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Case Reports

Coronal Vertebral Dislocation Due to Congenital Absence of Multiple Thoracic and Lumbar Pedicles: Report of Three Cases, Review of Literature, and Role of Intraoperative CT Navigation

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Abstract

Study Design: Case report

Objective: To present three cases of coronal vertebral dislocation due to congenital multiple thoracic and lumbar pedicle agenesis.

Summary of Background Data: Congenital pedicle agenesis is an uncommon condition and is frequently identified as an incidental finding on diagnostic imaging in asymptomatic individuals. This agenesis is frequently limited to a single level and is commonly seen in the cervical and lumbar spine.

Methods: We report three patients who presented with multiple thoracic and lumbar pedicle agenesis resulting in coronal vertebral dislocation. The patients presented with progressive kyphoscoliosis deformity. Identification of this malformation on conventional radiographs is difficult, and computed tomographic (CT) scan with 3D reconstruction provides a better delineation of the deformity.

Results: Computed tomography showed complete absence of pedicles and dissociation of anterior column from the posterior column, resulting in coronal vertebral dislocation. Magnetic resonance imaging confirmed the absence of pedicles and decreased anteroposterior diameter, causing canal stenosis. Two patients were treated by spanning internal fixation, partial deformity correction, and posterior fusion, with satisfactory results.

Conclusion: Coronal vertebral dislocation can be easily missed on plain radiograph because many patients with severe scoliotic deformity have thin or sclerotic pedicles. Computed tomography is essential to demonstrate these anomalies. It is important to recognize pedicle aplasia early to prevent rapid progression of deformity and neurologic deficit.

Keywords: Coronal vertebral dislocation; Scoliosis; Congenital; Pedicle agenesis; Navigation

Introduction

Congenital absence of a thoracic pedicle is a rare anomaly [1-6], and most reports of aplasia are isolated, asymptomatic, and incidental observations on diagnostic imaging [7-10]. However, multiple thoracic pedicle aplasia is an extremely rare condition. We report three cases of congenital multiple bilateral vertebral pedicle aplasia that resulted in coronal vertebral dislocation and progressive kyphoscoliotic deformity.

Case Report

Case 1

A 12-year-old premenarchal girl presented with a progressive kyphoscoliotic deformity. There were no clinical features of myelopathy and, radiographs showed a right thoracic scoliosis measuring 63°and a kyphosis of 65°. MRI showed no evidence of spinal cord anomalies, however, due to absent pedicles, there was complete dissociation between anterior and posterior elements resulting in coronal

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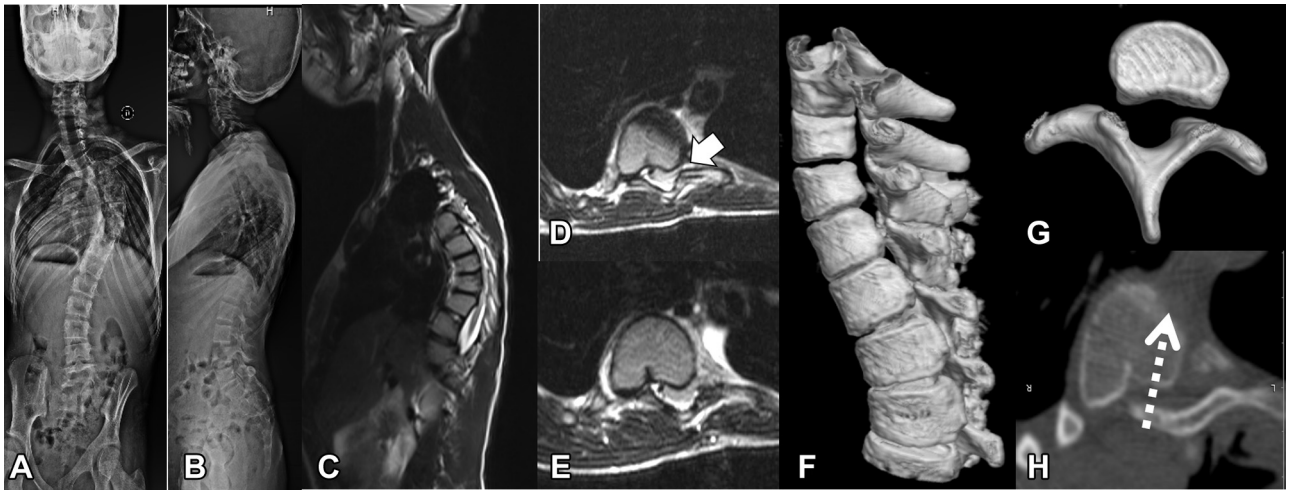

Fig. 1. (A, B) Anteroposterior and lateral radiographs showing right proximal thoracic scoliosis. (C) T2 sagittal MRI images showing signal changes in the thoracic cord over the apex of the deformity with absent pedicles. (D, E) Significant spinal canal stenosis (white arrow) is seen. There is a translation in the coronal plane between the vertebral body and the posterior lamina, with cord impingement seen between the vertebral body and the lamina over the concave apex of the curve. (F, G) 3D CT reconstruction of the spine showing absent pedicles with complete dissociation between the anterior and posterior elements at multiple contiguous levels in the thoracic spine. (H) Axial CT images, with the white dotted arrow indicating conventional screw trajectory with likely spinal canal violation.

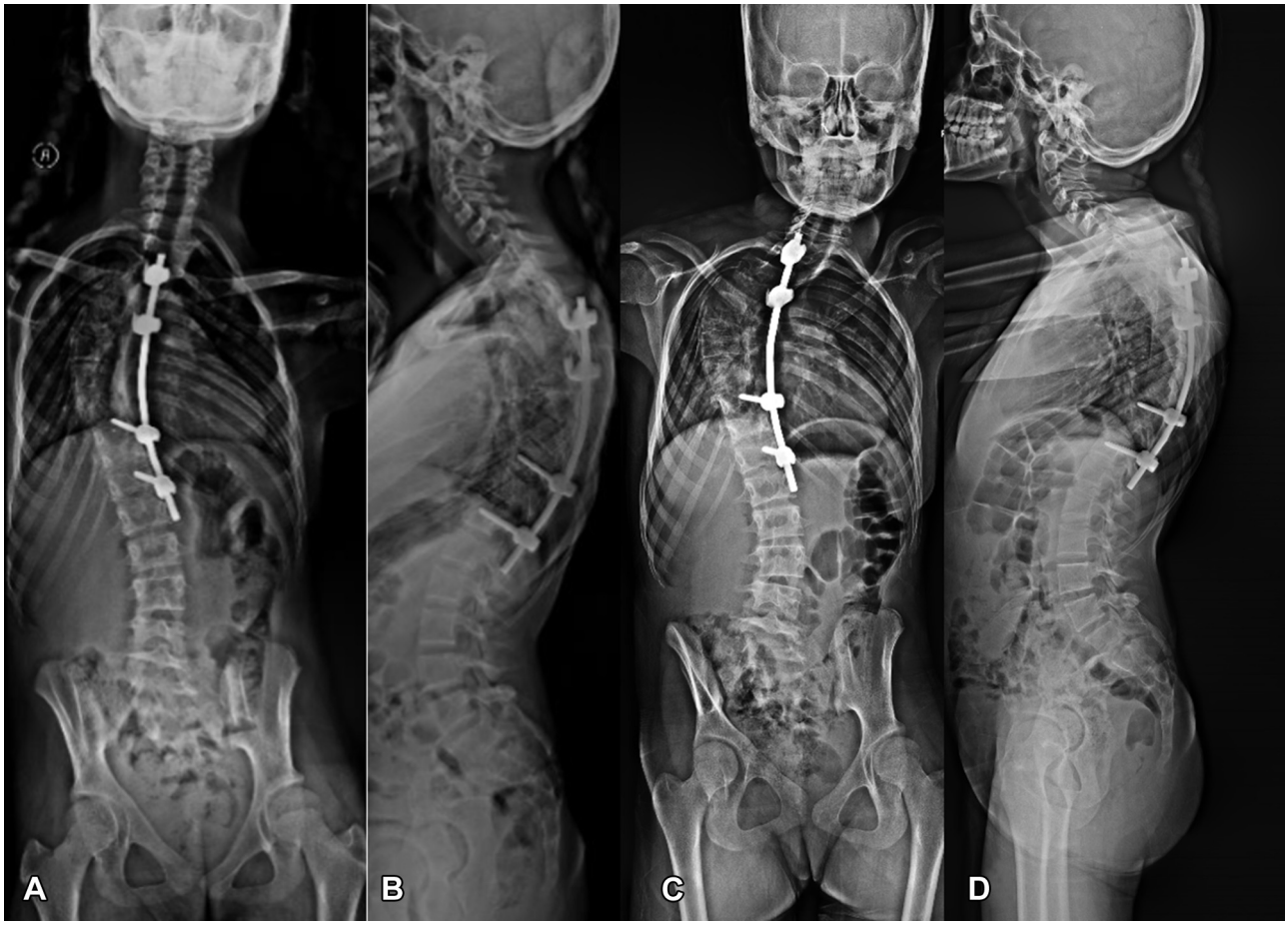

Fig. 2. (A, B) Immediate postoperative radiograph with hybrid construct fixation over the concave side of the curve. Laminar hooks placed at T3 and T5 with pedicle screws at T10 and T12. (C, D) Radiograph at the 27-month follow-up showing partial loss of correction with no implant failure.