took longer to return to play (mean, 21 days) than younger kickers (mean, 12 days) after nonsurgical injuries (P = .03). Mean return to play after injuries that required surgery was 121 days. Lumbosacral soft tissue injury, lateral ankle sprains, and shoulder injuries were more likely to occur in punters than placekickers.

Conclusion: Kicking athletes face a low risk of injury in professional American football. Injuries most commonly involve the lower extremities. Training and injury prevention efforts should reflect that punting is associated with different injuries than placekicking, and that older kickers take longer to recuperate than younger kickers after certain injuries.

Keywords: punter; injury; football; placekicker; strain; sprain

An estimated 600 000 to 1.2 million football-related injuries occur in the United States each year.[2,27] A number of studies have reported the incidence and anatomic distribution of American football injuries in the young adult population.[1,4,14] Other investigations have reviewed injuries that may limit an athlete's performance and/or the length of an athlete's career.[7,9,10,21,26] However, there has been little information published to date on injuries to kickers at any level of American football, other than isolated case reports.[11,20,24]

There are 2 types of kicking activities involved in American football. One, known as placekicking, involves kicking the ball as it is held stationary on the ground by either another player (during an attempt to score with an extra point or field goal) or by a tee used during the kick-off. The other kicking activity is known as punting, in which the athlete kicks the ball while holding it waist high after receiving the ball during the snap. As a specialized subset of American football athletes, kickers potentially suffer from different injuries than players at other positions. Because of the unique nature of their predominant activity, their injury patterns may be more similar to those suffered in other kicking sports such as soccer or the martial arts.

The National Football League (NFL) maintains a comprehensive computerized injury database that tracks injuries and medical conditions of all players. As such, it is possible to analyze injuries by position, anatomic region, activity involved, and time of game/season the injury occurred. Information obtained from this injury surveillance may be used to

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aid in injury prevention as well as to assist in determining potential time lost from competition. It was our hypothesis that lower extremity musculotendinous injuries would be the most common type of injury in American football kickers, and that the injuries related to punting differ from injuries related to placekicking. Therefore, the purpose of this study was to review the epidemiologic characteristics of injuries to kicking athletes in the NFL over a 20-year period with an emphasis on incidence and time lost from play.

MATERIALS AND METHODS

A retrospective review of all documented injuries to kicking athletes (placekickers and punters) was performed using the NFL Sports Injury Monitoring System (FlanTech Inc, Cottonwood, Arizona). In this system, an injury was considered significant and reportable if it resulted in premature cessation of at least 1 practice, game, or training event. Additionally, football injuries that were treated in a delayed fashion, even if not associated with premature cessation of play, were also reported.

Data were entered into this system by the team's senior certified athletic trainer, who completed a case entry on each injured kicking athlete and provided daily input pertaining to treatment rendered and the ultimate number of games or practices missed. The initial, presumptive diagnoses were made by the certified athletic trainer at the time of injury. Final diagnoses were not entered into the database until a complete work-up was performed. If time was lost from play, further testing was required (ie, radiographs or MRI). If urgent medical treatment was warranted (ie, open fracture, joint dislocation), then the team physician was consulted and the diagnosis was either confirmed or modified by the team physician as appropriate.

If the athlete returned to play the following practice or day, the time lost from play was recorded as 0 days. If an injury occurred near the end of the season, time lost was recorded from the date of injury until the player in question was able to participate in any football-related activities (off-season practice, weight lifting, etc). Information was collected from all NFL teams over a 20-year period from the start of training camp in 1988 through the 2008 Super Bowl (February 3, 2008).

Data from the NFL Sports Injury Monitoring System were divided into multiple categories pertaining to the injury itself, the athlete, and the team. Injury-specific data included the anatomic area affected, the injury type (fracture, sprain, etc), the laterality of the injury (where applicable), and the amount of time lost from play. Athlete-specific data included the player's age, height, and weight. Team-specific data included the nature of the contest (game vs practice), activity at the time of injury, and playing surface.

Injury data were entered only on kickers who had signed an NFL professional football contract. The injuries were documented if they occurred during the regular season (practice or games), preseason (organized team activities, training camps, or games), and postseason playoffs (practices or games). No data were collected from other NFL-sanctioned competitions such as NFL Europa.

For the purposes of this study, we defined the location of the injury as head, neck/cervical spine, shoulder, upper extremity, thorax/abdomen, lumbosacral spine, pelvis/hip, thigh, knee, leg, ankle, and foot. Injuries were classified into 9 groups by the authors: general trauma (eg, contusion, laceration, and puncture), inflammatory/overuse disorders (eg, bursitis, tendinitis, capsulitis, epicondylitis, and tenosynovitis), infection/cellulitis, muscle-tendon injuries (eg, strain, tendon avulsion, and tendon subluxation), low back soft tissue injury (lumbosacral sprain/strain), fracture (including fracture-dislocations), extremity ligamentous injury/joint instability (eg, sprains, dislocation, or subluxation without associated fracture), isolated cartilaginous injury (eg, loose bodies, osteochondritis, chondromalacia, and nonspecific joint degeneration), and miscellaneous (ie, nonspecific joint injury, elbow calcification, joint impingement, and nerve disorders).

Summary descriptive statistics were calculated by injury location, type, setting, and mechanism. Injury incidence was calculated separately for games and practices based on total exposure data. Mean duration of return to play after injury was calculated and compared based on injury and player demographics. The Student t test was used to assess for significant differences ($P < .05$) in return to play. Injuries in punters were compared with injuries in placekickers using a χ^2 analysis.

RESULTS

Over the 20-year surveillance period, there were a total of 488 reported injuries affecting all kickers for an average of 24 injuries per year. There were a total of 264 kickers on NFL rosters during this period—134 placekickers and 130 punters. The majority of both placekickers and punters were right-footed. Of the 134 placekickers, 125 (93%) were right-footed; 116 (89%) of the 130 punters were right-footed.

Anatomic Site

Table 1 summarizes the most common diagnoses reported, the average days lost to injury, and the side of involvement (where appropriate) for each diagnosis. By far, the 2 most common injuries recorded were adductor muscle strains and hamstring strains. Over 80% of adductor injuries occurred to the right lower extremity, whereas only 33% of ankle sprains occurred in the right lower extremity.

Total Injuries by Location

The majority (72%) of injuries occurred in the lower extremity—most often in the hip and pelvis—followed by the lumbosacral spine (9%) and head (7%) (Figure 1). Overall, 53% of injuries occurred on the right side, while 34% affected the left side and 3% involved both sides (laterality was not applicable to 10% of injuries).

Total Injuries by Type

Muscle-tendon injuries were the most common, making up 49% of all injuries (most often hip adductor or hamstring

TABLE 1
Most Common Diagnoses Reported in Kickers[a]

Description	No. of Injuries	Average Days Lost (Range)	Percentage Involving Right Side	Percentage of Injured Athletes Over 30 Years of Age
Adductor strain (pelvis)	54	10 (1-117)	83	43
Hamstring strain (thigh)	50	16 (0-146)	50	48
Concussion	31	3 (0-49)	NA	35
Quadriceps strain (thigh)	30	36 (1-211)	80	59
Lumbosacral sprain/strain	29	16 (1-136)	NA	33
Leg strain	25	15 (1-86)	64	52
Hip flexor strain	16	9 (0-23)	69	38
Groin strain NOS	13	20 (1-131)	85	31
Anterior talofibular ligament sprain (ankle)	12	9 (2-44)	33	25
Medial collateral ligament sprain (knee)	10	20 (1-88)	60	60
Adductor strain (thigh)	10	8 (1-20)	80	70

[a]NOS, not otherwise specified; NA, not applicable.

strains), followed by ligamentous injury/joint instability injuries (17% of injuries, most often in the knee and ankle) and miscellaneous injuries (9%, primarily due to the high number of concussions) (Figure 2).

Injury Mechanism

Overall, only 32% of injuries were caused by contact, while 54% were noncontact and 14% were attributed to an unidentifiable cause. During games, the leading mechanism of injury was contact (46%), followed by noncontact (43%) and an unidentifiable cause (11%). During practice, the majority of injuries were noncontact (73%), with 18% from an unidentifiable cause, and only 9% caused by contact. Injuries that did not require surgical treatment were most often caused by a noncontact mechanism (55%). Thirty-one percent of nonsurgical injuries were contact injuries and 14% were from an unidentifiable cause. Injuries that did require surgical treatment were also most often caused by a noncontact mechanism (46%), although 43% were contact injuries with the remainder attributable to an unidentifiable cause.

Only 42% (204 of 488) of injuries sustained by kickers actually occurred during the act of kicking (placekicking or punting). Injuries also occurred while the athlete was tackling (11%), blocking (8%), involved in a collision (8%), and in a variety of other situations (31%). Of the 204 injuries that occurred while kicking, only 1 was caused by contact. Fifty-two percent of the kicking injuries occurred in games and 48% occurred in practice. The vast majority (97%) of injuries that occurred while kicking were treated nonoperatively. The majority of kicking injuries (60%) occurred on the right side, while 33% involved the left side.

Game Versus Practice Injuries

A majority of injuries occurred during games (300 of 481 [62%]), with only 38% (181 of 481) occurring during practice. There were a total of 94 517 practice exposures and 16 992 game exposures over the 20-year period studied, resulting in an incidence of injury of 17.7 per 1000 athlete-exposures during games and 1.91 per 1000 athlete-exposures during practice. Despite the fact that significantly more time is spent practicing than playing (thus increasing the potential injury exposure time during practice), there was a >9-fold increase in the risk of injury during games in comparison with practice. The injury rate during games trended upward over the study period, whereas the injury rate during practice remained constant (Figure 3). The injury rate during games was broken down into contact and noncontact mechanisms and there was no trend in terms of the contact injury rate during games over the study period (Figure 4).

Days Lost From Play and Treatment

The 488 injuries resulted in 10 913 total days lost for a mean of 22 days lost per injury (range, 0-332 days). Most injuries (93%) did not require surgery. The likelihood of nonsurgical treatment was similar in kickers 30 years of age and younger (92%) and kickers over 30 years (96%). Injuries that did not require surgery (453 of 488) resulted in 6680 total days lost, with a mean of 15 days lost per injury (range, 0-211 days). Players older than 30 years of age took significantly longer to recover after injuries that did not require surgery (21 days) than players 30 years and younger (12 days) ($P = .03$). There was no significant difference in terms of the types of injuries by age (Table 1) or the return to play for each injury by age.

Injuries that required surgery (35 of 488) resulted in 4233 total days lost, with a mean of 120 days lost per injury (range, 2-332 days), which was significantly longer than injuries that did not require surgery ($P < .001$). There was no difference in return to play after surgery based on player age. The most common injury requiring surgery was an anterior cruciate ligament tear (13), followed by a fracture in the hand or wrist (5) and meniscal tears (3).
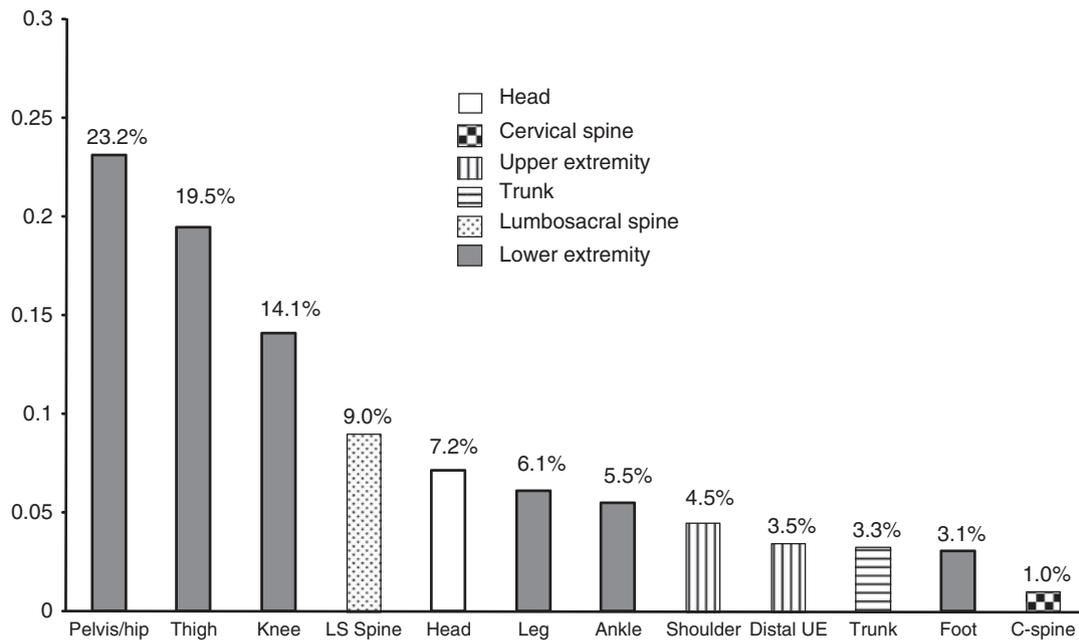
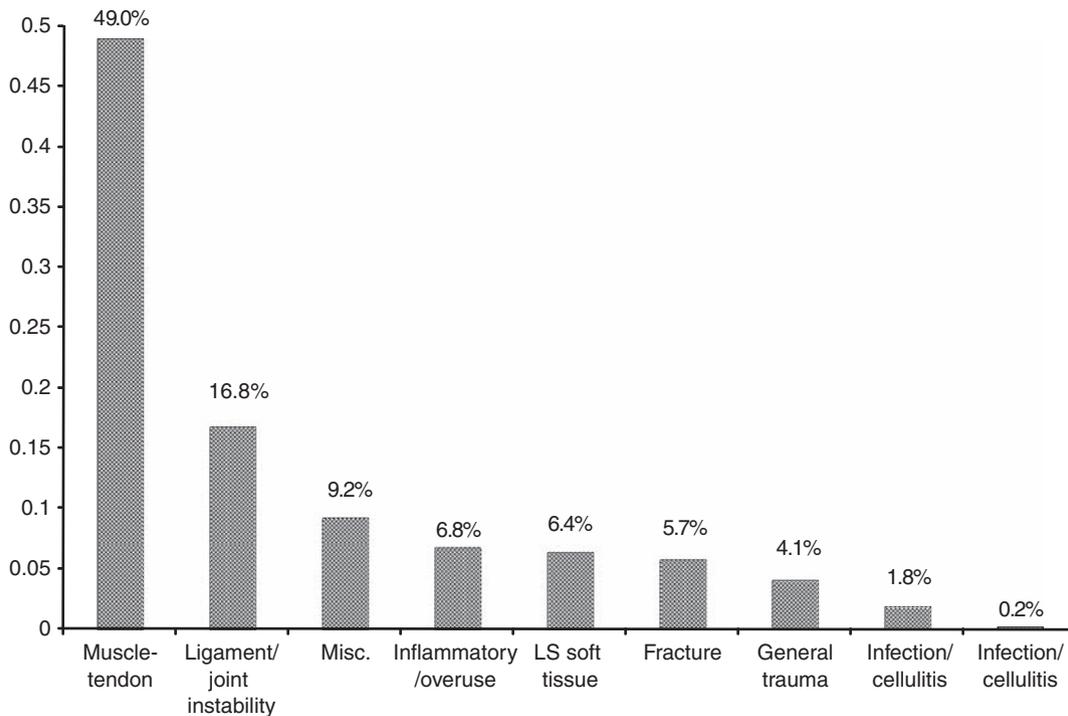**Figure 1.** Anatomic area of injury in American football kicking athletes.

Figure 2. Types of injury in American football kicking athletes.

Comparison of Punting and Placekicking

Forty-seven percent of the injuries (227 of 488) occurred during the act of punting; 53% (261) occurred while placekicking. There was no difference between punting and placekicking in terms of mean days lost to injury, injury setting (game vs practice), mechanism of injury (contact, noncontact, unspecified), laterality of injury, or likelihood of surgical treatment. Punters suffered a disproportionately higher percentage of lateral ankle sprains (70%; *P* = .03), lumbosacral soft tissue injuries (67%; *P* < .001), and shoulder injuries (68%; *P* = .03) compared with placekickers.
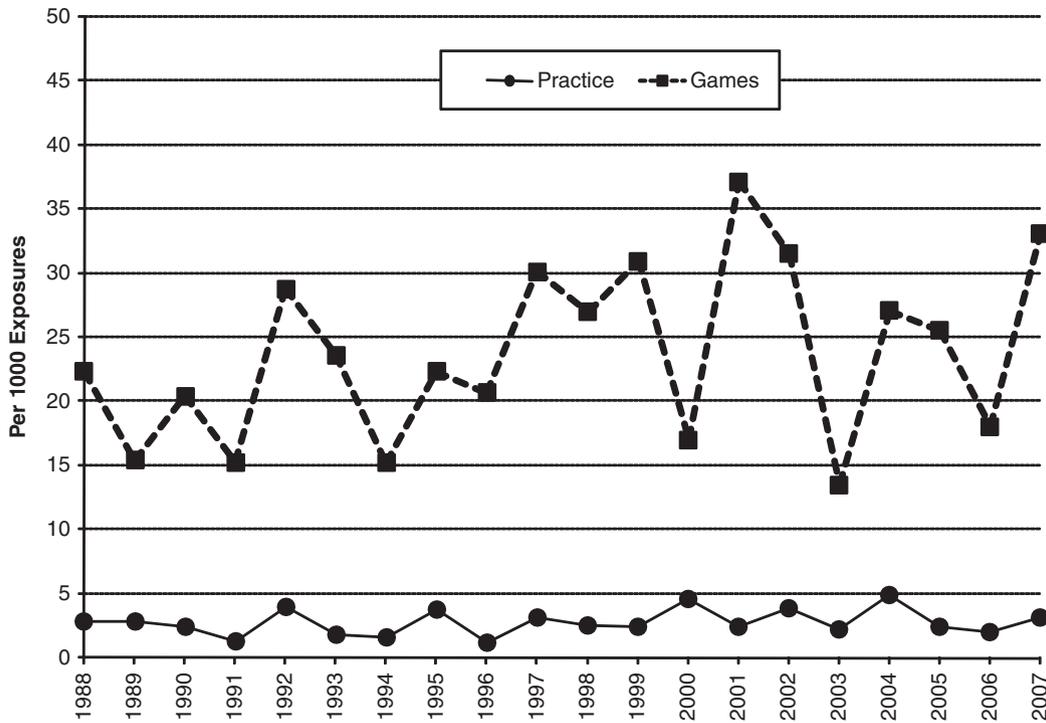
Figure 3. Incidence of National Football League kicking injuries from 1988 through 2007.
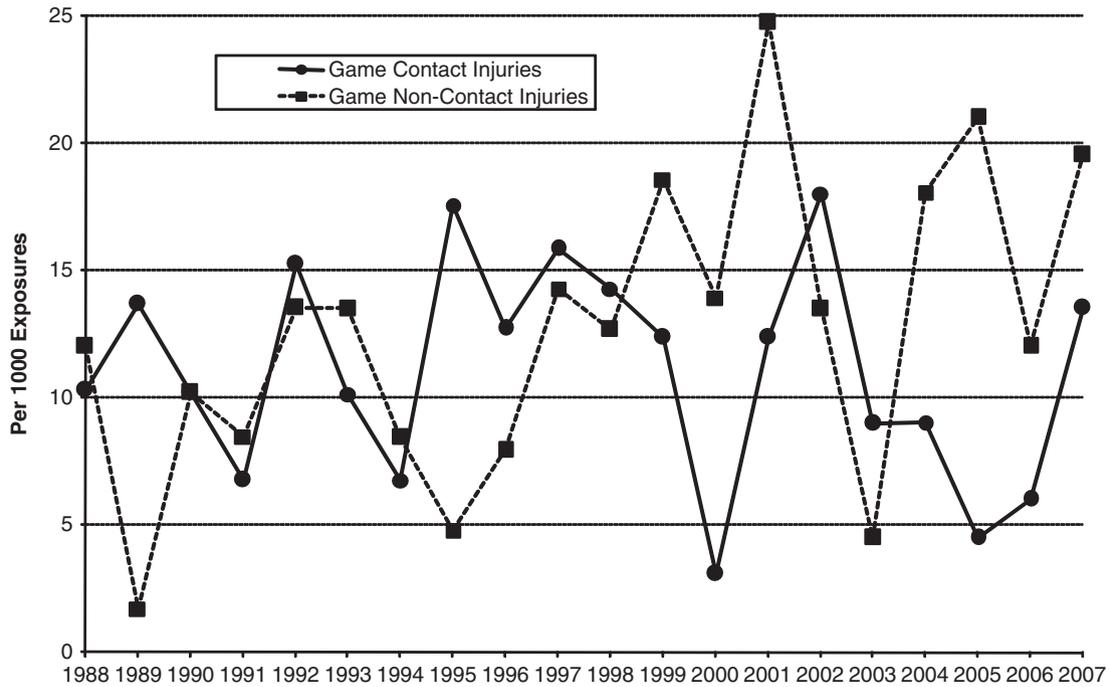

Figure 4. Incidence of game injuries by mechanism from 1988 through 2007.

DISCUSSION

The primary findings from this study were that kicking athletes in the NFL have a low injury rate, and the majority of their injuries are soft tissue injuries of the lower extremities that can be managed nonoperatively. These

athletes face a higher risk of injury during games compared with practices, with contact being the most common mechanism of injury during games. This is consistent with prior studies analyzing NFL injuries to the upper extremity.[12,22] However, less than one-third of all injuries in the current study were due to contact. The vast majority

of injuries in kickers were treated nonoperatively and most of these injuries allowed return to play within 2 to 3 weeks. The exceptions were low back injuries and injuries requiring surgery, which typically have a longer recovery period. Punters incur different injuries than placekickers, likely because of the different demands from the 2 types of kicking. Punters are often exposed to the onrush of opposing players trying to block the attempted punt, especially during the vulnerable period in which the punter is supporting his body on the nondominant plant leg. Placekickers are typically not exposed to such potential contact except when attempting to make a tackle during the kick-off return. Unfortunately, we were not able to definitively discern when specific injuries occurred in terms of game situations (ie, kick-off vs field goal attempt).

Many of the injuries occurred during blocking or tackling, which is an important albeit secondary function of the punter or placekicker. This typically indicates a breakdown in terms of return coverage by the kicking team, which suggests that a well-performing special teams unit may have the added benefit of reducing the risk of injury to the team's punter and/or placekicker.

The only previous study to include data on the injury rate for kicking athletes in American football was a review of preseason injuries in the NFL.[16] In that study, the overall injury rate for kickers was 0.7 per 1000 athlete-exposures, much lower than the rate in our study. The average number of days lost after injury was 6.0 days, again much shorter than the average number of days lost in the current study. Kickers appear to get injured less often, and have less severe injuries, in the preseason compared with the regular and postseason. In the preseason study,[16] 65% of injuries were strains, 24% sprains, 10% contusions, and there were no fractures. By comparison, only 48% of the injuries in our series were strains and 17% were sprains, while fractures made up 6% of all injuries. This suggests that the combination of more intense play and training, and perhaps the effect of fatigue over the season, lead to more significant injuries in kickers in the regular and postseason compared with the preseason.

The location of injuries is similar to that reported for kicking athletes in other sports. Thigh strains (including quadriceps and hamstring strains) have been reported as the most common injury in professional soccer players.[1,5,17-19,30,31] In terms of total injuries in our study, general thigh strains are, by far, the most common injury suffered by kickers in American football. Hamstring strains have accounted for 64% to 67% of the thigh strains in soccer players,[18,19,31] while they accounted for 65% of the thigh strains in the present cohort. In a recent study of collegiate soccer players,[3] the lower extremity was involved in 67% of practice injuries and 70% of game injuries, very similar to the 71% incidence of game-related injuries in our cohort. In this same study,[3] 12% of injuries to collegiate soccer players involved the back and trunk while 4% were caused by concussions. These data are strikingly similar to the 13% and 6% incidence of back/trunk and concussion injuries, respectively, in our cohort. Finally, the injury rate for collegiate soccer players was 18.75 per 1000 exposures in games and 4.34 per 1000

exposures in practices—very comparable with our rates of 17.7 and 1.91, respectively. In a companion study analyzing collegiate football players,[15] the injury rate was 35.9 per 1000 exposures in games and 3.80 per 1000 exposures in practices. Lower extremity injuries accounted for only 53% of all injuries in collegiate football athletes, whereas over 20% of injuries involved the upper extremities compared to 8% in our cohort. The collegiate football study reported some data by position but the kicking athletes were not reported separately. Comparing the results presented here with those of other studies supports the conclusion that injuries to kickers are more similar to those sustained by athletes from other kicking sports than those in athletes at other positions in American football.

Because soft tissue lower extremity injuries make up the majority of injuries and time lost for kickers in the NFL, there is an opportunity to improve the conditioning and training for these athletes to try to minimize these injuries. A number of studies examining kicking athletes from other sports suggest that well-designed interventions can reduce the incidence of adductor and hamstring injuries.[6,8,13,28,29,32] Preseason adductor strengthening has been shown to decrease the risk of adductor injury for professional hockey players.[28] Professional soccer players with quadriceps and/or hamstring tightness at the beginning of the season have been shown to be at higher risk for injury to the affected muscle group(s).[32] A study of elite male professional soccer players from Sweden demonstrated fewer hamstring strains in athletes who underwent a preseason strength training program emphasizing eccentric overloading for the hamstring muscle group.[6] Another study of Australian Rules football found fewer injuries, fewer games missed, and a decrease in the incidence of hamstring strains after an intervention program including stretching when fatigued, sport-specific training drills, and an emphasis on increasing the amount of high-intensity anaerobic interval training.[29] In a study of hamstring injuries in rugby, kicking injuries were associated with the most severe injuries (36 days lost on average).[8] This same study reported that the addition of Nordic hamstring exercises to conventional training resulted in fewer hamstring injuries and a quicker recovery from those injuries. A recent study of professional soccer players reported that hamstring strength imbalances were associated with a significantly higher risk of hamstring injury.[13] Isokinetic training that corrected hamstring strength imbalances reduced the risk of injury to that of players with no hamstring imbalances. Kickers in American football may benefit from hamstring and adductor training programs to try to reduce the incidence and severity of these injuries. Clearly, further research is warranted in this athletic population to determine the influence of lower extremity strength and flexibility imbalances on injury risk as well as the effect of intervention programs on injury prevention.

Concussions were the third most common injury in NFL kickers. Thirty of 31 concussions occurred in a game setting, and 29 of the 31 concussions were caused by contact. None of the concussions occurred while kicking, 12 occurred while blocking, 11 while tackling, 5 while being

tackled, and 3 during a nonspecific collision. The return to play was relatively quick for those kickers who sustained a concussion as there was no missed time after two-thirds (20 of 31) of these injuries. Only 3 of the 31 concussions (9.7%) resulted in more than 7 days of lost time, comparable to the overall League average of 8%.[26]

Based on the differences in injuries between punters and placekickers, special emphasis should be placed on low back stretching and conditioning for punters. The punt may put higher stress on the lumbosacral region because of the requisite follow-through with the kicking leg, although we have no objective data to quantify this. Lateral ankle sprains may be related to the follow-through as well, either due to awkward landing or contact from another player. Only 38% of the lateral ankle sprains in the database were reported to be from a contact mechanism; the other 62% were reported as noncontact. The percentage of lateral ankle sprains due to contact did not differ between punters and placekickers. Shoulder injuries, however, were primarily attributed to contact (68%); again, there was no significant difference in the percentage of contact injuries between punters and placekickers. It must be considered that both punters and placekickers are at risk for a variety of nonkicking injuries (listed above) when they attempt to tackle the opposing player returning or running with the ball after receiving the kick. This often results in violent, open-field collisions in addition to the possibility of injury while the kicker is running down the field attempting to make a tackle. It is unlikely that any form of preventive intervention will be useful to reduce this risk given the nature of the sport.

Injuries, in general, were more likely to occur on the right side. Although no data were available regarding the kicking foot of each athlete who was injured, most kickers in the NFL are right-footed. We identified 134 placekickers in the NFL over the study period, of whom 93% were right-footed. Of 130 punters in the NFL over the study period, 89% were right-footed. In regard to specific injuries, over 80% of adductor injuries occurred in the right lower extremity, suggesting this injury is associated with the kicking motion of the kicking lower extremity. Although 80% of quadriceps strains also occurred on the right, hamstring strains were evenly divided between the right and left lower extremities, suggesting that the knee extensors are more likely to be injured in the kicking leg while the knee flexors are also at risk in the plant leg. Lateral ankle injuries were more likely to occur in the left lower extremity, perhaps at risk while planted for the kicking motion. Previous studies looking at laterality as it relates to lower extremity injury have been mixed.[23,25]

The limitations of this study include the lack of data on exposures (and hence injury incidence) by kicking style, player age, and experience. Return to play is an important variable but does not reflect potential effects of injuries on career length or performance. The role of leg dominance could not be examined directly because the data were not available.

Despite these limitations, this study is the first of its kind looking specifically at injuries to kickers in American football, and specifically the NFL. These data may be used to guide expectations for return to play after injury as well as suggesting areas for possible improvement in conditioning and injury prevention for these athletes. Given the lack of any previously published data on kicking injuries in American football, the results of this study may be useful to those taking care of kicking athletes in collegiate and high school American football. However, it must be recognized that the data presented in this study pertain to professional players. The incidence and distribution of injuries to kickers at lower levels of play may be different based on player ability, conditioning, and rules differences. Future studies should assess the utility of specific interventions to reduce kicking injuries in American football.

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