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# LUMBOSACRAL TRANSITIONAL VERTEBRAE: NEGLECTED PROBLEM: A CASE REPORT

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## Abstract: -

*Lumbosacral transitional vertebrae (LSTVs) is a common within the spine, and their association with low back pain has been debated in the literature for nearly a century. It affects 4-8% of the population. LSTVs are congenital spinal anomalies defined as either sacralization of the lowest lumbar segment or lumbarization of the most superior sacral segment of the spine. These anomalies are usually identified incidentally because CT is not typically indicated solely to identify LSTVs, due to radiation concerns, nor is it the preferred imaging technique used to evaluate patients with nontraumatic low back pain.Correct identification of an LSTV is essential because there are important clinical implications. Inaccurate identification may lead to surgical and procedural errors and poor correlation with clinical symptoms.*

**Keywords:** *Lumbosacral transitional vertebrae, sacralization, CT imaging.*

## I. INTRODUCTION

Lumbosacral transitional vertebrae (LSTV) are a relatively common variant and can be seen ~25% (range 15-35%) of the general population [1-3]. Non-recognition of this variant and/or poor description in the report can lead to operations or procedures performed at the wrong level.

Depending on the number of thoracic vertebrae, lumbar vertebrae and sacral segments they can be thought of as a lumbarised S1 segment or sacralised L5 segment. There can be a varying degree of transition from partial to complete fusion. The degree of morphologic variation of these segments ranges from L5 vertebrae with broadened elongated transverse processes to complete fusion to the sacrum. Conversely, the S1 vertebral segment can show varying degrees of lumbarization, such as the formation of an anomalous articulation rather than fusion to the remainder of the sacrum, well-formed lumbar-type facet joints, a more squared appearance in the sagittal plane, as well as a well-formed fully-sized disk, rather than the smaller-sized disk typically seen between S1 and S2.

Low back pain associated with an LSTV may arise from the level above the transition, the contralateral facet when unilateral, and/or the anomalous articulation when present. Although this association is still somewhat controversial, beyond dispute is the importance of identifying an LSTV in patients in whom a surgical or interventional procedure is planned. This is essential to avoid an intervention or surgery at an incorrect level. In this article, each of these issues will be addressed with attention to identifying and correctly numbering LSTVs as well as detecting imaging findings related to the genesis of low back pain.

A new classification of lumbosacral transitional vertebra is presented based upon the morphologic and clinical characteristics with respect to herniated nucleus pulposus. Type I represents a "forme fruste" of lumbosacral transitional vertebra and shows no difference in the incidence of the location of herniations. In Types III and IV, there are no herniations at the level of the lumbosacral transitional vertebra and no increase in the incidence of herniations just proximal to the lumbosacral transitional vertebra. The Type II lumbosacral transitional vertebra presents herniated lumbar disc at the level of transition. It also presents a greater than normal incidence of herniations at the level just above the lumbosacral transitional vertebra.

## II. CLINICAL REPORT

A 36-year-old man who presented initially with low back pain while playing volleyball. Gradual improvement of symptoms with rest.

AP radiograph angled cranially at 30° allows better characterization of the transverse processes of L5. LSTVs have been classically described as best imaged by using Ferguson radiographs. AP radiograph demonstrates an LSTV with unilaterally enlarged L5 transverse processes. There is articulation with the sacrum.Sacralisation of the L5 transverse process on the left side and narrowing of the adjacent SI joint.

**Fig. 1– Enlarged left L5 transverse processes**

**CT was performed a non-enhanced study.**

**Fig. 2 - Axial CT image demonstrates osseous fusion of the left L5 transverse process with the sacrum**


**Fig. 3 - Hypertrophic left L5 transverse process with pseudo articulation with the sacrum.**

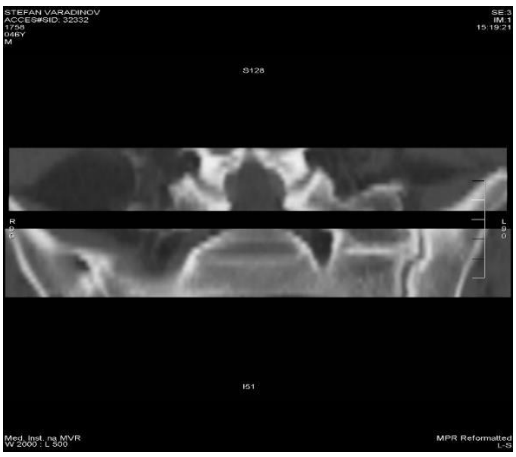


**Fig. 4 -Coronal reconstructed CT image demonstratesa neo-articulation between a left mega apophasis tranverse and the sacral bone**

## III.DISCUSSION

The studies of patients being imaged for low back pain or surgery for disk pathology demonstrated a greater than expected number of transitional vertebrae.[1]

The Castellvi classification is used for lumbosacral transitional vertebrae

- type I: enlarged and dysplastic transverse (at least 19 mm)
  - o Ia: unilateral
  - o Ib: bilateral
- type II: pseudoarticulation of the transverse process and sacrum with incomplete lumbarisation/sacralisation; enlargement of the transverse process with pseudoarthrosis
  - o IIa: unilateral
  - o IIb: bilateral
- type III: transverse process fuses with sacrum and there is complete lumbarisation or sacralisation, enlarged transverse process with complete fusion
  - o IIIa: unilateral
  - o IIIb: bilateral
- type IV: type IIa on one side and type III on contralateral side [2]

The relationship of low back pain and LSTV, termed “Bertolotti Syndrome,” has been debated in the literature since its initial description in 1917, many support this association.[4], [5],[6],[7]. Symptoms can originate from the anomalous articulation itself, the contralateral facet joint (when unilateral), instability and early degeneration of the level cephalad to the transitional vertebrae, and nerve root compression from hypertrophy of the transverse process.[2],[3],[9-11] The symptoms associated with each of the above processes are treated differently, requiring reliable techniques to not only identify LSTVs but also determine the type and site of the pathology generated by the transitional segment.

When an iliolumbar ligament was seen to arise above the LSTV, then the vertebral body with the iliolumbar ligament was labeled L5 and the LSTV, as S1. This technique has limitations because it assumes that there are always 7 cervical, 12 thoracic, and 5 lumbar vertebrae. Various segmentation anomalies may occur along with thoracolumbar transitional vertebrae, and in these cases, identification of the iliolumbar ligament is not sufficient to accurately identify the L5 vertebral body.[12]

In a series of 4000 patients, Tini et al[18] reported no correlation between low back pain and transitional vertebrae. Multiple studies have shown an increased incidence of disk pathology above LSTVs.[16] Luoma et al[17] reported an increased risk of early degeneration in the upper disk in young patients, but this change was obscured by age-related changes in the middle-aged population. Epstein et al41 described increased disk herniation in adolescents with spinal anomalies, including LSTV.

The use of anatomic markers, including the aortic bifurcation, right renal artery, and conus medullaris has been reported to be least reliable. Although Lee et al[13] report the position of the aortic bifurcation and right renal artery to be reliable landmarks for determining the lumbar vertebral segments on MR imaging and CT, these anatomic markers are widely believed to be less than satisfactory. Although the right renal artery is usually located at the L1–2 disk space, 25% of the time it is either not imaged or is present at another location. Variability may be seen in the position of the aortic bifurcation as it has been found at L4 in 83% of patients.[13] Lee et al have also shown that the conus medullaris should not be used as a landmark because its position is quite variable.

## IV.CONCLUSIONS

LSTVs are common anomalies of the spine necessitating the ability to accurately identify and number the affected segment. Although it has been long contested, there is fairly convincing evidence of an association of low back pain with LSTV. Knowledge of the biomechanical alterations within the spine caused by LSTVs will aid the radiologist in understanding and recognizing the imaging findings seen in patients with low back pain and a transitional segment. Additionally, a thorough understanding of the importance for both accurate enumeration of LSTV and communication to the referring clinician will help to avoid such dreaded complications as wrong-level spine surgery.

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