Case Report

Lumbosacral transitional anomaly- a case report

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Abstract
One of the most common congenital anomalies of the human spine is lumbosacral transitional vertebrae (LSTV). In LSTV, the presentation can either be the transverse process of last lumbar vertebra (L5) fusing with the sacrum on one side or both or to ilium or both (sacralisation of lumbar vertebra), or the first sacral vertebra fusing with the last lumbar vertebra (lumbarisation of sacral vertebra),both of which could be in ‘complete’ or ‘incomplete’ forms, either unilateral or bilateral. These anomalies are one of the causes of low back pain and such an occurrence has to be borne in mind during spinal surgery. During routine osteology classes for the medical students at Sri Manakula Vinayagar Medical College, Pondicherry, two of the sacra showed fusion of the fifth lumbar vertebra with the sacrum. In one, the transverse process of the last lumbar vertebra showed fusion with sacrum on both sides and in the other the transverse process of the last lumbar vertebra showed fusion with sacrum only on left side. The clinical implications of such variations are discussed.

Key Words: Sacralisation, Back pain, LSTV

Introduction
Sacrum is a triangular bone formed by the fusion of five sacral vertebrae. Its base articulates above with the body of fifth lumbar vertebra, laterally with two ilia and below with the coccyx. Its pelvic and dorsal surfaces present four pairs of foramina.[1,2]. The vertebral canal and intervertebral foramina form around the spinal cord and nerve roots during development. Lumbosacral region anomaly includes lumbosacral transitional vertebrae (LSTV). This anomaly occurs as a result of embryological defect in the segmentation of somites of lumbosacral region.[1,3]

The lower spinal nerves surround the end of spinal cord as cauda equina. The spinal nerves pass through the spinal canal before they exit through the intervertebral foramina. The nerves are thus likely to be compressed by bony structures as in case of LSTV. Consequently, the exiting spinal nerves are potential sources of pain in the lumbosacral area.[2,3]

The following report presents two cases of sacralisation of lumbar vertebrae.

Case report: During routine Osteology classes for pre clinical students in the department of Anatomy, Sri Manakula Vinayagar Medical College and Hospital, two anomalous sacra were observed and the details of each bone are discussed below.

1. Incomplete bilateral sacralisation of the fifth lumbar vertebra was noted (Figure 1). From an anterior view a well defined joint line between the bodies of L5 and S1 was present. Transverse processes of L5 were fused with the ala of the sacrum on either side. The bone showed five pairs of sacral foramina. The height of body of L5 was more than that on the left side. The joint line between L5 and S1 extended more laterally on the left side, extending into the
first pelvic sacral foramen. On posterior view, the lamina and spine of L5 were not fused with the corresponding parts of S1 on either side. The length of the sacral hiatus was unusually long extending up to the level midway between third and fourth dorsal sacral foramina.

2. Incomplete unilateral sacralisation of fifth lumbar vertebra on the left side was noted (Figure 2). From an anterior view, a well defined joint line between the bodies of L5 and S1 was present. The transverse process of L5 fused completely with the ala of the sacrum on the left side, whereas on the right it was normal. On posterior view, the lamina and spine of L5 and S1 were not fused with each other. Fusion was seen between the inferior articular processes of L5 and superior articular processes of S1 on both the sides. The length of the sacral hiatus appeared normal.

Discussion: The vertebral column not only functions as a support to the body, it also acts as a pathway for the spinal cord. Therefore for the spinal cord to work efficiently it is mandatory that the vertebral column follows a normal pathway of development. Development of the spine occurs through a number of complex steps which involve the genes, signalling pathways and many metabolic processes. Somites are derived from paraxial mesoderm of intraembryonic mesoderm. Sclerotome parts of the somites give rise to the vertebrae. During the formation of vertebral column, in the fourth week of intrauterine life the sclerotome part of somites migrate around the notochord and the neural tube and undergo a process called resegmentation \cite{1}. Any defect in such a process can lead to vertebral anomalies like LSTV causing neurological and vascular deficits.

Sacralisation of lumbar vertebra can be of two types \cite{3}:

- Complete
- Incomplete

Sacralisation of lumbar vertebra can also be classified as \cite{4,5}:

- Unilateral
- Bilateral

Complete sacralisation shows complete bony union between L5 and S1. Incomplete sacralisation shows a well defined joint line between L5 and S1 \cite{2}. A study by Karan S et al. on sacra, it was observed that 6.6% were sacralised. The authors also emphasized that such congenital anomalies can lead to pain along the nerve roots. In a study by Deepa TK et al. on sacra, it was stated that 88.03% of sacra showed normal anatomy, 1.70% showed lumbarisation and 10.25% showed sacralisation. It was also suggested that surgeons should be aware of such variations to avoid serious complications during spinal surgery. The misinterpretation of such variations can lead to misdiagnosis in CT scans and MRI images. In a statistical study conducted by Vandana et al. to determine, the prevalence of LSTV, it was recorded that 14.1% showed sacralisation, 9% showed lumbarisation indicating that sacralisation was more common than lumbarisation. Sacralisation of lumbar vertebra can be of two types Chakravarthy et al. concluded that 38% of the sample size showed sacralisation of lumbar vertebra, out of which 66.67% were bilateral and 33.33% were unilateral. The authors opined that sacralisation of lumbar vertebra can cause an increased risk of disc herniation, pseudoarthrosis with degenerative sclerosis and compressive neuropathy, which leads to low back ache. The authors have stated that sacralisation of the last lumbar vertebra can also lead to less mobile
pelvis, causing obstructed or delayed labour. They also pointed out that such congenital anomalies can give a varied appearance of surface landmarks leading to misguided administration of epidural and intradural anesthesia.

In a study by Mehemet et al. in patients to determine the relationship between sacralisation and low back pain, it was noted that 21.2% patients showed sacralisation, whereas in individuals without low back pain, sacralisation was observed in 16.8%. Various studies are being conducted worldwide to determine the association between sacralisation of lumbar vertebra with low back ache and many other clinical conditions as discussed above.

**Conclusion:** Sacralisation of lumbar vertebrae is not an uncommon condition, and can be a frequent cause of low back pain. The occurrence of sacralisation should be borne in mind by physicians, surgeons, anesthetists, radiologists and orthopaedicians, as an etiological factor in conditions like low back ache and during procedures for administration of anesthesia.

Figure 1: Incomplete bilateral sacralisation of the fifth lumbar vertebra

Figure 2: Incomplete unilateral sacralisation of fifth lumbar vertebra on left side

**References:**
