



ANALYSIS OF ILIOLUMBAR LIGAMENT ON LUMBOSACRAL TRANSITIONAL ANOMALIES

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SUMMARY

Objective: Our aim is to understand if there is a relationship about the numbering of LSTV with iliolumbar ligament or not.

Materials and Method: We inspected 350 lumbar MRI. Any pathologies or traumatic injuries with lumbosacral segment were excluded from the study. We found 58 patient with LSTV and 210 patient as control group without any pathology or segmental anomalies. LSTV patients were classified according to the Castellvi classification.

Results: The ILL originated in 100 % from the L5 vertebra in the control group. The ratio in the Castellvi type I group was 85.7 %. In the type II and higher group, the ILL originated only from L5 is 29.5 %.

Conclusion: We observed that ILL was always present and its origin always involved the last lumbar vertebra but the level of the origin of the ILL is unreliable for identification of the L5 vertebra in the setting of a LSTV type II or higher.

Key words: Lumbosacral transitional vertebra, Iliolumbar ligament, Lumbalization, Sacralization

Level of Evidence: Retrospective clinical study, Level III

INTRODUCTION

If the last lumbar vertebra shows elongation of its transverse process, with varying degrees of fusion to the first sacral segment, it is defined as lumbosacral transitional vertebrae (LSTV) ⁽¹⁰⁾. Bertolotti first described the assimilation of the fifth lumbar vertebra into the sacrum and its association with lower back pain in 1917 ⁽¹⁾. LSTV are common in the general population, with a reported prevalence of 4–21 % ⁽⁷⁾. Lumbar spine magnetic resonance imaging (MRI) can sensitively identify LSTV on based on abnormal morphology of the lumbosacral junction but there is no standard method is established for their numbering ⁽⁶⁾.

During the preparation of lumbosacral spinal surgeries, LSTV must be recognized. Otherwise the level of surgery, incision and trajectory could be incorrect. Many literature reported

that the origin of the iliolumbar ligament (ILL) has been suggested as a reliable identifier of the L5 vertebra as it originates from L5 in 97–100 % of patients without segmentation anomalies ^(2,4,7,11).

We made an observational analyze of ILL on LSTV to understand if there is a relationship with the numbering of lumbosacral vertebrae with LSTV or not.

MATERIALS AND METHODS

We inspected 350 lumbar MRI. Any pathologies or traumatic injuries with lumbosacral segment were excluded from the study. We found 58 patient with LSTV and 210 patient as control group without any pathology or segmental anomalies. LSTV patients were classified according to the Castellvi classification ⁽³⁾ (Table-1).

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RESULTS

The ILL originated in 100 % from the L5 vertebra in the control group. The ratio in the Castellvi type I group was 85,7 %. In the other group, the ILL originated only from L5 is 29,5 %. The other results are listed on Table-2.

Finally we observed that ILL was always present and its origin always involved the last lumbar vertebra but the level of the origin of the ILL is unreliable for identification of the L5 vertebra in the setting of a LSTV type II or higher.

Table-1. Castellvi classification of LSTV

TYPE	DESCRIPTION
Type I	Dysplastic transverse process (unilateral: Ia; bilateral: Ib)
Type II	Incomplete lumbarization /sacralization showing enlarged transverse processes with unilateral (IIa) or bilateral (IIb) pseudarthrosis with the adjacent sacral ala.
Type III	Complete lumbarization/sacralization showing enlarged transverse processes, with unilateral (IIIa) or bilateral (IIIb) fusion with the adjacent sacral ala
Type IV	Mixed (eg, type IIa on one side and type IIIa on the other)

Table-2. Results of our observation according to Castellvi classification

	Control	LSTV Type I	LSTV Type II and more
ILL originating only from L5	210 (100%)	12 (85.7%)	13 (29.5%)
ILL with multiple origins	0 (0%)	2 (14.3%)	28 (63.6%)
ILL with no origins from L5	0 (0%)	0 (0%)	3 (6.9%)

DISCUSSION

LSTV is best identified with a true 30° angled anteroposterior X-ray of the lumbosacral junction together with an anteroposterior view including the thoracolumbar junction to enable assessment of the vertebral level⁽⁶⁾. If an LSTV is suspected on MRI, the decision of whether it represents a sacralized L5 or lumbarized S1 must be made⁽¹³⁾. The true nature of the lower vertebral segmentation can be established only on conventional radiographs that include the thoracolumbar junction so that hypoplastic true ribs may be differentiated from large transverse processes, thus allowing correct identification of the L1 vertebral body⁽⁸⁾.

If inaccurate results occur frequently when the location is only determined from a lumbar radiograph or when MRI is used alone, surgery could be performed on areas other than those intended because the localization of the condition could be potentially flawed^(5,9). The reason for such results in most cases is due to the presence of an accompanying TV. For a TV of the lumbosacral area, an anatomically S1 vertebra that appears morphologically as an L5 vertebra is referred to as lumbarization also an L5 vertebra that appears as an S1 vertebra is referred to as sacralization^(3,5,7,12).

We observed that an ILL was always present and its origin always involved the last lumbar vertebra but the level of the

origin of the ILL is unreliable for identification of the L5 vertebra in the setting of a LSTV type II or higher. When we search the literature we found that Farshad-Farshad-Amacker et al., Carrino et al., Hughes et al. and Lee et al. have made similar studies and our results are supporting them^(2,4,6-7).

REFERENCES

1. Bertolotti M. Contributo alla conoscenza dei vizi di differenziazione regionale del rachide con speciale riguardo all'assimilazione sacrale della v. lombare. *Radiol Med* 1917; 4: 113-144.
2. Carrino JA, Campbell PD, Lin DC, Morrison WB, Schweitzer ME, Flanders AE, et al. Effect of spinal segment variants on numbering vertebral levels at lumbar MR imaging. *Radiology* 2011; 259: 196-202.
3. Castellvi AE, Goldstein LA, Chan DP. Lumbosacral transitional vertebrae and their relationship with lumbar extradural defects. *Spine* 1984; 9: 493-495.
4. Farshad-Amacker NA, Lurie B, Herzog RJ, Farshad M. Is the iliolumbar ligament a reliable identifier of the L5 vertebra in lumbosacral transitional anomalies? *Eur Radiol*. 2014; 24(10): 2623-2630.
5. Hahn PY, Strobel JJ, Hahn FJ. Verification of lumbosacral segments on MR images: identification of transitional vertebrae. *Radiology* 1992; 182(2): 580-581.

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6. Hughes RJ, Saifuddin A. Numbering of lumbosacral transitional vertebrae on MRI: role of the iliolumbar ligaments. *AJR Am J Roentgenol* 2006; 187: W59-65.
 7. Lee CH, Park CM, Kim KA, Hong SJ, Seol HY, Kim BH. Identification and prediction of transitional vertebrae on imaging studies: anatomical significance of paraspinal structures. *Clin Anat* 2007; 20: 905-914.
 8. Liu K-C, Xiang G-Z, Chen G-H, Zhou Y, Cao X-Q, Xia J-D. [CT axial imaging of the iliolumbar ligament and its significance on locating lumbosacral vertebral segments]. *Zhongguo Gu Shang* 2010; 23: 854-858.
 9. Malanga GA, Cooke PM. Segmental anomaly leading to wrong level disc surgery in cauda equina syndrome. *Pain Physician* 2004; 7(1): 107-110 .
 10. O'Driscoll CM, Irwin A, Saifuddin A. Variations in morphology of the lumbosacral junction on sagittal MRI: correlation with plain radiography. *Skeletal Radiol* 1996; 25: 225-230.
 11. Rucco V, Basadonna PT, Gasparini D. Anatomy of the iliolumbar ligament: a review of its anatomy and a magnetic resonance study. *Am J Phys Med Rehabil* 1996; 75: 451-455.
 12. Tini PG, Wieser C, Zinn WM. The transitional vertebra of the lumbosacral spine: its radiological classification, incidence, prevalence, and clinical significance. *Rheumatol Rehabil* 1977; 16(3): 180-185 .
 13. Wigh RE. The thoracolumbar and lumbosacral transitional junctions. *Spine* 1980; 5: 215-222.

