Football-Related Facial Trauma: A Population Based Analysis

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INTRODUCTION

In the wake of glorifying football and its related trauma, it is the discovery of a variety of head and facial trauma sequelae, resulting in drastic regulatory changes. Arguably popularized at the level of the National Football League (NFL) and National Collegiate Athletic Association (NCAA), these tackling continue to exist at a recreational level with players of all ages. Guidelines deterring this form of physically in football first took form in 1976 when the NCAA and the National Federation of State High School Associations (NFHSAA) amended the definition of spearing to include any deliberate use of the helmet in contact against opponents. In 2005, this regulation further evolved to include any helmet contact, regardless of whether or not the contact was purposeful, and would now include the facemask in the criteria.

In addition to targeting regulatory modifications to lower the incidence of facial trauma, there have been fundamental changes in helmet structure in an effort to improve safety. Historical modifications came with the invention of the leather helmet, which served as one of the earliest head protective devices in football. With the evolution of the helmet to its modern design, there have been significant decreases in reported concussion incidence.[6] However, there is a paucity of information regarding the incidence of facial trauma secondary to football related injury. In light of this regulation and equipment modifications at the organized level, our goal was to investigate whether there was an impact on the incidence of football-related facial trauma. Using a national database, it was our objective to evaluate for changes in the rate of emergency department visits pertaining to football-related facial injuries. Furthermore, we stratified data by patient demographics, type of injury, mechanism of injury and anatomical location of injury.

METHODS AND MATERIALS

The Consumer Product Safety Commission’s National Electronic Injury Surveillance System (NEISS) was utilized for data specific to football-related facial injuries presenting to the ED. This database has previously provided a plethora of analyses, demonstrating its distinct value in surveying population-based trends in emergency medicine. Briefly, the NEISS compiles data on injuries presenting to 100 different emergency departments, which is then further extrapolated into a national representation using a unique algorithm engineered by the NEISS.

Using the product code “Football”, the authors queried injuries occurring in the face during 2008 – 2013. Individual entries were assessed for patient demographics, diagnosis and any additional characteristics reported. Data collection and analysis was completed in October 2014.

RESULTS

From 2008 - 2013, 3,112 football-related facial injury entries were recorded, with estimated 103,803 ED visits at the nationally. The incidence of football-related facial injury incidence declined (Fig 1). There were 20,779 visits in 2008, declining to 13,974 visits in 2013, signifying a 32.7% decrease. Of the 3,112 ED visits, 93.9% of the patients were male.

Stratifying by age, over half of the entries (53.1%) were under age 18, with the most common age at time of injury was 17 years old (Fig 2). The majority of facial injuries were the result of laceration (51.1%), followed by contusion/abrasions (23.2%) and fractures (18.7%) across all age groups. Lacerations remained the majority across all ages, the proportion of facial fractures was found to increase with increasing age, until age 65+ (Table 1). Assessing for median age, fracture was determined to be the highest (17), followed by laceration (15) and contusion/abrasion (13).

Comparing pediatric to adult injuries, use of chi-square test reveals that 16.6% of injuries were facial fractures from ages 0-17 years which is significantly less than that of 27.6% at ages 18-30 (p<0.0001). Lacerations were most common in all age groups (Fig 4).

Most lacerations and contusions/abrasions were localized to the orbit (23.5%) and nose (26.1%), respectively. The majority of fractures were identified as nasal (66.0%), followed by mandible (16.8%) fractures (Fig 3). Lacerations, contusions/abrasions, and fracture were most commonly caused by head-to-head collisions, footballs, and arms, respectively (Fig 5).

With respect to total football-related facial injuries not restricted to the face, the NEISS estimated ED visits at 478,802 in 2008 and 420,581 in 2013, translating to a 12.2% decline or a decrease of 58,221 ED visits (Fig 5).

DISCUSSION

The NEISS has served as an invaluable database for analyses. No analysis of the NEISS on football-related facial injuries has previously been performed and there is little information in the literature regarding facial injuries specific to football. This study serves to investigate football-related facial trauma over the last 6 years.

Both regulatory evolution and helmet design modification are likely culprits for the decline in football-related facial traumas. With respect to changes made to gameplay, one possible explanation of the declining football-related facial trauma is the adoption of mandatory four-point chinstraps in 2005 in all levels of organized play.

Stratifying injuries demonstrated lacerations as the most common diagnosis, with a majority caused by head-to-head collisions. Those under 13 years old tend for decreased incidence of injury including: the facial bone retains a level of compliance, the pronounced buccal fat preserves an increased level of protection and the paranasal sinuses have not entirely pneumatized. Teenagers also tend to participate in more contact sports, with decreased adult supervision and increasing competitive level.

When isolating facial injuries by site of injury, the majority occurs at the nasal bone. Interestingly, the incidence of fractures relative to other diagnoses increases as age increases, until 65 years and older (Table 1). During puberty, as bones develop they become especially susceptible to injury due to the incongruity between the formation of the bone matrix and mineralization.

Future studies investigating favorable outcomes on timing of pediatric nasal fracture repair are necessary to dictate the management of this traumatic malady.

A majority of the facial injuries were localized to the soft tissue, made up of lacerations and contusions/abrasions, which the most common site at the orbit and nose, respectively. These observations from the data may reveal limitations in current helmet designs.

Limitations have been documented in other studies utilizing the NEISS database for analysis and differentiating organized versus recreational. The introduction of different safety regulations may modify gameplay in the uncontrolled setting, and thus may account for the decreased injury incidence as well as media presentation. While these associations are purely theoretical, the decline in football-related facial trauma is a significant discovery that has not otherwise been documented in the literature.

CONCLUSIONS

Based on the above analyses, the authorship hopes that the conclusions from this investigation will serve as a platform to shape new safety regulations in football, lend itself to evolving facial protective equipment, and serve to guide the clinical exam for providers facing facial trauma injuries in the acute setting.