ELSEVIER

CrossMark

The Spine Journal 16 (2016) e641–e646

THE SPINE JOURNAL

Case Report

Growing rod erosion through the lamina causing spinal cord compression in an 8-year-old girl with early-onset scoliosis

Fahad H. Abduljabbar, MBBS, FRCSC[a,b], Feras Waly, MBBS[a,c], Anas Nooh, MBBS[a,b], Jean Ouellet, MD, FRCSC[a,*]

[a]*Division of Orthopedic Surgery, McGill Scoliosis and Spine Centre, McGill University Health Centre, 1650 Cedar Ave, T8-200, Montreal, QC H3G 1A4, Canada*

[b]*Department of Orthopedic Surgery, King Abdulaziz University, Abdullah Sulayman St, P.O. Box 80215, Jeddah, 21589, Saudi Arabia*

[c]*Division of Orthopedic Surgery, University of Tabuk, Khalid Elsedery St, P.O. Box 741, Tabuk, 71491, Saudi Arabia*

Received 3 December 2015; revised 29 March 2016; accepted 4 May 2016

Abstract

BACKGROUND CONTEXT: Early-onset scoliosis often occurs by the age of 5 years and is attributed to many structural abnormalities. Syndromic early-onset scoliosis is considered one of the most aggressive types of early-onset scoliosis. Treatment starts with serial casting and bracing, but eventually most of these patients undergo growth-sparing procedures, such as a single growing rod, dual growing rods, or a vertical expandable titanium prosthetic rib.

PURPOSE: This case report aimed to describe an unusual complication of erosion of a growing rod through the lamina that caused spinal cord compression in an 8-year-old girl with early-onset scoliosis.

STUDY DESIGN: This is a case report.

METHODS: A retrospective chart review was used to describe the clinical course and radiographic findings of this case after rod erosion into the spinal canal.

RESULTS: The patient underwent successful revision surgery removing the rod without neurologic complications.

CONCLUSIONS: Patients with syndromic early-onset scoliosis are more prone to progressive curves and severe rotational deformity. We believe that the severe kyphotic deformity in addition to the dysplastic nature of the deformity in this population may predispose them to this unusual complication.

Keywords: Complications; Early-onset scoliosis; Growing spine; Growth sparing spinal instrumentation; Growing rods; Implant migration; Rod migration; Scoliosis

Introduction

Early-onset scoliosis (EOS) has been used to describe the presence of scoliosis of all etiologies by the age of 5 years [1–3]. The causes of EOS include neuromuscular conditions, congenital vertebral anomalies, associated syndromes, and structural lesions of the central nervous system [1]. Early-onset idiopathic scoliosis is a diagnosis of exclusion when these patients have no structural abnormalities. The initial treatment of EOS starts with serial casting, followed by bracing based on the principle of prevention of curve progression [4–8]. Despite such treatment, however, these curves may progress, necessitating surgical intervention. The disadvantages of serial casting and bracing include compromise of chest wall development and subsequent worsening of cardiopulmonary function [9,10]. Treating children with progressive EOS is challenging in many aspects [11]. The remaining

FDA device/drug status: Not applicable.

Author disclosures: ***FHA:*** Nothing to disclose. ***FW:*** Nothing to disclose. ***AN:*** Nothing to disclose. ***JO:*** Consulting: DePuy Synthes (B), outside the submitted work; Speaking and/or Teaching Arrangements: AO Foundation (B), outside the submitted work; Endowments: Synthes (F, Paid to the institution), outside the submitted work; Grants: Shriners International (E, Paid to the institution), outside the submitted work; Fellowship Support: AO Foundation (E, Paid to the institution), outside the submitted work.

The disclosure key can be found on the Table of Contents and at www.TheSpineJournalOnline.com.

No funds were received in support of this work. No benefits in any form have been or will be received from a commercial party related directly or indirectly to the subject of this article. FA (None). FW (None). AN (None). JO (grants from AO Foundation, DePuy Synthes; personal fees from DePuy Synthes, outside the submitted work).

* Corresponding author. Shriners Hospital for Children-Canada, McGill University, 1003 Décarie Boulevard, Montreal, Canada H4A 0A9. Tel.: +001 514 412 4464; fax: +001 514 412 4353.

E-mail address: jean.ouellet@muhc.mcgill.ca (J. Ouellet)

http://dx.doi.org/10.1016/j.spinee.2016.05.001

potential for growth makes it harder to fuse their spines to control the curve progression without losing that potential. This can compromise lung development, which will result in respiratory insufficiency. Thus, focus on EOS spine surgery has shifted from the spine alone to concomitant consideration of the chest wall and lungs, and the goals of treatment include a well-aligned spine and a thoracic cavity sufficiently developed to support adequate pulmonary development and function [12].

After this recognition of the importance of pulmonary function, the pendulum shifted toward preservation of spine and chest growth through the use of growth-sparing techniques. These techniques rely on the principle of a distraction-based construct to control curve progression, allowing axial and chest growth simultaneously. Many techniques have been described, such as the use of a single growing rod [13,14], dual growing rods [14], and a vertical expandable titanium prosthetic rib [15,16].

The growing rod technique is associated with a high rate of complications [17–19].

These include rod breakage, hook displacement, wound infections, and to a lesser extent neurologic injury [11]. We report an unusual case of an 8-year-old girl who underwent a dual growth lengthening for EOS that was complicated by erosion of a growing rod into the spinal canal.

Case report

The patient was an 8-year-old girl who initially presented to our clinic at the age of 25 months as a case of EOS. She was diagnosed with camptomelic dwarfism, Pierre Robin syndrome, severe kyphoscoliosis (Fig. 1), and spina bifida occulta. Bracing was initially started but failed to control progression of the curve. Casting was next attempted but also failed to prevent progression. Thus, at the age of 2 years and 10 months, the patient underwent halo gravity traction for 4 months. At the time of halo application, proximal and distal

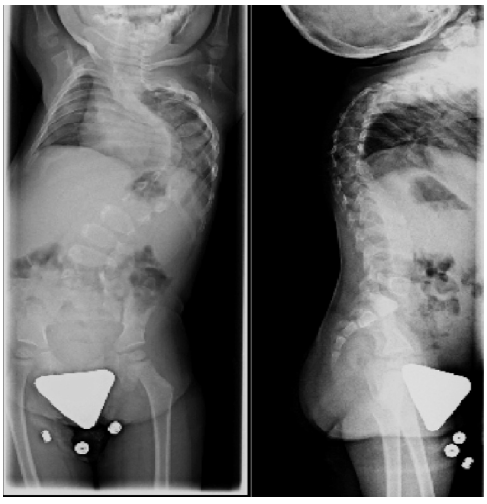

Fig. 1. Posteroanterior (PA) and lateral views of the whole spine showing severe kyphoscoliosis.

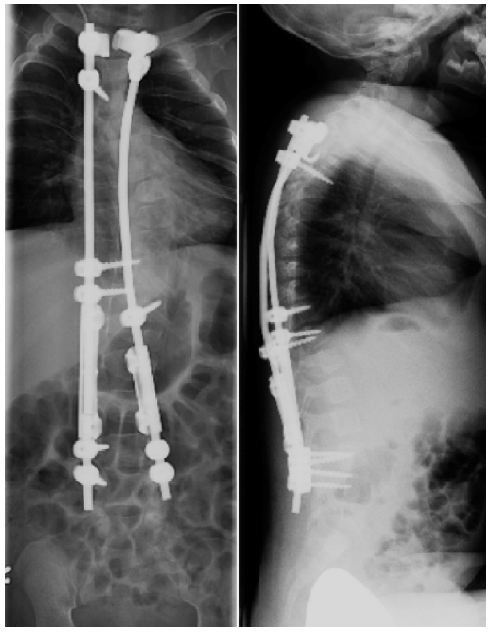

Fig. 2. Posteroanterior (PA) and lateral views of the spine showing posterior spinal fusion (PSF) of two-level focal sites, T1–T3 and L3–L4, and growing rods.

spinal anchors were inserted for selective fusions of two levels, T1–T3 and L3–L4. These were done at this time, as patient had no posterior elements at the distal segments and severe kyphosis, wanting to have solid fixation before the placements of the growing rods. Once partial correction was achieved by halo traction, growing rods were inserted with additional gliding anchors at the apex [5] to maximally translate and correct the spinal deformity (Fig. 2). At the age of 3 years and 7 months, the patient started to develop an iatrogenic low-grade slip at the level of L5–S1, which remained asymptomatic. She underwent growing rod lengthening every 6 months until she ran out of length at the age of 5 years, at which time she underwent a revision of her growing rods. At the age of 7 years, the L5–S1 spondylolisthesis has progressed to a high grade (Fig. 3), and the patient started to complain of right-sided L5 radiculopathy. Advanced imaging, including computed tomography (CT) scanning and magnetic resonance imaging (MRI), revealed high-grade spondylolisthesis and right L5 nerve root compression. Surprisingly, the imaging also showed that the left rod was eroding through the lamina at the apex of her thoracic deformity and encroaching on the spinal cord (Fig. 4). Despite this complication, the patient had no signs of myelopathy. At that point, a decision was made to extract the left rod, perform a thoracic spinal decompression and right L5 nerve root decompression, and extend the fusion level distally to the pelvis.

Under a total intravenous anesthetic, the patient was positioned prone on the Jackson table. Even before initiating surgery, there were no motor evoked potentials. An emergency wake-up test was done and the child did not move her