Case Report

Congenital Pedicle Hypoplasia of Lumbarized S1 Transitional Vertebra; A Rare Cause of Low Back Pain

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Abstract

We aimed to present radiological findings of a case of pedicle hypoplasia of lumbarized S1 vertebra accompanying with multiple vertebral and rib anomalies. Congenital aplasia or hypoplasia of spine pedicle is an uncommon anomaly. Aplastic- hypoplastic cervical, thoracal, lumbar pedicles have been reported. But sacral pedicle hypoplasia is rare anomaly. Sacral spine pedicle hypoplasia of lumbosacral transitional vertebra has not been reported previously in the radiological literature. Recognising of this anomaly can prevent misinterpretation of radiologic and clinical findings.

Keywords: Congenital vertebral abnormalities, hypoplasia of pedicle, lumbosacral region, low back pain, back pain

INTRODUCTION

Congenital aplasia- hypoplasia of a spine pedicle is a rare anomaly. It has been reported in the lombar, cervical area and rarely in the thoracal or sacral spine[10,6].

Patients with this anomaly commonly remain aseptomatetic. Some patients with this anomaly have pain, degenerative changes, instability, neurologic findings and some of them are vulnerable to the trauma.
It is important to distinguish the aplasia or hypoplasia of a spine pedicle from other clinical entities. Here we present a case with both multiple vertebral anomalies including congenital pedicle hypoplasia of lumbarized S1 vertebra and multiple rib anomalies.

**CASE PRESENTATION**

A 41-year-old woman was admitted with a several-month history of gradually increasing low back pain. On physical examination she had intact motor and sensory function.

The case was evaluated with lumbar direct radiograph (DR) and lumbar magnetic resonance imaging (MRI). DR showed that rotoscoliosis and left lumbarized S1 vertebra (Figure 1). Lumbar MRI showed that prominent thinning right pedicle of left lumbarized S1 vertebra and abnormal enlargement in right L5-S1, S1-2 intervertebral neural foramen (Figure 2a, b, c). There was no discal pathology.

To better assessment of bone structure, computed tomography (CT) was performed. Axial, sagittal and coronal reformatted images were evaluated. In CT examination showed right pedicle hypoplasia of left lumbarized S1 vertebra (Figure 3a, b, 4a, b), abnormal right transverse process of L3 vertebra that extend superolaterally and arising from lateral aspect of L3 corpus vertebra (Figure 4a, b, c, 5a) and prominent left process accessorius of L1 vertebra (Figure 5c).

In recent thorax CT examination that in Picture archiving and communicating system of the patient observed that the fusion of the T3, T4, T5 corpus vertebra. On the right there were two ribs arising from this fused vertebra whereas on the left three ribs arised from this level. So there were eleven ribs in the right hemithorax, twelve ribs in the left hemithorax (Figure 6a, b). On the left first and second ribs were partially fused (Figure 7a) and on the right fifth rib was shorter than other ribs (Figure 7b).

The patient was treated conservatively and discharged for follow-up.

*Figure 1: Anteroposterior lumbar DR shows rotoscoliosis, lumbarized S1 vertebra.*
**Figure 2:** (a) Sagittal T1 weighted (b) sagittal T2 weighted (c) axial T2 weighted images show right S1 pedicle hypoplasia.

**Figure 3:** (a) Coronal (b) axial reformatted CT images show right S1 pedicle hypoplasia (c) sagittal CT scanogram of this level

**Figure 4:** (a) (b) Three dimensional reconstruction of the CT images show right S1 pedicle hypoplasia and abnormal right L3 transverse process (c) coronal reformatted CT image shows abnormal right L3 transverse process.
DISCUSSION

Low back pain is exceedingly common complaint within the general population. Lumbosacral transitional vertebra and/or congenital vertebral anomalies are the causes of low back pain. Numerous situations which are spinal, extradural and mechanical origin are
among the causes of low back pain. More suitable approach can be provided by doing appropriate imaging modalities in right times and evaluating every cases separately. For the evaluation of patients, usually DR and MRI are the first choice imaging modality. DR gives general information about vertebral alignment, corpus height and bone density. The images in multiple planes and large view area can be obtained with MRI. Speciality of MRI that high-resolution of soft tissues provides additional information about intervertebral disc, bone marrow, spine and spinal cord. For evaluation of the bone structure first choice imaging modality is CT imagination.

The vertebral arch of a typical vertebra is formed by a pair of pedicles, laminae, four articular process, two transverse process and one spinous process. The vertebral arch and its process may present with multiple anatomic variations and congenital anomalies result from alterations in the ossification process(2). Failure of development of a vertebral chondrification center of a particular sclerotome or failure of ossification could lead to the absence of a pedicle(1). These variations and anomalies commonly remain asymptomatic, but a few variations and anomalies may cause painful syndromes or may be confused with fractures or dislocations(3). In reported many cases the terms hypoplasia and absent pedicle have been used synonymously with resultant confusion. In retrospect with the knowledge obtained from CT scans, many cases reported as an absent pedicle are, in reality, an aberrant hypoplastic pedicle. Many of the cases described as an absent lumbar pedicle are obviously cases of a hypoplastic aberrant pedicle. Complete agenesis of the lumbar pedicle appears to be a quite rare anomaly(10,8).

Radiologic evaluation of patients begins with DR, it can in many instances make the diagnosis. CT, MRI and in some cases myelography should be performed. Three dimensional and reformatted CT images also may define the anomalous pedicle, axial CT images are by far the best diagnostic modality(10). Several characteristic radiographic features of this congenital anomaly described, the false appearance of an enlarged ipsilateral neural foramen due to the aplastic or hypoplastic pedicle, a dysplastic, dorsally displaced ipsilateral articular pillar and lamina and a dysplastic ipsilateral transverse process(10,1,9). On axial multidetector CT images, the congenital absence of a thoracolumbar pedicle is typically associated with a small anteriorly displaced transverse process. The anterior attachment of the transverse process can be interpreted as a hypoplastic pedicle, which may also occur. Additional features include dysplasia of the ipsilateral superior articular facet, tilt of the spinous process, contralateral arch hypertrophy, sclerosis and rib abnormalities(2).

Some authors indicate that MRI with multiplanar imaging is superior to isolated axial CT studies in the evaluation of these types of anomalies and it also eliminates the need for further work-up to diagnose possible neoplastic or inflammatory lesions(8).

The nature of the anomaly explains the difficulty in diagnosis by DR or CT study. An enlarged neural foramen and pediculate thinning can also be caused by dumbbell-shaped spinal tumours, neurofibroma, mesodermal displasia associated with neurofibromatosis, bone tumours, vascular anomalies, meningocele and fractures(10,1,5).

This anomaly can cause instability, spondylolisthesis, degenerative changes to adjacent level and contralateral facet joints(5). It is also important knowledge of this anomaly and pedicle diameters of first sacral vertebra is crucial for safe placement transpedicular screw insertion(4).

In our case interpreted that low back pain causes were lumbarization, rotoscoliosis,
abnormal transverse process that located near right psoas muscle and abnormal extension of intertransversarius, quadratus lumborum muscle that insert on the transverse process of the lumbar vertebra(7).

This congenital abnormality can be associated with other osseous abnormalities. In patients with pedicle hypoplasia, all vertebral columna and ribs must be checked in any malformation.

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