



Small Doses.....

by

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Sports Injuries in Children and Adolescents

Each year approximately 30 million American children and teenagers participate in school-sponsored and community-organized sports. These activities include the traditional sports of football, baseball, basketball, and soccer, as well as volleyball, tennis, lacrosse, field hockey, rugby, cheerleading, and gymnastics. The musculoskeletal system is one of the body systems most commonly injured in these sports. Many of these injuries are minor, and can be considered a normal part of growing up. Health care providers need a basic understanding of these occurrences and how they are best treated.

The recent emphasis in our society placed on children participating in sports has resulted in an increase in overuse injuries. Adolescents may be prone to these chronic injuries for physiologic reasons (their bodies are still actively growing), too much or too intense participation, or because they return to participating without enough recovery time from a previous injury. Competitive seasons are lasting longer, and many programs conduct year-round training.

Many orthopedic problems that develop in the young athlete can be attributed to the inability of growth centers to meet the demands placed on them during physical activity. The apophysis is a prominent bony outgrowth projecting from the surface of a bone and often is an attachment site for tendons. Damage to this growth center, mainly from overuse syndromes, may result in apophyseal injuries such as Osgood-Schlatter disease (affecting the tibia), Sever's disease (affecting the heel), and little leaguer's elbow (affecting the medial epicondyle). Initial treatment for many of these syndromes will employ RICE therapy and then often be followed by medication for both pain and inflammation.

RICE is an acronym for the most common non-drug treatment for overuse injuries. *RICE* stands for: **R**est, **I**ce, **C**ompression, and **E**levation. Rest should include reducing or stopping all activity for at least 48 hours. Ice should be placed on the injured area for 15-20 minutes at a time, and then removed. This treatment can be used between four and eight times per day. Ice packs may consist of a cold pack, an ice bag, or a plastic bag filled with ice that has been wrapped in a towel. Never allow the ice to directly contact the skin. Ice should only be used for the first 72 hours after the injury. After that, heat can be applied to the injured area, also for 15-20 minutes at a time. Do not allow the heat source to directly contact the skin. Compression, especially on an injured joint such as an ankle, knee, or wrist may be used to help reduce the swelling. Elastic wraps, air casts, and splints are commonly used. Keeping the injured area elevated above the level of the heart will reduce blood flow, which has been shown to minimize swelling and improve healing times.

Overuse Injuries of the Upper Extremities

Sports such as baseball, tennis, and volleyball put the shoulder at risk for overhead injury. Little leaguer's shoulder is particularly common in adolescents, due to the mechanics of the throwing motion and the fact that many of these athletes still have open growth plates. The average age of onset for little leaguer's shoulder is 14. The typical presentation is pain over the proximal and lateral portion of the humerus. X-rays can be used to confirm the diagnosis, and they usually demonstrate a widening of the proximal humeral physis. Treatment includes rest from the activity that caused the injury (typically for three months), icing, and analgesics as needed for pain.

The elbow is also susceptible to overuse injuries, particularly in young baseball players. Throwing puts significant stress on the elbow and results in a condition known as little leaguer's elbow. This condition

usually presents in athletes 9-12 years old, and results from an apophysitis of the medial epicondyle. Pain is usually felt in the medial aspect of the elbow. The diagnosis of little leaguer's elbow can be confirmed with x-rays that will usually show an apophyseal widening, or hypertrophy of the medial epicondyle. Treatment consists of complete rest from throwing or pitching (typically for 4-6 weeks), icing, and analgesics as needed for pain.

Overuse Injuries of the Lower Extremities

Knee pain and injuries are common in the adolescent athlete. Osgood-Schlatter disease is one of the most common causes of knee pain, and is seen in children 10-15 years old. Osgood-Schlatter disease is an apophysitis of the tibial tuberosity, and is often seen in children participating in activities that require jumping, such as soccer, basketball, and gymnastics. Patients often report anterior knee pain, and examination reveals tenderness and swelling of the tibial tubercle. X-rays are rarely indicated unless there is suspicion of other injuries. Osgood-Schlatter disease is usually self-limited, and as the child stops growing, the pain and swelling usually subside. Treatment consists of rest from the causal activity, icing, quadriceps stretching, and analgesics as needed for pain.

Sinding-Larsen-Johansson disease commonly affects male athletes 11-13 years old that participate in jumping sports such as basketball and volleyball. Clinical diagnosis demonstrates tenderness at the inferior pole of the patella. Treatment consists of rest, ice, analgesics as needed for pain, and strength and stretching exercises for both the quadriceps and hamstrings. Sinding-Larsen-Johansson disease is self-limited, and will resolve as the athlete ages.

The occurrence of activity-induced shin pain or "shin splints" is a common complaint in young athletes. Medial tibial stress syndrome is the most prevalent type of periostitis, and is particularly common in runners. The shin pain typically presents bilaterally and is characterized by tenderness over the posterior medial edge of the tibia. Initially, pain may only occur with activity, but over time it continues even when activity has stopped. X-rays can help differentiate between periostitis and stress fracture. Treatment includes rest, icing after activity, and non-steroidal anti-inflammatory drugs (NSAIDs) for pain and inflammation. A program of strengthening and stretching exercises should be implemented as pain permits. It is also important to emphasize the use of properly fitting and well constructed running shoes.

Sever's disease (calcaneal apophysitis) typically presents in male athletes from 9-12 years old. This traction apophysitis can be attributed to overuse of the heel. Sever's disease is common in athletes participating in contact sports, particularly when cleats are worn. On physical examination, medial and lateral compression of the heel can reproduce the pain. X-rays may show sclerosis and fragmentation of the calcaneal apophysis. Treatment consists of activity modification, icing, analgesics as needed for pain, stretching, and heel lifts or cushions.

Persistent heel pain not responding to treatment may be due to calcaneal stress fractures. Stress fractures are an overuse injury resulting from excessive loading of the bone, frequently affecting the tibia, fibula, and metatarsals. The combination of load, repetition, and inadequate recovery time results in the injury. Additionally, aggressive training regimens, improper equipment, and nutritional habits may play a role. For the female athlete it is important to consider the role of the "female athlete triad" (i.e., amenorrhea, eating disorders, and osteoporosis) as risk factors for stress fractures.

Epidemiologically, the highest incidence of stress fractures occurs in track and field sports. Pain may be noted during or immediately after exercise with progression to involve pain during times of rest and non-sport activities. Examination will show localized tenderness over the affected bone. Diagnosis may be confirmed with x-rays 2-3 weeks after symptoms occur, and the fracture may show as a faint sclerotic line. MRI is being used more frequently to diagnose stress fractures. Treatment for stress fractures primarily includes avoidance of painful activities until healing has occurred. Activity should be modified for at least one month. The athlete can gradually return to activities after being pain free for one month. Stress fractures may also require immobilization with splinting or casting.

Muscle injuries are often caused by excessive strain. Muscle strains typically occur at the myotendinous junction, but they may also involve other parts of the muscle. Adolescent athletes are at greatest risk for apophyseal avulsion, the weakest biomechanical interface. Strains are often diagnosed on a three-point scale: 1 - mild, 2 - partial tear, and 3 - complete tear. Muscle strain injury is associated with improper warm-up, fatigue, and previous injury. To reduce the incidence of muscle strain, it is important to properly and completely stretch prior to playing.

Participation in sports is a rite of passage for children. Most injuries are minor, and can be easily treated, or even prevented with careful preparation and sensible participation. It is important that health care professionals understand both minor injuries as well as the more complex ones to properly counsel patients and their parents as to which conditions require medical follow-up.

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