

Back Pain in the Pediatric and Adolescent Athlete

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KEYWORDS

- Back pain
- Young athletes
- Acute injuries
- Overuse injuries

KEY POINTS

- Back pain is becoming more common in young athletes, due in part to injuries sustained during organized sports.
- The spectrum of clinical entities is different from that in adults, and in young athletes, back pain usually arises from either an acute traumatic event or from chronic overuse.
- Acute injuries include thoracolumbar fractures, spinal cord injury without radiographic abnormality, acute disc herniation, apophyseal ring fractures, and muscular sprains.
- Problems associated with overuse include spondylolysis, spondylolisthesis, degenerative disc disease, hyperlordotic mechanical back pain, and atypical Scheurmann disease.
- It is important to remember that an infection, a neoplasm, or a rheumatologic condition may be mistaken for a sports injury.

Although back pain in adults is very common, its incidence among pediatric patients is variable, depending on age and level of activity. Classically, it was believed that children rarely have back pain,¹ and that in comparison to adults, a child with a backache is more likely to have a serious underlying disorder such as a neoplasm, discitis, or osteomyelitis. Although this may be the case in an inactive child or one younger than 10 years of age,² recent evidence demonstrates that the prevalence of back pain in older children and adolescents may be much higher than previously thought. By late adolescence, the incidence of low back pain in may be as high 24% to 36%.^{3,4}

The increased incidence of back pain in adolescents is likely related to the increasing level of participation in organized sports. In 2008, an estimated 44 million preadolescents and adolescents participated in organized sports in the United States.⁵ Because of the competitive emphasis of organized sports, young athletes are now specializing in fewer sports and training and playing with greater intensity. As a

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result of increased repetitive training in these sports, the risk of sustaining injuries, and, in particular, overuse injuries, is now much greater. Sports injuries occur from either an acute traumatic event or from chronic overuse due to repetitive training and microtrauma. Children's overuse injuries were rarely encountered before the advent of organized sports training; however, they are now a major source of morbidity in children and adolescents. In fact, epidemiologic data now show that sports injuries exceed infectious diseases as a cause of children's morbidity in Canada.⁶

Acute and overuse injuries of the back are an important subset of injuries in adolescents. Repetitive trauma and hyperextension during sports can cause young athletes to be susceptible to clinical or subclinical injuries that can lead to acute or chronic back pain. Unfortunately, despite the increasing incidence of back pain in adolescents, these injuries can be missed by the clinician unaware of the common diagnosis in adolescent athletes. Injuries occurring in the adolescents differ in etiology and prevalence from those occurring in adults. A recent study found that in adults, 48% of patients with low back pain have discogenic etiologies, whereas 47% of low back pain in adolescents is due to spondylolysis and 25% to hyperlordosis.⁷ Further, in contrast to back pain in the nonactive general adolescent population, which most often has a nonspecific cause,⁸ back pain in young athletes is usually due to an identifiable diagnosis. Because of the increasing frequency of back pain, it is important that clinicians understand that pediatric and adolescent athletes are a distinct at-risk population with a unique set of differential diagnoses. Using a sport-specific history and a careful systematic physical exam, combined with the appropriate imaging techniques, clinicians can usually make an accurate diagnosis. Correctly identifying common and uncommon diagnoses in young athletes will prevent further disability and allow earlier return to sports.

ANATOMY AND BIOMECHANICS

Spinal injuries are particularly prevalent during adolescence, when the spinal column undergoes structural and flexibility transformations associated with accelerated growth. These changes occur within the growth tissues in the vertebral bodies and neural arch. During growth, these become the weakest part of the spinal column and stand the greatest risk of injury during force transfer.⁹

The spine consists of a triple joint complex comprising the intervertebral disc and bilateral facet joints, which together form a triangular base for support, motion, and force transfer. It is divided into anterior and posterior columns. In competitive adolescent athletes, the spine is at risk for injury because it transfers forces between the upper and lower extremities during rapid and forceful movements. Injury occurs when the spine and its supporting structures cannot withstand compression, distraction, or shear forces during movement in an acute or overuse situation. Forced forward flexion causes disc compression and injury. Loaded hyperextension can contribute to pars fractures, and rotational forces stress the facet joints.

The anterior column includes the vertebral body, the intervertebral disc, and the anterior and posterior longitudinal ligaments. Within the vertebral body of children, there is a superior and an inferior epiphyseal growth plate, each with a contiguous ring apophysis. The cartilaginous portions of these epiphyses develop into the vertebral end-plate, which can be a source of weakness in the spinal column and is susceptible to injury during growth. The anterior and posterior longitudinal ligaments are important stabilizers in the pediatric spine, as they protect against hyperextension and hyperflexion.

The posterior column consists of the neural arch, facet joints, spinal process, and pars interarticularis. The posterior arch has three primary growth centers, one in the

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