

# **Basketball Related Injuries**

## **Background**

### 1. General info

- Basketball has been an organized sport since the 1890's
- Considered a limited contact sport
  - Physical nature/contact has increased
- Participants include males and females
  - All ages
  - 2/3 of participants male, 1/3 are female
  - In US 24-32 million recreational players
  - >1 million high school athletes
  - >30,000 collegiate athletes<sup>2,3,4</sup>
- Basketball-most popular girls high school sport by participation
- Nearly 50% of all basketball players say "pickup" games are main form of play<sup>3</sup>

### 2. Injuries

- Mechanism of injury:
  - Overuse and acute
  - Majority are acute
    - Basketball involves running, jumping, cutting, pivoting and explosive movements
    - Expose body to stresses from sudden acceleration and deceleration
- Most common injuries in basketball players involve ankle, followed by knee and foot
- Injury risk is greater in female athletes
  - Female athletes have 4-6x greater risk of ACL injury than male athletes
  - ACL-injury-prevention training programs:
    - <http://www.aclprevent.com/PEPEercises.pdf>
    - Incorporate proprioception-balance and/or plyometric-agility exercises
    - Promote movement awareness/proper technique
    - Have been demonstrated to reduce incidence of ACL injuries in female athletes<sup>5,6,7,8</sup>

### 3. Intrinsic factors

- Overall fitness
- Strength
- Flexibility
- Biomechanical alignment

### 4. Extrinsic factors

- Practice and game surfaces
  - Hardwood vs. synthetic vs. blacktop
- Artificial playing surfaces increase injury risk in pivoting indoor sports<sup>9</sup>
- Foot wear
  - No difference in high top vs. low top basketball shoes for prevention of ankle sprains<sup>10</sup>
- Ankle braces may help prevent ankle sprains<sup>11</sup>

## Foot and Ankle Injuries

### 1. Ankle sprain

- Rates of injury
  - Most common injury in basketball
  - Account for greater than 80% of lower extremity injuries<sup>12</sup>
  - Responsible for >50% of time missed due to injury<sup>13</sup>
  - Injury rate 3.85 per 1,000 participants<sup>14</sup>
- Mechanism of injury
  - Landing of body weight on foot while it is plantar flexed and internally rotated
  - Most common mechanisms involve:
    - Landing either on floor or another player's foot
    - Sharp turn, collision or fall<sup>14</sup>
- Risk factors<sup>14</sup>
  - History of ankle injuries
  - Air cells in heels of shoes
  - Inadequate stretching prior to activity
- Ottawa Ankle Rules
- Nonsteroidal anti-inflammatory drugs
  - Help reduce swelling and pain after ankle injuries
  - May decrease the time it takes for the patient to return to activity<sup>15</sup>
- Structured balance exercise program
  - More effective than traditional strength/conditioning exercises in preventing ankle sprains in high school athletes<sup>16</sup>

### 2. Ankle fracture

### 3. Syndesmotom Ankle Sprain (High Ankle Sprain)

- High ankle ligaments:
  - At tibia-fibula interface
  - Function to maintain integrity of ankle mortise/fibular motion
  - During ankle dorsiflexion anterior tibia-fibula ligament resists normal posterior displacement and external rotation of fibula
- Can be isolated
- Can be associated with medial deltoid sprains or fibular fractures
- Mechanism of injury is externally or internally directed rotational force applied to a dorsiflexed and axially loaded ankle
- Injury to syndesmotom ligaments are assessed by "squeeze test"
  - Compress tibia and fibula together just below knee
  - If ligaments torn or strained, resulting stress on syndesmotom ligaments will elicit pain above ankle

### 4. Foot Injuries in Athletes

## Knee Injuries

### 1. ACL

- Rates of injuries
  - More common in female athletes<sup>17</sup>
  - In NCAA basketball statistics, account for 8% of all game injuries in women versus 1.8% of all game injuries in men<sup>18,19</sup>

- Mechanism
    - Most common mechanism of injury in basketball is deceleration and change of direction when the tibia is externally or internally rotated
    - Athlete typically feels a sudden pain in knee associated with a pop or tearing sensation
    - Commonly have immediate effusion and inability to continue play
  - ACL-injury-training prevention programs
    - Incorporate proprioception-balance and/or plyometric-agility exercises
    - Promote movement awareness/proper technique
    - Have been demonstrated to reduce incidence of ACL injuries in female athletes
  - ACL-injury-prevention training program resources:
    - Reprint: A Randomized Controlled Trial to Prevent Noncontact Anterior Cruciate Ligament Injury in Female Collegiate Soccer Players, American Journal of Sports Medicine
      - <http://ajs.sagepub.com/cgi/reprint/36/8/1476>
    - ACL - injury prevention program website
      - <http://www.aclprevent.com/pepprogram.htm>
    - ACL - injury prevention program pdf
      - <http://www.aclprevent.com/PEPEercises.pdf>
2. Knee Meniscal Injuries (Sports)
  3. Patellar Tendonitis "Jumper's Knee"
  4. Osgood Schlatter Disease

### **HEENT Injuries**

1. Concussion (Sports)
2. Eye trauma
3. Dental trauma in athletes
  - Mouthguards offer protection against orofacial injuries
  - Insufficient evidence to recommend for prevention of concussion<sup>20</sup>

### **Extremity and Skin Injuries**

1. PIP joint dislocations
2. Abrasions / lacerations
  - Abrasions occur on artificial turf, synthetic courts, asphalt, concrete
  - Treatment:
    - Clean/debride tissue with soap and water
    - Apply topical antibacterial ointment or silvadene
    - HIV in athletes
  - Due to risk of transmission of blood-borne pathogens, all wounds should be covered with occlusive dressing during play
  - NCAA mandate:
    - Athletes be removed from competition if they are actively bleeding
    - Bleeding must be stopped and covered with dressing before return to play
    - [http://www1.ncaa.org/membership/ed\\_outreach/health-safety/index.html](http://www1.ncaa.org/membership/ed_outreach/health-safety/index.html)

## Medical Considerations

1. Exercise induced asthma
2. Cardiac disorders in athletes
3. Mononucleosis in athletes

## Evidence-based Inquiry

1. Does a knee brace decrease recurrent ACL injuries?
2. How accurate is the physical examination in diagnosing acute knee injuries?
3. What is the best way to evaluate an acute traumatic knee injury?
4. Heat or ice for acute ankle sprain?

## References

1. National Sporting Goods Association, <http://www.nsga.org>
2. Sporting Goods Manufacturers Association (SGMA) U.S. Trends in Team Sports (2006 Edition)
3. National Federation of State High School Associations (NFHS). 2006-2007 report, [http://www.nfhs.org/web/2007/10/73\\_million\\_participants\\_in\\_high.aspx](http://www.nfhs.org/web/2007/10/73_million_participants_in_high.aspx) Sports Medicine: Just the Facts, O'Connor, Sallis, Wilder and St. Pierre (Editors), McGraw-Hill, 2005
4. NCAA Sports Sponsorship and Participation Rates – 1981-2006, [http://www2.ncaa.org/portal/media\\_and\\_events/ncaa\\_publications/research/sports\\_sponsorships\\_and\\_participation\\_rates/index.html](http://www2.ncaa.org/portal/media_and_events/ncaa_publications/research/sports_sponsorships_and_participation_rates/index.html)
5. EMBASE Padua D.A., Marshall S.W. Evidence supporting ACL-injury-prevention exercise programs: A review of the literature. [Journal: Review] Athletic Therapy Today. 11(2) (pp 11-23), 2006. Date of Publication: Mar 2006.
6. Timothy E. PhD \*, +, ++; Ford, Kevin R. MS +; Myer, Gregory D. MS, CSCS + Anterior Cruciate Ligament Injuries in Female Athletes: Part 2, A Meta-analysis of Neuromuscular Interventions Aimed at Injury Prevention. American Journal of Sports Medicine. 34(3):490-498, March 2006
7. Fischer, Donald V. MSPT, ATC, CSCS Neuromuscular Training to Prevent Anterior Cruciate Ligament Injury in the Female Athlete. [Article.] Strength & Conditioning Journal. 28(5):44-54, October 2006.
8. A Randomized Controlled Trial to Prevent Noncontact Anterior Cruciate Ligament Injury in Female Collegiate Soccer Players. Julie Gilchrist, Bert R. Mandelbaum, Heidi Melancon, George W. Ryan, Holly J. Silvers, Letha Y. Griffin, Diane S. Watanabe, Randall W. Dick, and Jiri Dvorak. Am. J. Sports Med., Aug 2008; 36: 1476 – 1483
9. Artificial playing surface increases the injury risk in pivoting indoor sports: a prospective one-season follow-up study in Finnish female floorball. Pasanen K, Parkkari J, Rossi L, Kannus O. British Journal of Sports Medicine. 2008; 42: 194-197
10. High-versus low-top shoes for the prevention of ankle sprains in basketball players (There was no significant difference among these 3 groups, leading to the conclusion that there is no strong relationship between shoe type and ankle sprains) Barrett JR, Tanji JL, Drake C, Fuller D, Kawasaki RI and Fenton RM American Journal Sports Medicine. 21(4):582-585, 1993
11. A semi rigid ankle brace worn during performance of high-risk sports such as soccer or basketball is an option to reduce the risk of future ankle sprains for patients with a history of ankle sprains Handoll HH, Rowe BH, Quinn KM, de

- Bie R. Interventions for preventing ankle ligament injuries. *Cochrane Database Syst Rev* 2001; (3):CD000018.
12. The efficacy of a semi rigid ankle stabilizer to reduce acute ankle injuries in basketball, *American Journal of sports medicine*, 1994; 4:454-61
  13. McKay GD, Payne WR, Goldie PA, et al. A comparison of the injuries sustained by female basketball and netball players. *Aust J Sci Med Sport* 1996; 28:12-17.  
. Ankle injuries in basketball: Injury rate and risk factors. McKay GD, Goldie PA, Payne WR, Oakes, BW. *British Journal of Sports Medicine*; 35: 103-108
  14. Nonsteroidal anti-inflammatory drugs help reduce swelling and pain after ankle injuries and may decrease the time it takes for the patient to return to usual activities. Petrella R, Ekman EF, Schuller R, Fort JG. Efficacy of celecoxib, a COX-2-specific inhibitor, and naproxen in the management of acute ankle sprain: Results of a double-blind, randomized controlled trial. *Clin J Sport Med* 2004;14:225-31
  15. A structured balance exercise program is more effective than traditional strength and conditioning exercises in preventing ankle sprains in high school athletes. McGuine TA, Keene JS. The effect of a balance training program on the risk of ankle sprains in high school athletes. *Am J Sports Med* 2006; 34:1103-1111.
  16. Anterior cruciate ligament injury in national collegiate athletic association basketball and soccer: a 13-year review. Agel J, Arendt EA, Bershadsky. *American Journal of Sports Medicine*. 2005; 33: 524-30
  17. Descriptive Epidemiology of Collegiate Men's Basketball Injuries: National Collegiate Athletic Association Injury Surveillance System, 1988-1989 Through 2003-2004 Dick R, Hertel J, Agel J, Grossman, J, Marshall S. *Journal of Athletic Training* 2007;42(2):194-201
  18. Descriptive Epidemiology of Collegiate Women's Basketball Injuries: National Collegiate Athletic Association Injury Surveillance System, 1988-1989 Through 2003-2004 Dick R, Hertel J, Agel J, Grossman, J, Marshall S. *Journal of Athletic Training* 2007;42(2):202-210
  19. Effectiveness of mouthguards to prevent injury during sport and exercise activities. The authors concluded that mouthguards offer protection against orofacial injuries, but there was insufficient evidence to determine protection against concussion. Knapik J J, Marshall S W, Lee R B, Darakjy S S, Jones S B, Mitchener T A, delaCruz G G, Jones B H. Mouthguards in sport activities: history, physical properties and injury prevention effectiveness. *Sports Medicine*. 2007; 37(2):117-144.
  20. *Sports Medicine: Just the Facts*, O'Connor, Sallis, Wilder and St. Pierre (Editors), McGraw-Hill, 2005

**Author:** Richard Sisson, MD, *Exempla St. Joseph FP, CO*

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