Update on Evaluation and Treatment of Scoliosis

Ron El-Hawary, MD, MSc, FRCS(C)*, Chukwudi Chukwunyerenwa, MD, MCh, FRCS(C)

KEYWORDS

• Scoliosis • Bracing • Surgery • VEPTR

KEY POINTS

- Scoliosis can arise from a variety of causes and is defined as a lateral curvature of the spine greater than 10°.
- The most common cause of scoliosis is idiopathic, which accounts for up to 80% of scoliosis in children.
- The Adam's forward bending test is a clinical evaluation of axial plane rotation that is associated with scoliosis.
- The goal of treatment is to prevent curve progression. If a curve progresses beyond 50°, it will likely continue to progress into adulthood.
- For children with early onset scoliosis, the goal of treatment is also to maintain spine, chest, and pulmonary development throughout childhood.

INTRODUCTION

Scoliosis can arise from a variety of causes and is defined as a lateral curvature of the spine greater than 10° on an anterior-posterior standing radiograph (**Fig. 1**). However, in reality, it is a 3-dimensional structural deformity that includes a curvature in the anterior-posterior plane, angulation in the sagittal plane, and rotation in the transverse plane. This 3-dimensional deformity differentiates scoliosis from nonstructural spine deformities, which arise as compensation for abnormalities in other regions (eg, lower limb disorders resulting in limb length discrepancy), in which case the deformity is mono-planer and resolves when the primary abnormality is treated.

IDIOPATHIC SCOLIOSIS

The most common cause of scoliosis is idiopathic, which accounts for up to 80% of scoliosis in children.[1] The cause of idiopathic scoliosis is unknown and is a diagnosis

Disclosures: Consulting Depuy-Synthes Spine, Medtronic Canada, Halifax Biomedical Inc, research/educational support Depuy-Synthes Spine, Medtronic Canada (R. El-Hawary). Nothing to disclose (C. Chukwunyerenwa).
Division of Orthopaedic Surgery, Department of Surgery, IWK Health Center, 5850 University Avenue, PO Box 9700, Halifax, Nova Scotia B3K-6R8, Canada
* Corresponding author.
E-mail address: ron.el-hawary@iwk.nshealth.ca

Pediatr Clin N Am 61 (2014) 1223–1241
http://dx.doi.org/10.1016/j.pcl.2014.08.007 **pediatric.theclinics.com**
0031-3955/14/$ – see front matter

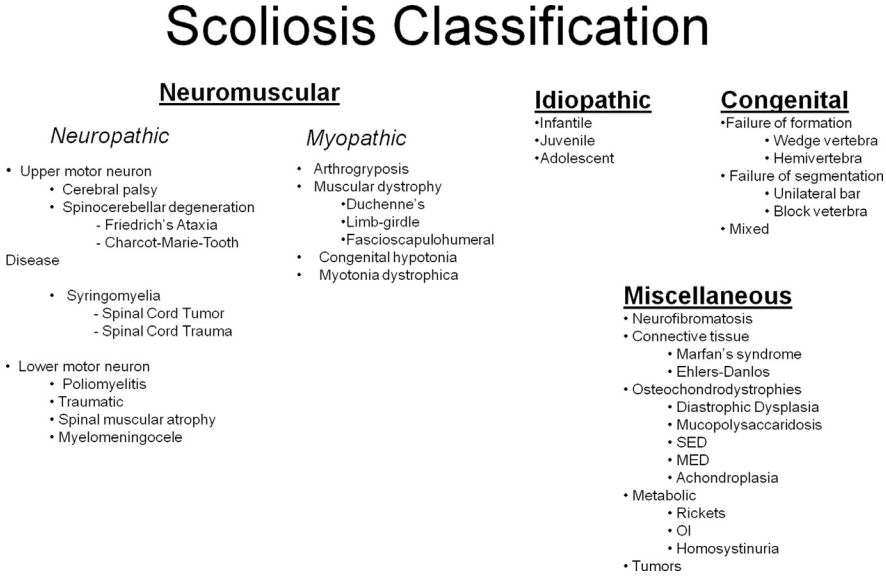

Fig. 1. Classification of scoliosis.

of exclusion. It is classified based on age of onset into infantile (0–3 years), juvenile (3–10 years), and adolescent (>10 years).[2] These 3 periods mark the different periods of growth velocity during childhood; hence, the curves behave differently.

A different classification, first used by Dickson,[3] separates idiopathic scoliosis into early onset (<5 years) and late onset (>5 years), given that the natural history, prevalence, and treatment methods for patients with scoliosis when younger than 5 years is significantly different from patients presenting with scoliosis when older than 5 years. Another advantage of this classification is that it separates scoliosis into 2 distinct periods of pulmonary development; from 0 to 5 years of age is the period of major pulmonary development, and a thoracic deformity during this period will have a greater impact on pulmonary function than one developing in later years. Early onset scoliosis includes all patients with an age of onset of less than 5 years regardless of the cause; however, more recently, there is a growing trend toward changing this definition to less than 10 years of age regardless of cause.

Infantile Idiopathic Scoliosis

Infantile idiopathic scoliosis accounts for less than 1% of idiopathic scoliosis.[4] It is more common in boys (ratio: 3:2); most are convex left curves (75%–90%); most tend to resolve spontaneously and often can be associated with plagiocephaly (80%–90%).[5–7]

Juvenile Idiopathic Scoliosis

Juvenile idiopathic scoliosis makes up between 12% and 21% of patients with idiopathic scoliosis.[2,8,9] Juvenile idiopathic scoliosis is a transition between infantile and adolescent idiopathic scoliosis. There is a slight female preponderance ranging from 1.6:1.0 to 4.4:1.0, which tends to increase with increasing age of onset.[9,10] A right thoracic curve is predominant in this category. Because the juvenile period is a period of slow spinal growth,[11] the natural history is that of slow progression until about