

Adolescent spinal deformity

Adolescent spinal deformity refers to abnormal curvature or misalignment of the spine that occurs in adolescents, typically during the growth years of childhood and adolescence. These deformities can affect the shape and alignment of the spine and may lead to physical, cosmetic, and functional issues. Some of the most common adolescent spinal deformities include:

Adolescent Idiopathic Scoliosis (AIS): AIS is the most common type of spinal deformity in adolescents. It is characterized by a sideways curvature of the spine that typically develops during puberty. The cause of AIS is generally unknown (idiopathic), and it can affect the thoracic (upper back), thoracolumbar, or lumbar (lower back) regions of the spine. AIS can vary in severity, and treatment options may include observation, bracing, or surgery, depending on the degree of curvature and other factors.

Adolescent Kyphosis: Kyphosis is an excessive forward rounding of the upper back, which can lead to a hunched or rounded appearance. Adolescent kyphosis can be caused by various factors, including poor posture, Scheuermann's disease (a specific type of kyphosis), or other spinal abnormalities. Treatment may involve physical therapy, bracing, or, in severe cases, surgery.

Adolescent Lordosis: Lordosis involves an exaggerated inward curvature of the lower back, creating a swayback appearance. While some degree of lumbar lordosis is normal, excessive lordosis can lead to issues with posture and discomfort. Treatment may involve physical therapy to strengthen core muscles and improve posture.

Congenital Spinal Deformity: Some adolescents may have congenital spinal deformities, which means they were born with abnormalities in the development of their spine. These can include vertebral abnormalities, hemivertebrae (wedge-shaped vertebrae), or other structural issues. Treatment depends on the specific deformity but may involve observation or surgery.

Neuromuscular Scoliosis: Adolescents with neuromuscular conditions such as cerebral palsy or muscular dystrophy may develop scoliosis due to muscle weakness or imbalance. Management often involves a multidisciplinary approach, including physical therapy, bracing, and orthopedic care.

The management and treatment of adolescent spinal deformities depend on various factors, including the type and severity of the deformity, the age of the individual, skeletal maturity, and the presence of symptoms. Early detection and intervention are essential for better outcomes, as spinal deformities can progress during the growth years.

Treatment options may include:

Observation: In some cases, mild deformities may not require active treatment but will be monitored regularly by a healthcare provider.

Bracing: Bracing may be recommended for adolescents with progressive spinal deformities to prevent further curvature. The type and duration of bracing depend on the specific condition.

Physical Therapy: Physical therapy exercises can help improve posture, strengthen muscles, and alleviate pain associated with spinal deformities.

Surgery: Severe or progressive deformities may require surgical intervention to correct and stabilize the spine. Surgical procedures often involve spinal fusion and the use of instrumentation such as rods

and screws.

The choice of treatment will be tailored to the individual's unique condition and needs, and it is typically determined in consultation with orthopedic specialists and other healthcare professionals. Early diagnosis and appropriate treatment can help adolescents manage and, in many cases, correct spinal deformities to maintain spinal health and quality of life.

The authors evaluate all pediatric and adolescent patients undergoing operative correction of complex spinal deformity from December 1997 through July 1999. No patient was lost to follow-up review (average 21.1 months). There were 27 consecutive pediatric and adolescent patients (3-20 years of age) who underwent 32 operations. Diagnoses included scoliosis (18 idiopathic, five nonidiopathic) and four severe kyphoscoliosis. Operative correction and arthrodesis were achieved via 21 posterior approaches (Cotrel-Dubousset-Horizon), seven anterior approaches (Isola or Kaneda Scoliosis System), and two combined approaches. Operative time averaged 358 minutes (range 115-620 minutes). Blood loss averaged 807 ml (range 100-2,000 ml). Levels treated averaged 9.1 (range three-16 levels). There was a 54% average Cobb angle correction (range 6-82%). No case was complicated by the patient's neurological deterioration, loss of somatosensory evoked potential monitoring, cardiopulmonary disease, donor-site complication, or wound breakdown. There was one case of hook failure and one progression of deformity beyond the site of surgical instrumentation that required reoperation. There were 10 minor complications that did not significantly affect patient outcome. No patient received undirected banked blood products. There was a significant improvement in cosmesis, and no patient experienced continued pain postoperatively. All patients have been able to return to their preoperative activities.

Compared with other major neurosurgical operations, segmental instrumentation for pediatric and adolescent spinal deformity is a safe procedure with minimal morbidity and there is a low risk of needing to use allogeneic blood products ¹⁾.

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Wiggins GC, Rauzzino MJ, Bartkowski HM, Nockels RP, Shaffrey CI. Management of complex pediatric and adolescent spinal deformity. J Neurosurg. 2001 Jul;95(1 Suppl):17-24. PubMed PMID: 11453426.

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