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Orthotic treatment with a brace remains the treatment of choice for adolescent idiopathic scoliosis in the immature patient with documented progression or a curve magnitude of 25° to 40°. Studies of natural history and bracing consistently show high rates of curve progression and surgery with observation and significantly less so with brace treatment. Brace treatment is difficult in overweight patients and challenging in males. Many of the variations in brace study results may be attributable to differing rates of compliance with brace wear, a parameter that is becoming easier to measure.

Casting and Traction Treatment Methods for Scoliosis 477
 Jacques L. D'Astous and James O. Sanders

There is little consensus among spinal deformity surgeons as to the best way to treat infantile or early-onset scoliosis. Bracing may or may not be effective, and subcutaneous rods have a high complication rate. Current techniques of casting as championed by Min Mehta and Jean Dubousset are presented as is the use of halo-gravity traction for the more severe cases. We firmly believe that "outdated" techniques, such as casting and traction, still play an important role in the treatment of this challenging problem.

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 John Sarwark and Vishal Sarwahi

The outcome of spinal fusion in neuromuscular scoliosis demonstrates a consistently high satisfaction rate among parents and caretakers. It is somewhat more difficult to determine the functional benefits in individual patients, especially in those with the most severe involvement. Even in those children, a predicted 70% survival rate at 11 years has been documented following surgery. Scoliosis is common in children with neuromuscular diseases, especially cerebral palsy. Most of these children need stabilization to enhance their quality of life by improving sitting ability. Studies continue to show a high family satisfaction and caregiver satisfaction following spine reconstructive surgery for neuromuscular scoliosis and other spine deformities.

Surgical Treatment of Congenital Scoliosis

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Daniel J. Hedequist

The surgical options for congenital spine deformities are numerous and depend on the type of anomaly, the degree of deformity, and the age of the patient. The mainstay of surgical treatment remains early diagnosis before severe curvature and deformity exist. Occasionally, patients present with large deformities that require more significant procedures; however, early limited arthrodesis remains the safest and most reliable procedure. Patients who have significant decompensation of the spine at a young age may benefit from a fusionless procedure, as do patients who have coexisting rib deformities and chest wall insufficiency. This article reviews the general surgical principles that need to be followed to treat these patients safely. The numerous surgical procedures available for treating these patients also are reviewed.

Lenke 1C, King Type II Curves: Surgical Recommendations

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B. Stephens Richards

The objectives of this article are twofold. The first is to discuss the surgical experience in patients who have Lenke 1C (King type II) curves, including the experience with newer instrumentation. These patients present a significant challenge to the deformity surgeon because they have structural thoracic deformities and significant, but nonstructural, lumbar curves. Over the years, selective instrumentation and fusion of the thoracic curve have been the primary approach to preserve motion of the lumbar segments, and thus, improve the long-term outlook. This strategy has been undertaken with the expectation that the uninstrumented lumbar curve will allow for a well-balanced spinal column postoperatively. The second objective of this article is to present basic strategies that may be helpful when planning for surgery in these patients.

Classification of Operative Adolescent Idiopathic Scoliosis: Treatment Guidelines

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Peter S. Rose and Lawrence G. Lenke

Patients presenting with adolescent idiopathic scoliosis may be classified into one of 42 curve types using the system of Lenke and associates. This classification system provides a template to guide the selection of surgical approaches and fusion levels for patients undergoing surgical treatment of adolescent idiopathic scoliosis.

Anterior and Thoracoscopic Scoliosis Surgery for Idiopathic Scoliosis

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Vidyadhar V. Upasani and Peter O. Newton

Surgical management of idiopathic scoliosis is based on the natural history of this spinal disorder and on the likelihood of developing a worsening deformity. Anterior surgical treatments continue to evolve and provide advantages over posterior procedures in specific instances. Open and thoracoscopic anterior approaches allow direct access to the anterior stabilizing structures of the spine, enable mobilization of a rigid deformity, and provide a large surface area for arthrodesis. Thoracoscopic procedures provide a more cosmetically appealing alternative to a large midline posterior or anterolateral thoracotomy scar. Although the indications and contraindications for anterior versus posterior surgical intervention (for thoracic and thoracolumbar curve patterns) have been defined to some degree, there remains appropriate flexibility in the decision-making process, allowing the surgeon to make an optimal recommendation for each patient based on surgeon experience and patient needs.

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James T. Guille, Linda P. D'Andrea, and Randal R. Betz

The recent investigations of convex anterior vertebral body stapling have offered promising early results with use of improved implants and techniques. The use of a shape memory alloy staple tailored to the size of the vertebral body, the application of several staples per level, the instrumentation of the Cobb levels of all curves, and the employment of minimally invasive thoracoscopic approaches all offer substantial improvements over previous fusionless techniques. Patient selection may also play a role in the current success of these fusionless treatments, with perhaps the ideal candidates for this intervention possessing smaller and more flexible curves. Long-term results of the effects on the instrumented motion segments and adjacent spine are not yet available.

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John T. Smith

The management of severe spinal deformity in the growing child remains a challenging problem. Nonoperative methods range from orthotics to casting to traction; however, in certain circumstances, these techniques cannot effectively prevent deformity progression or are not tolerated by the child and surgical methods are required. Current options for surgical management of spinal deformity in the growing child include definitive spinal fusion with or without instrumentation, selective fusion, growth modulation, spinal instrumentation without fusion, or more recently, the use of the vertical expandable prosthetic titanium rib. Historically, all of these methods have a significant complication rate and despite advances in technology and instrumentation, remain problematic. This article provides an overview of current methods and outcomes for spinal instrumentation in the growing spine.

Scoliosis Associated with Neurofibromatosis 553
Alvin H. Crawford and Jose Herrera-Soto

Neurofibromatosis type 1 (NF-1) is a multisystemic disease. It may manifest as abnormalities of the nervous tissue, bones, soft tissue, and skin. The manifestations of NF-1 vary from person to person and range from subclinical to severe. Individuals who carry the gene eventually exhibit some clinical feature of the disease. The penetrance for NF-1 nears 100% during adulthood. Skeletal abnormalities are common in NF-1, with most patients presenting with some type of bony dysplasia. The orthopedic complications usually appear early. They include spinal deformities, such as scoliosis or kyphosis, congenital tibial dysplasia with bowing and pseudarthrosis of the tibia, forearm, other bones, as well as overgrowth phenomenon of an extremity, and soft tissue tumors.

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Constantine A. Demetracopoulos and Paul D. Sponseller

Marfan syndrome is a connective tissue disease that affects the skeletal system among other organ systems. Kyphoscoliosis, spondylolisthesis, and atlantoaxial subluxation are common spinal deformities in Marfan syndrome, and distinctive vertebral morphology within such patients presents significant treatment challenges. Although most scoliosis curves in patients who have Marfan syndrome are minor, those that require treatment progress rapidly; brace treatment has proven ineffective for most patients. Surgical correction is associated with complications, such as failure of fixation and additional deformity; however good results are possible when consideration is given to the unique challenges presented by patients who have Marfan syndrome.

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