FOOTBALL RELATED INJURIES

Background

1. General Information:

- First collegiate game was played in 1869
- Considered a high-velocity collision sport
- Participants are both male and female (at high school level)
 - >1.1 million high school athletes¹
 - >75,000 collegiate athletes²
- The most popular sport in America based on participation numbers in high school
- National Association of State High School Associations Sports Medicine website: <http://www.nfhs.org/sportsmed.aspx>

Pathophysiology

1. Mechanisms of injury

- Acute and overuse
 - Majority are acute

2. Incidence, Prevalence

- Most common injuries: knee, ankle, head injuries

3. Risk Factors

- Football involves running, jumping, cutting, throwing, tackling and explosive movements
- Acute injuries happen by one of 3 mechanisms:
 - Player contact, other contact, no contact
- Factors affecting injuries
 - Athlete Specific:
 - Strength (both muscular and ligamentous)
 - Flexibility
 - Fitness/conditioning - can help prevent injuries during season³
 - General:
 - Playing surface
 - Grass versus artificial turf
 - Injuries on grass are more common than artificial turf⁴
 - Footwear
 - Length of cleats affects torsion forces on ankle leading to knee and ankle injuries⁵
 - Protective Equipment:
 - Helmet, mouthguard, shoulder pads, hip pads, knee pads
 - Protective equipment does reduce injuries⁶
 - Mouthguards help prevent orofacial injuries.
 - Insufficient evidence supports concussion reduction secondary to mouthguard use⁷
 - Knee braces, no consensus recommendation exists from current evidence.⁸

4. Morbidity / Mortality

- 7 fatalities directly related to high school football in 2008

- 13 indirectly related
- Rate of direct fatality 0.39 per 100,000 participants¹¹

Specific Injuries

1. Lower Extremity

- Accounts for > 50% of all football injuries
 - Knee injuries
 - Internal Derangement
 - Most common injury in games (18%) and practice (12%)⁹
 - ACL, PCL, menisci
 - Injury rate of 6.17 per 1000 athletes⁹
 - Mechanism
 - Contact: blocking, being blocked, being tackled
 - Non-contact: Rotation about a planted foot

2. Patella/Patella Tendon Injury

- Accounts for 1% of high school football injuries, and 9% of all knee injuries.¹⁰
- Usually subluxation injury.¹⁰

3. Foot and Ankle Injuries

- Ankle sprain
 - Rates of injury
 - Second most common football injury¹¹
 - Injury rate of 5.39 per 1000 athletes⁹
- Ankle fracture
- Patellar tendon rupture
- Turf toe

4. Shin Splints-medial tibial stress syndrome

5. Head, Eyes, Ears, Nose, Throat (HEENT) Injuries

- Concussion
 - Rate
 - 0.72 per 100,000 athletes⁹
 - Third most common game injury

6. Cervical spine injuries

- Mechanism:
 - Axial loading with neck in flexion as in “spear tackling”
 - Usually from tucking chin at impact
 - Encourage coaches to teach “heads up” tackling
- Management of Head and Neck Injuries by the Sideline Physician:
<http://www.aafp.org/afp/2006/1015/p1357.html>¹⁵

7. Eye Trauma

8. Dental Trauma

- Mouthguards protect against orofacial injuries⁷

9. Upper Extremity

- Shoulder injuries
 - Rates of Injury
 - 5th-8th most common game injuries
 - Account for 10% of football injuries¹⁶
 - Mechanism
 - Thrusting shoulder into opponent while tackling

- Landing on shoulder while being tackled
 - Obstructed throwing motion
 - Most common injuries
 - Acromioclavicular joint injury
 - Rotator cuff tear
 - Shoulder subluxation
10. Skin Injuries
- Abrasions/lacerations
 - NCAA Sports Medicine Handbook: Blood-Borne Pathogens and Intercollegiate Athletics:
<http://www.ncaapublications.com/productdownloads/MD10.pdf>
 - MRSA in athletes
 - High transmission rates between players in practice and games¹⁷
 - Athlete's foot
11. Medical Considerations
- Exertional heat illness
 - Most common during preseason, accounting for 6% of preseason injuries⁹
 - Asthma
 - Exercise induced
 - Cardiac disorders in athletes
 - Inter-Association Task Force Recommendations on Emergency Preparedness and Management of Sudden Cardiac Arrest in High School and Collegiate Athletic Programs: A Consensus Statement¹⁸:
<http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1896083/>
 - Sick cell trait
 - NCAA recommends screening of all student athletes before participation
 - Mononucleosis
 - Pre-Participation Evaluation (PPE)
 - Recommendations for Preparticipation screen for cardiovascular abnormalities¹⁹

Patient Education

1. NCAA Sports Medicine Handbook
 - Published annually:
<http://www.ncaapublications.com/productdownloads/MD10.pdf>
2. National Federation of State High School Associations
 - <http://www.nfhs.org/sportsmed.aspx>.
3. The Sports Medicine Patient Advisor by Pierre Rouzier

Disclaimer: "The views expressed in this article are those of the author and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U.S. Government."

References

1. National Federation of State High School Associations (NFHS). 2006-2007 report,
http://nfhs.org/web/2007/10/73_million_participants_in_high.aspx

2. NCAA Sports Sponsorship and Participation Rates - 1981-1982-2007-2008, DeHass D. 2009. The National Collegiate Athletic Association.
3. Effect of preseason conditioning on the incidence and severity of high school football knee injuries. Cahill BR, Griffith EH. *Am J Sports Med.* 1978 Jul-Aug; 6(4):180-4. Descriptive
4. Incidence, Mechanisms, and Severity of Game-Related College Football Injuries on Field Turf Versus Natural Grass: A 3-Year Prospective Study. Meyers MC. *Am J Sports Med.* 2010 Jan 14.
5. Physiologic axial load, frictional resistance, and the football shoe-surface interface. Cawley PW, Heidt RS Jr, Scranton PE Jr, Losse GM, Howard ME. *Foot Ankle Int.* 2003 Jul; 24(7):55 1-6.
6. An ecologic study of protective equipment and injury in two contact sports. Marshall S, Waller A, Dick R, Pugh C, Loomis D, Chalmers D. *International Journal of Epidemiology* 2002;31:587-592.
7. Commentary: Role of Properly Fitted Mouthguards in Prevention of Sport-Related Concussion. Winters J Sr. *J Athl Train.* 2001 Jul-Sep; 36(3): 339-341.
8. The Efficacy of a prophylactic knee brace to reduce knee injuries in football. A prospective, randomized study at West Point. Sitler M, Ryan J, Hopkinson W, Wheeler J, Santomier J, Kolb R, Polley D. *Am J Sports Med.* 1990 May-Jun;18(3):310-5.
9. Epidemiology of Collegiate Men's Football Injuries: National Collegiate Athletic Association Injury Surveillance System, 1988-1989 through 2003-2004. Dick R, Ferrara M, Courson R, Marshall S, Hanley M, Reifsteck F. *Journal of Athletic Training* 2007;42(2):221-233.
10. A Systematic Review of Prophylactic Braces in the Prevention of Knee Ligament Injuries in Collegiate Football Players. Pietrosimone, B.G., Grindstaff, T.L., Linens, S.W., Uczekaj, E., Hertel, J., *Journal of Athletic Training* 2008; 43(4):409-415.
11. Predictive Factors for Lateral Ankle Sprains: A Literature Review. Beynnon B, Murphy D, Alosa D. *Journal of Athletic Training* 2002; 37(4):376-380.
12. Annual Survey of Catastrophic Football Injuries 1977-2008. Mueller F, Cantu R. <http://www.unc.edu/depts/nccsi>
13. Prehospital Care of the Spine-Injured Athlete: A Document from the Inter-Association Task Force for Appropriate Care of the Spine-Injured Athlete. . Kleiner DM, Almquist JL, Bailes J, Burruss P, Feuer H, Griffin LY, Herring S, McAdam C, Miller D, Thorson D, Watkins RG, Weinstein S. Dallas, Texas, National Athletic Trainers' Association, March 2001.
14. Suggested Guidelines for Management of Concussion in Sports. national Federation of State High School Association. NFHS Sports Medicine Advisory Committee 2009. <http://www.nfhs.org>
15. Management of Head and Neck Injuries by the Sideline Physician. Whiteside J. *American Family Physician* 2006; 74(8)1357-1362. <http://www.aafp.org/afp/2006/1015/p1357.html>
16. Prevalence and variance of shoulder injuries in elite collegiate football players. Kaplan LD, Flanigan DC, Norwig J, Jost P, Bradley J. *Am J Sports Med.* 2005 Aug; 33(8):1142-6.
17. A Clone of Methicillin-Resistant *Staphylococcus aureus* among Professional Football Players. Kazakova S, Hageman J, Matava M, Srinivasan A, Phelan L, Garfinkel B, Boo T, McAllister S, Anderson J, Jensen B, Dodson D, Lonsway

- D, McDougal L, Arduino M, Fraser V, Killgore G, Tenover F, Cody S, Jernigan D. The New England Journal of Medicine: February 3, 2005. Number 5. Volume 352:468-475.
18. Inter-Association Task Force recommendations on emergency preparedness and management of sudden cardiac arrest in high school and collegiate athletic programs: a consensus statement. Drezner JA, Courson RW, Roberts WO, Mosesso VN, Link MS, Maron BJ. Journal Athletic Training 2007 Jan-Mar; 42(1):143-158
 19. Maron DJ, Thompson PD, Ackerman MJ, Balady G, Berger S, Cohen D, Dimeff R, Douglas PS, Glover DW, Hutter AM Jr, Krauss MD, Maron MS, Mitten MJ, Roberts WO, Puffer JC, American Heart Association Council on Nutrition, Physical Activity, and Metabolism. Recommendations and considerations related to preparticipation screening for cardiovascular abnormalities in competitive athletes: 2007 update. Circulation 2007 Mar 27; 115(12):1643-1655.

Author: David Volk, DO, *Naval Hospital JAX, FL*

Editor: Carol Scott, MD, *University of Nevada Reno FPRP*