What are the Medical Concerns for the Adolescent Female Athlete?

Krystle Farmer, MD
July 21, 2016

Learning Objectives

• Discuss why females are different than males in sports- the historical perspective.
• Review some of the unique challenges of the female athlete.
• Differentiate the most common orthopedic medical injuries for the young female athlete.

Epidemiology

• Half of all children 5-18 years old in the US participate in organized sports programs
• 38% of high school children and 34% of middle school children will sustain an activity related injury that will be treated by a doctor or nurse
• Average of 2.6 million ED visits for sports-related injuries per year in patients 5-24 years old
Why talk about the female athlete?

- Since adoption of Title IX women's sports participation has dramatically increased
- Anatomic, hormonal and functional differences between males and females
- Different injury patterns compared to male athletes

Unique Female Challenges

- Effects of cycle phase
- Iron deficiency anemia
- Female athlete Triad
  - Menstrual dysfunction
  - Low energy availability
  - Abnormal bone health

Menstrual Cycle

- Some suggest that there is a correlation between cycle phase and performance but studies have failed to support this
- Effects on performance parameters likely vary amongst individuals
Oral Contraceptive Pill

- OCPs used by female athletes for many different reasons:
  - Contraception
  - Cycle control
  - Management of menstrual disorders
  - Time-shifting the menstrual cycle

OCPs

- Athletic performance may be improved by controlling pre-menstrual symptoms
- Endurance athletes may benefit from lower incidence of iron deficiency anemia found in OCP users
- Lower incidence of musculoskeletal injuries

Iron Deficiency Anemia

- 20-30% of female adolescents and young adults have iron deficiency
- Runners are at increased risk
- Black adolescent female runners have twice the incidence compared to white adolescent female runners
Anatomic Differences

• Both genders are comparable physically and physiologically in childhood but this starts to change with puberty
• Girls enter puberty on average 2 years earlier than boys at 9 to 11 years of age

Anatomic Differences - Males

• Higher red blood cell counts and hemoglobin levels
• Larger proportion of Type 2 muscle fibers – generate power, strength and speed
• Less body fat and more lean body mass
  – Average body fat in men is 14% vs. 26% for women
  – Subcutaneous fat distribution is different

Anatomic Differences - Females

• Increased flexibility
• Less muscle strength
  – Upper body strength is 30-50% of similarly trained male peers
  – Lower body strength is 60-80% of males
• Broader pelvis
• Lower extremity alignment differences
Female Injury Risk

- More prone to certain types of athletic injuries (ACL tears, shoulder subluxation, etc)
- Higher incidence of overuse injuries
- Greater risk of being re-injured
- Lower extremity injuries are more common than upper extremity injuries: 80%/20%
- Increased rate of anterior knee pain

Male vs. Female

- Study done at Boston Children’s Hospital
  - Retrospective review of children 5-17 years of age seen over 10 years in sports medicine clinic
  - Concluded that sports injuries in males and females differ by injury type, diagnosis and body area

Male vs. Female Results

- Female athletes sustained more injuries to the lower extremity and spine
- Males had a higher percentage of injuries to the upper extremity
- Percentage of males and females with ACL injury was almost equal
Male vs. Female Results

- Female athletes had a higher percentage of overuse injuries compared to traumatic injuries
- Percentage of females with patellofemoral knee pain was 3 times greater than in males

Overuse Injuries

- Increased intensity of sports activities combined with decrease in daily physical activity is making overuse injuries in children more common
- Mean age of diagnosis in females is 10.8 vs. 11.7 in males
- Most common in the lower limbs – knees, ankle, foot

Common Overuse Injuries

- Osgood Schlatter’s disease
- Sever’s disease
- Apophyseal Injuries of the Hip
- Spondylolysis
- Osteochondritis Dissecans
- Stress Fractures
Stress Fractures

- 1.2-10 times more likely in female vs male military recruits
- High risk populations include distance runners, dancers, gymnasts
- Patients with poor nutrition and menstrual irregularities also at risk
- Lower extremity is most common

Site Specific Injuries

Ankle

- Most frequently injured joint in both male and female athletes
- Common in basketball and volleyball
- Ankle sprain is the most common injury
- Females are 25% more likely to have a grade 1 ankle sprain
Treatment of Ankle Sprain

- RICE therapy
- NSAIDs
- Bracing
- Early Mobilization
- Physical therapy

Knee

- Patellofemoral disorders
- ACL injuries

ACL Injury

- The anterior cruciate ligament is a primary stabilizer of the knee against anterior translation
- Typically injured from a rotational or hyperextension force – landing from a jump or making a lateral pivot
- Most often a noncontact injury
ACL Injury Risk

- ACL injury rates for soccer and basketball over 10 year period
  - Females risk 2.6 times greater in soccer and 3.6 times greater in basketball compared to males
  - Likely multifactorial – differences in training, neuromuscular responses, laxity, hormonal differences and anatomic differences

Patellofemoral Pain Syndrome

- Diffuse anterior knee pain
- Often worse with sitting with knee flexed for prolonged periods
- Also exacerbated by jumping, climbing stairs, squatting
- May have mild swelling
- May have snapping and popping around the patella

PFPS Predisposing Factors

- Vastus medialis obliquus (VMO) dysplasia
- Increased Q-angle
Treatment of PFPS

- Activity modifications
- Quadriceps strengthening
- Quadriceps and hamstring flexibility
- Short term use of NSAIDs
- Patellar support sleeve or infrapatellar strap may help
- Weight loss in overweight patients

Shoulder

- Problems often due to joint laxity and decreased strength
- Loose supporting tissues may lead to instability
- May lead to dysfunction of overhead activities
- Common in volleyball, gymnastics, cheer, and swimming

Spine

- Scoliosis more common in females than males
- Spondylolysis
- Spondylolisthesis
- Stress fractures
- Compression fractures
Burnout

• Psychological syndrome of emotional and physical exhaustion
• Negative cumulative reaction to chronic everyday stress as opposed to acute doses of stress
• Athlete no longer receives physical benefits of exercise

Burnout Prevention

• 1-2 days off per week
• 2-3 months away from specific sport throughout the year
• Delay specialization and encourage multi-sport participation

Benefits of Exercise

• Improved self image and better self-esteem
• Positive effect on bone mass
• Cardiovascular and weight control benefits
• Females involved in sports are
  – Less likely to become pregnant as a teenager
  – Less likely to be involved in an abusive relationship
  – More likely to finish high school and go to college
Questions??