

Overuse Injuries in Children and Adolescents

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It is estimated that 45 million children between the ages of 6 and 18 years of age participate in organized sporting activity¹⁻³. Classes, tournaments, showcases, sport specialization, and performance enhancement sessions now target younger ages. Athletes begin younger, specialize sooner, play on multiple teams in a single season, and participate year round without rest,³⁻⁴ which places the skeletally immature body at risk for injury⁵.

Because an estimated half of all visits to the primary care doctor are due to overuse injuries it is important for physicians to be aware of these types of injuries⁶. Intrinsic risk factors for overuse include lower extremity misalignment, leg length discrepancy, hyperpronation of the foot, pes planus, pes cavus, muscular inflexibility and imbalance⁷. Extrinsic factors include hard training surfaces, old shoe wear, improperly fitting equipment, and rapid increases in training⁷. The skeletally immature athlete has unique sites at risk for injury which are discussed below.

APOPHYSEAL INJURIES

The apophysis is the site where tendon inserts onto the cartilage in growing bone and serves as a secondary ossification center which does not fuse until skeletal maturity⁷. Until fusion, the attachment site is weaker than the tendon/muscle unit and therefore more susceptible to irritation or inflammation (apophysitis). During childhood, bones grow at a faster rate than muscles leading to muscular tightness and inflexibility which inadvertently places strain on the apophysis. Common sites of apophysitis are listed in Table 1 (Page 20).

Signs of apophysitis include insidious onset of pain during and after repetitive activity at the attachment site of the tendon/muscle unit. Examination may show localized swelling at the apophysis, point tenderness, and pain with resisted muscle group testing. Standard x-rays of the affected area are typically normal with open ossification centers present at the affected site. Treatment is relative rest, ice massage, activity modification with low impact activities until pain free, along with a stretching and strengthening program targeting the affected muscle group. Additionally, gel heel cups and patellar straps can be used acutely to help with pain and inflammation at the calcaneal apophysis and tibial tuberosity/inferior patellar pole apophyses respectively.

ARTICULAR CARTILAGE

The immature articular cartilage on the joint surface is susceptible to shear injury from repetitive use in youth

athletes⁸⁻¹⁰. Juvenile osteochondritis dissecans (OCD) is microtrauma of incompletely vascularized subchondral bone leading to fissures of the cartilage and fragmentation. OCD is more often diagnosed in male athletes between the ages of 9 and 18 years of age. The joints affected most commonly are the knee (medial and lateral femoral condyles), ankle (talus), and elbow (capitellum)⁷. Presentation typically consists of insidious onset of joint pain, swelling and limited motion of the joint. A description of joint locking or catching occurs if a fragment has displaced. Physical examination may reveal joint effusion and limited range of motion compared to the unaffected side. X-rays may reveal the OCD lesion but an MRI is typically necessary for staging the lesion and assessing healing potential. Initial management in the primary care office includes rest from activity, symptomatic pain management, and possibly immobilization for knee and ankle lesions. Referral to orthopedic surgery is often warranted for high grade lesions or those not responding to conservative management in 6-12 months.

PHYSIS

The physis is the growth plate at the end of long bones comprised of mainly cartilage cells subject to repetitive stress. The proximal humerus and distal radius are two common sites of injury in the skeletally immature athlete. Little League Shoulder (proximal humeral epiphysiolysis) occurs in any sport with repetitive rotational overhead activity such as pitching in baseball, swimming, tennis, volleyball, and gymnastics. Symptoms are insidious onset of lateral shoulder pain exacerbated by throwing or overhead activity. Commonly the athlete describes loss of velocity and accuracy with throwing. Examination reveals tenderness at the proximal humeral physis, decreased shoulder range of motion, and pain with resisted external rotation. AP shoulder x-rays in internal and external rotation may reveal widening at the proximal humeral physis compared to contralateral side. Termination of overhead activity is recommended initially, along with physical therapy and a throwing evaluation to assess throwing mechanics if possible. Competitive overhead activity may resume once the athlete is pain free, has completed rehab and has improvement or normalization of any x-ray abnormalities. Prevention is paramount and youth pitchers should be aware of published pitch counts and pitch type guidelines for age.

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