

American football injuries in Finland

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American football is currently played in 14 European countries. It is a contact sport where injuries are inevitable. In this study, injuries causing more than one week of absence from game or practise were registered during the 1991 preseason and season. A total of 112 injuries was reported among 684 players. Knees were most vulnerable to injury (28.6%) followed by ankle injuries (16.7%). Operations were performed on 28 (25%) of the injured players. Catastrophic injuries can occur in this sport, but none has happened in Finland during the 12 years for which the sport has been practised. The skill level was not a contributing factor. The frequency of injuries and their profile closely resemble those in US-based studies so it is suggested that the precautions and preventive measures recommended in the USA should be applied and followed in Europe.

Keywords: American football, athletic injuries

American football is a contact sport, sometimes even referred to as a collision sport. The game originates from rugby and the first game was played in 1869 in the USA between Rutgers and Princeton Universities. There are approximately 1.8 million registered players in the USA from high-school level to professional players¹.

American football came to Europe in the 1970s. It is organized under the European Football League, which has 14 national member federations. The level of American football among top European teams is comparable to division III college teams in the USA. In Finland American football has been played for 12 years and Finland is the only country to win medals in every European Championship so far – the UK being the reigning champion at the moment.

American football is a growing sport in Europe, and increasing numbers of European sports physicians will have to deal with American football injuries; it is therefore useful to be aware of the risks of the game. To examine the injury frequency and profile and to compare it with USA statistics, an injury register was kept during the 1991 Finnish preseason and season.

Materials and methods

The Finnish American Football Federation has 941 registered players (excluding junior levels) in 25 teams in 24 clubs. The mean(range) age of the players was 23.6(18–36) years. The teams play in three different divisions: Maple League (which is the highest level) and divisions I and II. Each starting team begins from division II and the best two teams try to qualify to the next higher division with the last two teams from that division. The squad in each team varied from 26 to 48 players. The season is from June to August and for the 3 months before the season training emphasizes game skills. During the preseason and season the teams have from four to six weekly training sessions. All injuries that caused at least one week of absence from game or practise were registered by the medical officer of each club. An injury was classified as moderate if the absence from game or practice was 1–3 weeks, and severe if the absence was over 3 weeks. Mild injuries with disability less than a week were not registered. The players are amateurs and personal reasons other than a mild injury could be more important for missing practise for a day or two. The preseason injury register was kept during the 3 months before the season. Each team had 8–12 games during the season, depending on their success.

Six teams from each level (18 teams; 684 players, 73%) participated in the registry. Student's *t* test was used for statistical analysis.

Results

A total of 112 injuries was reported of which 65 occurred in games and 47 during practise. There were 48 moderate injuries causing 1–3 weeks of absence, and 64 severe injuries causing more than 3 weeks of absence from games and practice. There was no significant difference in the number of severe injuries during games (33) or practice (31). The mean(range) age of the injured players was 23.4(18–35) and the mean(range) length of participation in football was four (range 0–15) complete seasons. There were no significant differences in the ages of the injured players in different levels. The number of injured players in each level was: Maple League 35 injuries out of 225 players (16%), division I 44 out of 233 (19%) and division II 33 out of 226 (15%). Offensive

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players received 65 injuries, defensive players 46 and one special team player was injured (Table 1). Running backs and linebackers were most frequently injured and the knee the most vulnerable body part; with 32 of the 112 reported injuries (28.6%) being to the knee – 20 were severe. The anatomical distribution of the injuries is presented in Table 2. Operations were carried out on 28 injuries (Table 3).

Discussion

Injury in contact sports is inevitable. American football is known to have a high incidence of injuries², Canale *et al.*³ reporting a 46.6% probability of injury for an individual player during 1-year participation in American football at US college level, and Zemper's⁴ 32.1% of players injured annually. Both studies also reported milder time-loss injuries than this study.

In this report, during the one preseason – season surveillance period 16.4% of the players sustained an injury that could be regarded as moderate or severe. Of the reported injuries, 25 (22.3%) occurred in non-contact situations, which is close to the 20%

found in Zemper's study⁴. Surgery was required in 25% of the cases, whereas in Zemper's study⁴ 8.5% of the patients were operated on. However, the total number in Zemper's study⁴ included also mild injuries. The patients in this report were treated by several physicians and therefore the criteria for operative treatment can have varied. Inexperience in lower levels, and speed and strength in higher levels could contribute to the fact that the risk of injury was similar in all levels.

Although there were more injuries during games, no significant difference was found in the occurrence of severe injuries causing over 3 week's disability during games or practise. Similarly, Canale *et al.*³ also found only a slightly higher percentage of severe injuries during competition than during practise. Much of the practise game drills usually include full contact. Competent medical personnel should therefore also be present during practice. Whiteside *et al.*⁵ found that games produced more injuries than practices by almost a 5:1 ratio in Penn State University and according to Zemper⁴ the injury rate is 8.6 times higher in games than in practices. The overall 9.4% frequency of severe injuries in this report is in accordance with other reports³.

Offensive players incurred more injuries than defensive players in accordance with other studies^{4,5}. Those who state that it is safer to play in offence than defence may be referring to reports that risk of catastrophic injury is higher for defence players⁶. Running backs and linebackers had the greatest number of injuries. This is not surprising, because running backs as primary ball handlers are tackled frequently and these tackles are most often performed by linebackers. Injuries to these players are also frequent in the USA^{3,5}. However, the incidence of injuries for the different game positions in this study or in any other previous study has not been calculated because the time-at-risk for an individual player is difficult to measure due to the nature of the game.

Knees are known to be most vulnerable to injury²⁻⁵. Of the 32 reported knee injuries, 17 were

Table 1. Injuries by position

<i>Offense</i>	
Running backs	29
Offensive linemen	16
Wide receivers	9
Quarterbacks	6
Tight ends	5
Total	65
<i>Defence</i>	
Linebackers	21
Defensive linemen	16
Defensive backfield	9
Total	46
<i>Special teams</i>	
Kick-off	1

Table 2. Injuries by anatomic site

Anatomic site (no. injuries)	Moderate	Severe	Total injuries (%)
Knee (32)	12	20	28.6
Ankle (18)	8	10	16.1
Shoulder (12)	10	2	10.7
Thigh (9)	4	5	8.0
Back (6)	3	3	5.4
Hand (6)	2	4	5.4
Wrist (6)	2	4	5.4
Clavicle (4)	0	4	3.6
Ribs (4)	1	3	3.6
Head (2)	2	0	1.8
Neck (2)	2	0	1.8
Hip (2)	0	2	1.8
Elbow (2)	0	2	1.8
Hamstring (2)	2	0	1.8
Others (5)	2	3	4.5
Total	50	62	

Table 3. Surgically treated injuries

Pathology	Operations (no.)
Medial meniscus (MM)	5
Anterior cruciate ligament (ACL)	4
Patellar luxation	3
Unhappy trias (ACL + MCL + MM)	2
Hip luxation	2
Anterior fibulotalar ligament	2
Clavicular fracture	2
Medial collateral ligament (MCL)	1
ACL + MCL	1
ACL + MM	1
Acromioclavicular luxation	1
Elbow luxation	1
Nasal fracture	1
Knee distortion (diagnostic arthroscopy)	1
Fifth metatarsal fracture (Jones)	1
Total	28

treated operatively, although one of them can be regarded only as a diagnostic arthroscopy. The overall surgery rate for all knee injuries (mild and severe) seems to be approximately 20%^{5,7}. The anterior cruciate ligament was torn in eight cases.

In the USA ankle injuries occur second most frequently^{3,4}. Two of our lateral ligamentous injuries of the ankle were treated operatively, although there is a tendency towards orthotic conservative therapy⁸. Two dislocations of the hip were reduced under anaesthesia. Traumatic dislocation of the hip results from a powerful dislocating force and there is a risk of post-traumatic aseptic necrosis⁹.

Two cerebral concussions were reported but no cervical injuries with permanent neurologic sequelae have occurred in Finland so far. In the USA, most of the direct fatalities have been caused by head and neck injuries¹⁰; the worst year was 1968 with 36 direct fatalities. Analysis showed that the majority of cervical fractures and dislocations were due to axial loading. The rules were changed in 1976 to ban both deliberate spearing and using the top of the helmet as the initial point of contact in making a tackle^{11,12}. The number of fatalities, and important cervical spine injuries has decreased^{2,12}. Grade I brachial plexus injuries, often referred to as burners or stingers, are common in American football and are thought to occur due to traction forces on the brachial plexus and cervical nerve roots when players are in contact¹³. In our cases full recovery was seen and persistent sensory changes are known to be rare¹³.

The frequency of American football injuries in Finland and their anatomical distribution resembles that of the USA. It is therefore reasonable to conclude with the following recommendations: preseason medical evaluation; proper coaching techniques to discourage the players from using their heads as battering rams when blocking and tackling; good

conditioning and strengthening including the neck musculature; good properly fitted equipment; and effective emergency care.

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