

Hand, Finger and Wrist Injuries may be Creating Post Retirement Headaches in Australian Football League Players

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Abstract

Objective: In the Australian Football League (AFL) an injury is only recorded when it causes a player to miss a match. This recording method indicates a predominance of lower limb injuries, although the Victorian Injury Surveillance Unit has shown the upper limb to be involved almost twice as commonly as the lower limb. We hypothesize that hand, finger and wrist injuries in AF are an under-recognized entity due to the ability of players to continue play without missing subsequent games. The aim of this study is to estimate the true incidence of hand, finger and wrist injuries in elite AF players, through a prospective study of all hand, finger and wrist injuries at a professional AFL club during an entire season.

Methods: This is a prospective cohort study of all senior and rookie players at an AFL club examining the incidence and epidemiology of hand, finger and wrist injuries during the 2015 AFL season.

Results: An incidence of 25.0 injuries per season requiring treatment in 27 players was recorded during the 2015 AFL schedule. A total of two games were missed due to metacarpal fracture. All other players continued to play with their injury during the season with three players requiring surgery post season. A hand, finger and wrist injury incidence of 43.8 per 1000 exposures was recorded, equating to 22.6 injuries per 1000 contact hours.

Conclusion: Hand, finger and wrist injuries in AF are an under-recognized entity due to the ability of players to continue play without missing subsequent games. This study highlights a tendency to minimize the impact of hand, finger and wrist injuries within AF and the scientific literature, and raises further questions regarding injury reporting and management within professional sports. We recommend the adoption of more detailed

Keywords: Hand; Finger; Wrist; Injuries; Football; Professional; Surveillance; Sports injury

Introduction

Australian Football (AF) is the leading cause of sports-related hospital presentations and admissions to emergency departments in the state of Victoria, Australia [1]. Hand, finger and wrist injuries account for 23% of all football related hospitalizations, equalled only by head and face injuries, whilst the knee and lower limb account for 20% [2]. The upper limb is also the second most commonly injured body part in AF players presenting for medical review in the community [3].

The Australian Football League (AFL) is the distinguished professional competition of AF in Australia. The AFL Injury Report has been the most widely reported registry of elite level injuries in AF. Inclusion criteria for injuries reported in this database are those that result in missed game participation. The AFL Injury Report season summaries from 2006 to 2015 demonstrate a different injury profile compared to community figures, with an average incidence of hand,

wrist and forearm injuries of only 1.6 from a total of 36.1 new injuries per club per season [4]. This is compared with 8.0 for foot and ankle, and 2.8 for shoulder and elbow injuries per season. The prevalence (number of games missed per club per season) has averaged 5.2 for hand, wrist and forearm injuries, compared with 38.9 for foot and ankle injuries and 14.6 for shoulder and elbow injuries [4].

As injuries that do not produce loss of game time are not recorded in the official AFL Injury Report, the true incidence of hand and wrist injury is likely to be under reported [4,5]. There is significant heterogeneity in the reporting protocols of hand injuries across the football codes and between levels of participation. These injuries are typically recorded as a subset of injury surveillance programs and categorized by body region, thereby lacking injury specific details. Standardization of injury reporting has been attempted within individual sports, although an encompassing definition spanning multiple sports remains elusive. In rugby union, the international governing body has sought to standardize injury reporting by defining the difference between a "medical attention injury" and a "time-loss injury" [5], although prior studies included events requiring a player to leave the field or miss a subsequent game [6]. Rugby league injury

definitions have included events requiring medical treatment or resulting in a missed game or training [7]. Gridiron player injuries in the National Football League (NFL) surveillance registry are defined also by cessation of participation in the game or practice session, or resulting in a missed game or training [8]. In this cohort, injury type and mechanism are well documented as well as specialist player position. The total number of injuries were predominantly fractures and dislocations, which were more likely to be sustained in specialist positions requiring tackling and blocking. AF players have a more homogenous role in the game involving greater ball handling, catching and grappling than most other contact sports, thereby exposing a greater number of players to hand and finger injuries.

We hypothesize that hand, finger and wrist injuries in AF are an under-recognized entity due to the ability of players to continue play without missing subsequent games. The aim of this study is to estimate the true incidence of hand, finger and wrist injuries in elite AF players, through a prospective study of all hand, finger and wrist injuries at a professional AFL club during an entire season.

Materials and Methods

Institutional review board approval was gained for this study. A season was defined as including all games and training during the 2015 pre-season, regular season, as well as finals period. At the conclusion of each training session or game throughout the season, all senior and rookie players at a men's AFL club were monitored by the team therapist for new or recurrent injuries. All hand, finger and wrist injuries were reviewed by the team physician, followed by review with a specialist upper limb surgeon for injuries potentially requiring surgical intervention, or when the diagnosis and management of an injury was in question. Injury data was collected and tabulated after each training session or game by the team physician. Injuries were tracked by the team physician for games missed and time to return-to-play. Median, range and standard deviation values are presented for data sets.

Results

Injuries were recorded across 30 games and all training sessions. Player statistics are presented in Table 1. In a 46-man squad (40 senior, 6 rookie), thirty-four injuries were recorded in twenty-seven players during the 2015 season. Eight injuries occurred during training compared to twenty-six injuries during competitive games. Injuries sustained are detailed in Figure 1. Two players sustained metacarpal fractures requiring immediate cessation of their activity, with one of these players undergoing surgery, missing the subsequent two games. All other players completed their current game or training despite injury and no subsequent games were missed. Three players underwent surgery post season, two for acute and one for acute on chronic injuries. Injury statistics are presented in Table 2.

Demographics	26.4 age (average)
	27 Male, 0 Female
Game minutes played	1,979 average entire cohort
	1,961 average injured players
	90,218 total all players
Time to play post injury (mean)	0.9 days non-contact (range 0-6)

	2.6 days contact (range 0-20)
	0.09 missed games (range 0-2)

Table 1: Injured player demographics.

34 injuries	27 players	
Part of season injury sustained	Pre-season competition	training/ 15
	First half of regular season	11
	Second half of regular season	5
	Finals season	3
Position played when injury was sustained	Forward	6
	Midfield	13
	Backline	10
	Ruck	5
Nature of injury	Soft tissue	29
	Dislocation	3
	Fracture	2

Table 2: Injury statistics.

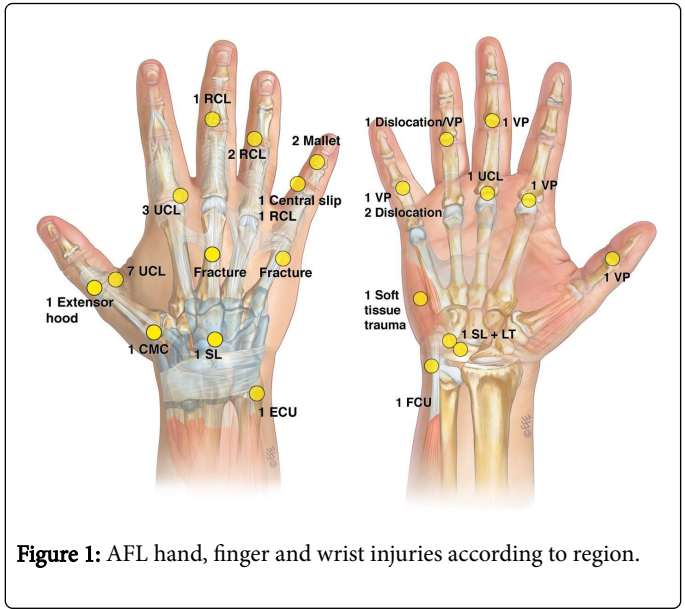


Figure 1: AFL hand, finger and wrist injuries according to region.

Legend: VP (volar plate), FCU/ECU (flexor carpi ulnaris/extensor carpi ulnaris), SL (scapholunate), LT (luno-triquetral), UCL (ulnar collateral ligament), RCL (radial collateral ligament), CMC (carpo-metacarpal)

Discussion

Australian football is the 10th most popular Australian sport for males above 15 years at 2.6% participation. Female participation is less

than 1% in the same age group [9], although with the recent advent of professional level women's AFL, this will increase in the future. Despite this, AF football is responsible for 50% of sports related hospitalizations in the state of Victoria at approximately 1 per 100 participants [2]. Over double this number are seen in the emergency department and discharged. Sports clinics similarly share the burden of care for football injuries, with these injuries responsible for 20-30% of new presentations [3,10-12].

Surveillance studies have previously reported two-thirds of injuries involving the lower limb, with the remainder divided between head or neck, trunk and upper limb [4,13]. However, the Victorian Injury Surveillance Unit documents a differing profile, with the upper limb the most frequent region injured for AF (43%), rugby league and union (38%), baseball/softball (39%), cricket (49%) and hockey (46%). The lower limb is more frequently injured in sports such as soccer, netball, basketball, squash, tennis and badminton [2].

AF requires a unique mix of skills including sprint and endurance running, ball-handling, tackling and kicking. AFL players complete on average per game 13.2 km running, 169.8 handballs (passes), 88.5 marks (catches), 69.7 tackles and 205.1 kicks [22]. Catching, passing and tackling are the primary activities identified in ball sports as contributing to hand, finger and wrist injuries [21], and therefore would be expected to be documented as a significant injury burden to players. Saw and colleagues recently conducted a literature search of injuries in Australian Rules Football and noted that upper limb injuries are more commonly reported in treatment-based data collections than in community or 'grass roots' surveillance [22]. As a result, analysis of hand, finger and wrist injuries were omitted from the review due to a paucity of information. Shoulder injuries alone were discussed regarding upper limb injuries.

The paucity of information continues when attempting to analyse injury rates at a 'grassroots' level, which requires injury reporting directly to the athletic trainer. A study by Rettig and colleagues examined the incidence of hand and wrist injuries at the Olympic Training Center in Colorado Springs, CO, USA. Over a 10-year period, 729 injuries were reported from athletes across 36 sports. Injuries were reported directly to the athletic trainer, representing a 'grassroots' approach to injury surveillance. Sprains and contusions accounted for 64% of injuries, with fractures compromising only 10% of hand and wrist injuries [23]. Notably, football (rugby union or its derivatives American or Australian football) was not an Olympic sport at that time.

American football, as a contact-sport requiring ball-handling skills and tackling, serves as a corollary to the injury analysis of AF. As an example of a 'grass roots' approach to injury surveillance, injury statistics were compiled by the National Athletic Trainers Association (USA) in a single high-school football season in one of the largest cohorts of this type of injury reporting. Of 92,655 injuries involving the hand, wrist or forearm, fractures accounted for only 7% of injuries. Sprains, contusions and lacerations made up 88% of the total injuries.

This injury profile is in stark contrast to the reporting of hand, first ray and finger injuries of professional NFL players by Mall and colleagues. The League's injury surveillance database was utilised in their descriptive epidemiological study documenting injuries in the NFL from 1996-2005. Of a total 1385 injuries studied, metacarpal fracture and proximal interphalangeal dislocation accounted for 34% of all injuries recorded [8]. When including all other locations in the hand, first ray and finger, fractures and dislocations accounted for a

total of 68% of all injuries, and contributed to 77% of days lost to practice or game play due to injury. Whilst there are many differences between amateur and professional athletes and play, there is undoubtedly a significant knowledge gap of soft tissue hand, finger and wrist injuries in the professional athlete.

Our study recorded a single season incidence of new hand, finger and wrist injury requiring a game to be missed of 2.0, which is comparable to the 2010 AFL Injury Report which documented 1.6 per club per season in the same category [4]. However, the total incidence of new hand, finger and wrist injury without requirement for cessation of activities in this study is 25.0 per club per season, demonstrating the significantly higher true incidence of new injuries when a broader surveillance program is instituted.

The first and fifth ray both accounted for 37.5% of injuries by area, and most commonly the MCP joints (38.3%) and the PIP joints (29.4%) were involved. The most common injury seen was to the ulnar collateral ligament (UCL) of the thumb metacarpo-phalangeal (MCP) joint (20.6%), which were chiefly lower grade injuries. The thumb (and in particular the UCL) are recognised as particularly vulnerable in competitive sports that risk injury to the hand and wrist [8,14].

In our study, there were 594 game exposures for a hand, finger and wrist injury incidence of 43.8 per 1000 exposures. The total minutes played were 90218, equating to 22.6 injuries per 1000 contact hours. This is a considerably injury incidence when compared to a ten-year database review of the NFL [8], which noted an injury incidence to the hand and wrist of 10.6 per 1000 exposures. In a prospective cohort study of 1475 rugby union players [15], 9.84 upper limb injuries per 1000 exposures were recorded, of which 2.53 per 1000 were to the hand and wrist. An injury rate for the hand and wrist in 546 rugby union players was recorded by Brooks [16] as 1.1 per 1000 contact hours.

Although there is a proliferate increase in injury incidence demonstrated in this study compared to the NFL or rugby codes, this is explained by the narrow inclusion criteria of injuries requiring games missed, and further emphasizes the burden of upper limb injuries in contact sport [17]. This is highlighted within our study, which showed that other than metacarpal fractures, all other hand injuries (including those requiring surgery post season) were able to be carried through the season.

Acute injuries that occurred during the season studied including central slip avulsion, mallet finger, scapho-lunate and luno-triquetral dissociation, and thumb MCP joint UCL/RCL injury. These injuries were managed expectantly allowing both immediate continued play and subsequent game play with splinting treatment. Those requiring surgery had delayed surgical management at the season's conclusion. The effect of this delayed management of acute injuries requires further investigation. Although injuries such as thumb MCP joint RCL disruption demonstrate good patient outcomes with delayed repair [18], others such as mallet finger are more difficult to salvage after chronic deformity develops [19].

Our study found almost 20% of players required treatment for an exacerbation of a chronic injury occurring prior to the season studied. These injuries were predominantly ligamentous injuries including scapho-lunate and thumb MCP instability. Some of these injuries, such as scapho-lunate dissociation, have known degenerative consequences with chronicity. Early surgical repair is a less involved procedure than delayed reconstruction, compounding the impact of delayed management of such injuries [20-23]. The current "courageous" player

activity of playing despite having significant injury may be less acceptable if consequences for physical activity after retirement from professional sport were considered in early management.

The authors acknowledge that this epidemiological study is limited by data collection across a single AFL club and season. Although this limits the statistical significance of the dataset, this paper is the first to document the entire breadth of hand, finger and wrist injuries in a professional AFL cohort.

Conclusion

Hand, finger and wrist injuries in AF are an under-recognized entity due to the ability of players to continue play without missing subsequent games. This study highlights a tendency to minimize the impact of hand, finger and wrist injuries within AF and the scientific literature, and raises further questions regarding injury reporting and management within professional sports. Acknowledgment of the long-term effects of sports-related concussion has led to widespread head injury prevention and management protocols across many high-risk sports. The concussion precedent questions the responsibility of professional sports organisations to monitor and treat athlete injuries that may result in post-career disability. Presently, there is no published evidence describing the long-term disability incurred as a result of hand, finger and wrist injuries in professional athletes. In highlighting the true incidence of hand, finger and wrist injuries in AFL players, we recommend the adoption of more detailed injury surveillance programs and further study of upper limb disability in retired players.

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