Etiology, Pathophysiology, and Most Common Injuries of the Lower Extremity in the Athlete

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KEYWORDS

• Sports injury • Foot injury • Ankle injury • Lower extremities

The number of participants in sport activities continues to increase. Approximately 6 million adolescents now participate in school-sponsored activities alone, with many more participating in after-school and community leagues. In the past 10 years, participation in these activities is on the rise; there is as much as a 10% increase for boys and 40% for girls.[1] At the other end of the spectrum, older individuals are also increasing their participation in sport. Many, on the advice of their primary care physicians, are doing so for health benefits such as reducing medications and limiting arthritic complaints.

It is well known that participation in these activities instills positive habits and has many benefits. Learning to be active begins a habit of health maintenance and fosters the concept of teamwork. Participation in sports allows one to acquire these traits early in life along with other physical and mental benefits. Physical activity aids growth and development, helps control weight, and can decrease chances for certain illnesses. What is less clear is the effect on risk-taking behavior as well as the impact of both short- and long-term injuries. Some studies show increased alcohol abuse as well as increased emphasis on self-image and possible eating disorders associated with sport participation.[2] Most of these studies have focused on athletics at the collegiate level. What is known is that the majority of injuries during sport are to the lower extremity (more than 50%), most of which occur in children and young adults younger

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than 25 years.[3] These injuries make up as much as 20% of the emergency room visits in that age range.

Sports injuries are broadly divided into overuse or traumatic as well as either acute or chronic. Traumatic injuries are more typical in collision or contact sports such as football and soccer, due to their nature. Overuse injuries are seen mostly in training situations and sports that require endurance or repetitive activities such as gymnastics and track. The most common injuries to the lower extremity associated with sport involve fractures, ligament injuries, or tendon injuries.

The current trend of increasing participation in sporting activities among adolescents can lead to fatigue, which plays a large role in overuse injuries. If the body cannot recover, the risk for injury increases. As muscle fatigues, increased stress shifts to the ligaments and bony architecture. This shift plays a large role in overuse injuries. Fatigue may come in 2 ways, the first of which is pure overuse. Participation in various sporting activities on a daily basis with training, practice, scrimmage, and games does not leave adequate time to recover. This situation is especially apparent in adolescents as they and their parents try to maintain a rigorous schedule. The second form of fatigue is seen in the participant with a single sporting interest. In years past activity and participation changed with the seasons, allowing for the use of different muscle groups and different stresses to the body as seasons change. Someone participating in baseball one season and basketball the next would use different skills, with different movements and muscles to fit the requirements of the sport. In some ways this is thought to have helped minimize overuse to any one area. The increase in the number of stress fractures reported recently is in some cases thought to be a reflection of a single activity repeated all year. Specialization in one sport is more common, as there are opportunities for the same sport all year with indoor leagues, outdoor leagues, travel leagues, camps, and tournaments. The same activity using the same muscles, same ligaments, and same motions may be one reason for overuse and subsequent fatigue injury.

It is estimated that high school athletes account for more than 2 million sport-related injuries each year requiring over 500,000 office visits, while children of ages 14 and under produce more than 3 million injuries.[3] Most adolescents want to play and be on the field. Their cartilage is softer and muscles not fully developed, and their ligaments may be stronger than the bone to which they are attached. When these factors are combined with adolescents being unaware of the clues their body is giving them during overuse, delays are made in diagnosis and treatment. Parents, coaches, and trainers need to look for signs of injury early, such as favoring one side, slowing down, difficulty sleeping, and aches and pains including headaches.

Certain injuries are more common with particular sports and seem to be more common in competition than in practice.[4–6] This situation is obviously a result of the training involved as well as the type of impact. Football and soccer tend to have the highest rate of lower extremity injuries, with sprain being the most common at 50%.[3] The ankle is the most often involved, at 42% of all injuries, followed by the knee at 25%. When it comes to fracture, again the ankle is the most likely to be involved, at 42% of all sport-related fractures.[3] Girls tend to have more significant injuries requiring surgical intervention. Approximately 13% of injuries to the lower extremity in girls lead to a “season-ending” decision, which is 1.5 times that of boys at 8%.[3]

In recent years, many simple sports-related injuries were treated with the “RICE” protocol. More recently, this has been modified to include protection (“P”) and referral (“R”), now deemed the “PRICER” protocol. For organized sports, many schools and organizations have athletics trainers available to guide practice and physical activity, who are also useful in early diagnosis and treatments. However, if the athlete is not