

Low Back Pain in the Adolescent Athlete



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KEYWORDS

• Low back pain • Adolescents • Athletes • Spinal injuries

KEY POINTS

- Low back pain is frequently encountered in adolescent athletes.
- The adolescent athlete is at risk for significant structural injuries as well as nonmechanical problems.
- Adolescent athletes who present with low back pain are more likely to have structural injuries and therefore should be investigated fully.
- Any athlete with severe, persisting, or activity-limiting symptoms needs to be evaluated thoroughly.
- It is imperative to complete a comprehensive evaluation of back pain, and a cause such as muscle strain should be a diagnosis of exclusion.

INTRODUCTION

Low back pain is a common problem among adolescent athletes. It is estimated to occur in 10% to 15% of young athletes,^{1,2} but the prevalence may be higher in certain sports.^{1,3-7} Back pain has been reported as high as 27% in football and between 50% and 86% in gymnastics.⁴⁻⁶ Although adolescent athletes are undergoing their pubescent changes into adulthood, they cannot be treated like young adults. Therefore, the approach to the treatment of adolescent athletes with low back pain can be difficult and requires thorough understanding of spinal development.

The demographics of adolescents with low back pain varies from that of adulthood, Although there are many conditions that occur in both adolescence and adulthood, there are certain spinal disease/injury processes that are unique to the growing adolescent spine.⁸⁻¹¹ One of the key factors to consider in the adolescent athlete is the ongoing growth and development of the adolescent spine. The growing spine introduces variables into the assessment and management of injuries to the spine that do not exist in the mature and developed spine of the adult population. For example, injuries of the pars interarticularis are more common in the adolescent spine, occurring

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in up to 47% of young athletes,⁹ whereas disk-related problems are uncommon in children; only 11% of children have disk-related disease, compared with 48% of adults.⁹ Idiopathic pain is also less common in young athletes. Physicians who attribute low back pain in young athletes to simple back strains, without investigations, run the risk of delaying the diagnosis and appropriate treatment of more serious injuries, such as spondylolysis or spondylolisthesis.^{8,11} Therefore, it is imperative that the clinician is aware the development of the spine and subsequent variances in injury patterns and frequencies when evaluating the adolescent athlete.

In addition to the structural considerations of the spine, the clinician should also be aware of potential physiologic, psychological, social, and cultural issues that may exist and affect the approach to diagnosis and management of adolescent spine disorders. To treat these athletes appropriately, clinicians need to develop a relationship with the athlete's parents/guardians, coaches, and other potential athletic support staff to facilitate compliance with the activity modifications and treatment necessary to provide optimal rehabilitation to the injured spine. The coordination of care with the athlete's support team facilitates the athlete's recovery, training, and performance.¹²

GROWTH AND DEVELOPMENT OF THE SPINE

There are distinct structural differences of the spine in adolescents from the adult spine, which affect the nature of injury. Compared with the adult spine, the relatively greater hydrophilic nature of the nucleus pulposus of the spine of a child allows for more effective force absorption and central distribution of force transfer to the adjacent vertebrae.¹² However, the composition of the nucleus pulposus begins to change as early as 7 or 8 years old, resulting in a more peripheral force distribution of the disk.¹³ There are 3 primary ossification centers of the vertebrae: one in the vertebral body and 2 in the vertebral arch. The 2 ossifications in the center of the vertebral arch typically fuse by 2 to 6 years, and spinal bifida occulta results, caused by failure of fusion of these primary centers.^{14,15} Pars interarticularis defects/fractures are more common in the adolescent spine, occurring in up to 47% of young athletes, and are postulated to be caused by incomplete bony maturation present in the neural arch.⁹ Biomechanical studies have indicated that the bony strength of the vertebrae, particularly the neural arch, can increase into the fourth or fifth decade of life.¹⁶

The physes associated with the vertebral end plates facilitate the growth of the vertebral body. Hyaline cartilage adjacent to the nucleus pulposus and physal cartilage adjacent to the vertebral body comprise the vertebral end plate. A ring apophysis and an end-plate physis comprise the physal cartilage. The growth of the vertebral body is facilitated by the ring apophysis, which surrounds the periphery of the vertebral body and begins to ossify at 7 or 8 years old,¹² whereas vertical growth of the vertebral body is caused by end-plate physis, which begins to fuse with the vertebral body at about age 14 to 15 years, with final closure occurring around age 21 to 25 years.¹²⁻¹⁴

In addition to understanding the structural aspects of the growing adolescent spine, the clinician needs to be familiar with the variances of pubescent spinal development to assist in the diagnosis and management of spinal injuries. Schmorl nodes occur more frequently in children and adolescents compared with adults. Schmorl nodes are vertebral end-plate herniations of disk material, which are postulated to result from a combination of more central distribution of force via the nucleus pulposus combined with a relatively weak vertebral end plate.¹²⁻¹⁵ The adolescent athlete is also at increased risk for apophyseal ring fractures during the ongoing physal development until ossification.¹²

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