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Degenerative Scoliosis: Clinical Features, Diagnosis, and Contemporary Management

Ray V. Lange, Arthur J. Christensen, Roberto J. Freeman*

Department of Neurology, Graduate School of Medicine, Chiba University, Japan
***Corresponding Author:** Roberto J. Freeman, Department of Neurology, Graduate School of Medicine,ChibaUniversity,Japan
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Abstract

Background: Degenerative scoliosis (DS), a form of adult spinal deformity, arises secondary to age-related asymmetric degeneration of the intervertebral discs, facet joints, and supporting spinal structures. Its prevalence is increasing with global population aging and is frequently associated with pain, neurological compromise, and functional limitation.

Objective: To provide a concise, publication-ready overview of the etiology, clinical features, diagnostic approach, and contemporary management of degenerative scoliosis.

Methods: This short communication synthesizes current concepts from the clinical and scientific literature on adult degenerative scoliosis, with emphasis on practical considerations for diagnosis and treatment

Results: Degenerative scoliosis commonly affects the lumbar and thoracolumbar spine and presents with mechanical back pain, radiculopathy, and neurogenic claudication. Diagnosis relies on standing radiographs and advanced imaging to assess alignment and neural compression. Management is individualized, ranging from conservative therapies to complex surgical correction in selected patients

Conclusion: Degenerative scoliosis is a multifactorial condition requiring a patient-centered, multidisciplinary approach. Early recognition and appropriate stratification of treatment options are essential to optimize outcomes and quality of life.

Introduction

Degenerative scoliosis (DS), also known as adult degenerative scoliosis, is defined as a coronal spinal curvature exceeding 10° that develops after skeletal maturity as a consequence of degenerative changes in the over 50 years of age and most frequently involves the lumbar or thoracolumbar spine. With increasing life expectancy, DS has emerged as a significant cause of pain, disability, and healthcare utilization. Patients often present with symptoms attributable not only to the deformity itself but also to associated degenerative conditions such as spinal stenosis, spondylolisthesis, and osteoporosis. This short communication aims to summarize key aspects of DS relevant to clinical practice and research, in a format suitable for academic publication

Etiology and Pathophysiology

The pathogenesis of degenerative scoliosis is multifactorial and begins with age-related degeneration of the intervertebral discs. Progressive disc dehydration and loss of disc height, when asymmetric, lead to unequal load distribution across the spinal column. This imbalance initiates coronal curvature and vertebral rotation Degeneration of the facet joints further contributes to segmental instability and lateral listhesis. Ligamentous laxity, paraspinal muscle degeneration, and osteoporotic weakening of vertebral bodies exacerbate curve progression. Over time, these changes result in a complex three-dimensional deformity involving coronal, sagittal, and axial planes. Sagittal imbalance, in particular, has been recognized as a major determinant of pain and disability in DS.

Clinical Presentation

The clinical manifestations of degenerative scoliosis are variable and depend on the severity of deformity, degree of neural compression, and overall spinal balance. The most common presenting symptom is mechanical low back pain, often aggravated by standing or ambulation balance. The most common

presenting symptom is mechanical low back pain, often aggravated by standing or ambulation Radicular pain and neurogenic claudication occur due to foraminal or central canal stenosis caused by disc collapse, osteophyte formation, and facet hypertrophy. Some patients report postural imbalance, truncal shift, or a progressive loss of height. Functional impairment, including reduced walking tolerance and difficulty performingactivities of daily living, is common in advanced disease Neurological deficits are less frequent but warrant careful evaluation, as their presence may influence management decisions

Diagnostic Evaluation

Accurate diagnosis of DS requires a thorough clinical assessment complemented by appropriate imaging. Standing anteroposterior and lateral full-length spine radiographs are essential for evaluating coronal curvature, sagittal alignment, and global balance. The Cobb angle remains the standard method for quantifying scoliosis. Magnetic resonance imaging (MRI) is invaluable for assessing intervertebral disc degeneration, spinal stenosis, and neural element compression. Computed tomography (CT) provides detailed information on bony anatomy and facet joint pathology and is particularly useful for preoperative planning. Assessment of bone mineral density is recommended in older adults to identify osteoporosis, which has important implications for both conservative and surgical management.

Management

The management of degenerative scoliosis is individualized and guided by symptom severity, radiographic findings, patient comorbidities, and treatment goals. Options are broadly divided into conservative and surgical approaches.

Conservative Treatment

Conservative management is the initial treatment of choice for most patients, especially those with mild to moderate symptoms. It includes pharmacological pain control with analgesics and nonsteroidal anti-inflammatory drugs, as well as neuropathic agents when radicular pain is present. Structured physical therapy focusing on core strengthening, flexibility, and postural correction plays a central role.Spinal injections, such as epidural steroid or facet joint injections, may provide temporary symptom relief in selected cases. Bracing can be considered for pain control, although its role in altering disease progression in adults is limited

Surgical Treatment

Surgical intervention is reserved for patients with persistent, disabling pain, progressive neurological deficits, or significant deformity unresponsive to

conservative measures. Surgical strategies range from decompression alone to deformity correction with instrumented fusion The primary goals of surgery are neural decompression, restoration of spinal alignment, and stabilization. However, surgery for DS is associated with substantial risks, particularly in elderly patients with multiple comorbidities. Careful patient selection, preoperative optimization, and shared decision-making are therefore essential

Prognosis and Future Perspectives

The natural history of degenerative scoliosis is typically characterized by slow progression, although rapid worsening may occur in the presence of sagittal imbalance or lateral vertebral translation. Manypatients achieve acceptable symptom control with non-operative treatment, while others experience significant improvement following appropriately selected surgical interventionFuture directions in DS management include the refinement of minimally invasive surgical techniques, improved understanding of sagittal balance, and Future directions in DS management include the refinement of minimally invasive surgical techniques, improved understanding of sagittal balance, and

Conclusion

Degenerative scoliosis is an increasingly prevalent condition associated with aging and spinal degeneration. It presents distinct clinical and therapeutic challenges compared with adolescent scoliosis. A comprehensive understanding of its pathophysiology, clinical presentation, and management options is essential for optimizing patient care. Individualized, evidence-based treatment remains the cornerstone of effective management

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