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Case Study

Osseous bridging of lumbar transverse processes causing low back pain: A case report and review of the literature

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Abstract. Congenital or developmental osseous bridging between lumbar transverse processes is a very rare condition which may cause low back pain. Etiology of most of the cases is alleged to be post traumatic in origin whereas congenital nature is much less. The nature of bridging can not be determined just depending on patient's medical history. Radiological findings such as shape and outlines of bridging help in differentiation of congenital and traumatic etiology. We present x-ray and multidedector CT (MDCT) findings of a girl as the youngest to be reported with congenital transverse process bridging in the literature.

Keywords: Anomaly, CT, low back pain, lumbar vertebrae, osseous bridging

1. Introduction

Osseous bridging of lumbar transverse processes is an entity with controversial etiology. Bone bridging is usually asymptomatic while lumbalgia is the most frequent symptom when it becomes symptomatic [3].

In the pertinent literature, etiology of most of the cases is alleged to be post traumatic in origin whereas congenital nature is much less than traumatic and it is mostly reported in adult population [1,3,6]. Trauma may lead to osseous bridging of transverse processes, particularly in the lumbar spine. After trauma, heterotopic ossification develops in surrounding soft tissues leading to bridging or pseudoarthrosis of transverse processes [2,5]. According to congenital/developmental theory, a bony bridge may be formed between two adjacent transverse processes during the ossification of apophysis [1]. Determination of etiology can mainly be feasible by evaluation of radiologic features of bridging.

2. Case report

An eighteen year old female was referred to physical medicine and rehabilitation clinic with a sense of fullness and stiffness in the left low back region and mild low back pain of one year's duration. The pain was aggravated by motion of low back and prolonged hours of standing. Her detailed medical history was unremarkable and there was no back injury in the past.

Physical examination revealed tenderness over the left side of the lower lumbar spine. Motion of lum-

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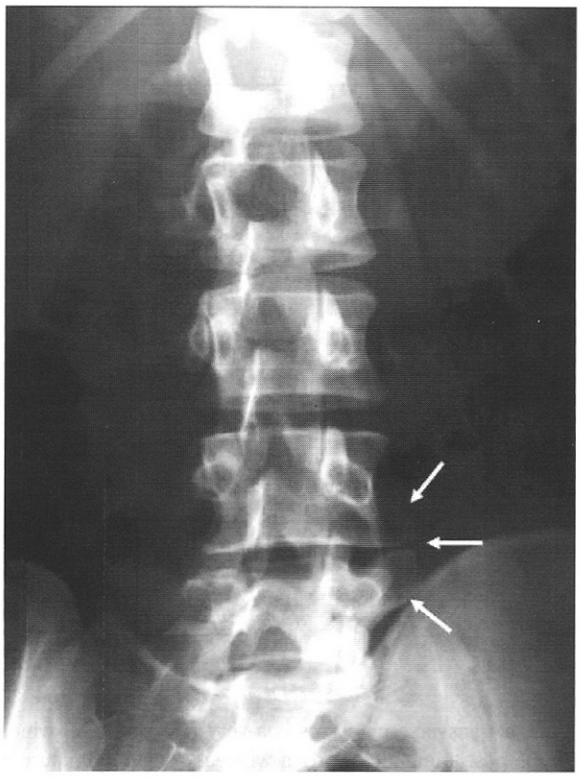


Fig. 1. An AP lumbar roentgenogram shows an osseous bridging between left transverse processes of L4 and L5 vertebras (arrows) and slight rotation of the L5 vertebrae.

bar spine was restricted in extension, left lateral trunk flexion, and rotation. Neurological examination was within normal limits.

An anteroposterior roentgenogram of the lumbar spine demonstrated the presence of osseous bridging between the left transverse processes of the fourth and fifth lumbar vertebrae. There is a slight rotation at the L5 vertebrae and minimal scoliosis at the bridging site. There is no accompanying anomaly such as spina bifida (Fig. 1). Three dimensional reconstructions of CT images in maximum intensity projection (MIP) and shaded surface display (SSD) formats displayed an articulation between left transverse processes of the fourth and fifth lumbar vertebrae (Fig. 2a, 2b, 2c). The left lateral contour of the vertebral body with the bridging transverse processes resembles the shape of the letter 'O'. The components of bone bridge have smooth and regular contours. There was a mild narrowing of the intervertebral space at this level (Fig. 2d) and right foraminal protrusion of the L4–L5 disc. No osteoarthritic changes of L4, L5 vertebrae and joint between the transverse processes were observed. As her symptoms regressed remarkably after medical and physical therapy she refused surgery as a choice of treatment. After one year follow up her symptoms were still present but less disturbing with the help of specific exercises.

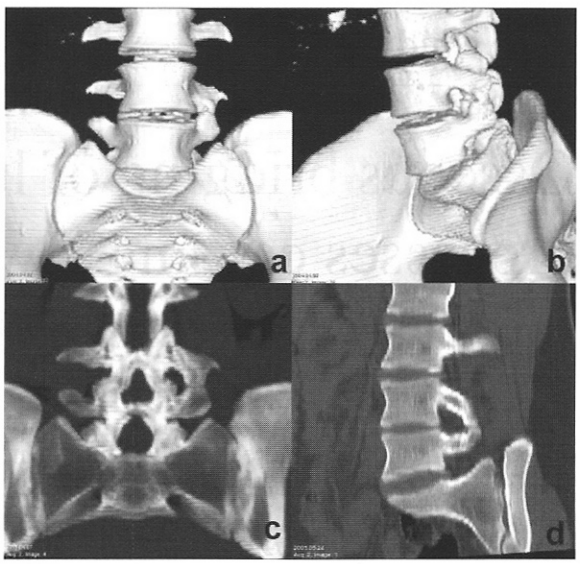


Fig. 2. Three dimensional reconstructions of CT images in shaded surface display (SSD) reconstructions in anteroposterior (2a) and lateral (2b) projections shows 'O' shaped bridging between transverse processes of L4-L5 vertebras. Articulation between left transverse processes of L4-L5 vertebras with regular and smooth contours is demonstrated on coronal maximum intensity projection (MIP) image (2c). A mild loss in L4-L5 intervertebral disc height is seen on sagittal MIP image (2d).

3. Discussion

Osseous bridging between two or more contiguous transverse processes of lumbar spine has traumatic origin in most cases [6]. First cases with congenital etiology were reported in 1956 [3]. In 1991, Billet et al. [1] reviewed 59 cases with osseous bridging between lumbar transverse processes in the literature and added 13 more new cases. They reported that only 11 cases had congenital etiology among overall 72 cases with intertransverse processes osseous bridges. They notified the age of the youngest case as twenty three but the origin of osseous bridge of that case was not obvious.

Transverse process fractures are seen around 7% after blunt abdominal trauma [4] and subsequent development of bridging is seen in only a few of these patients. Billet et al. suggested criteria for differentiation of congenital and traumatic osseous bridges. The localization of the hematoma and myositis ossificans plays an important role in modeling of the bony bridge. The configuration and the shape of traumatic osseous bridg-

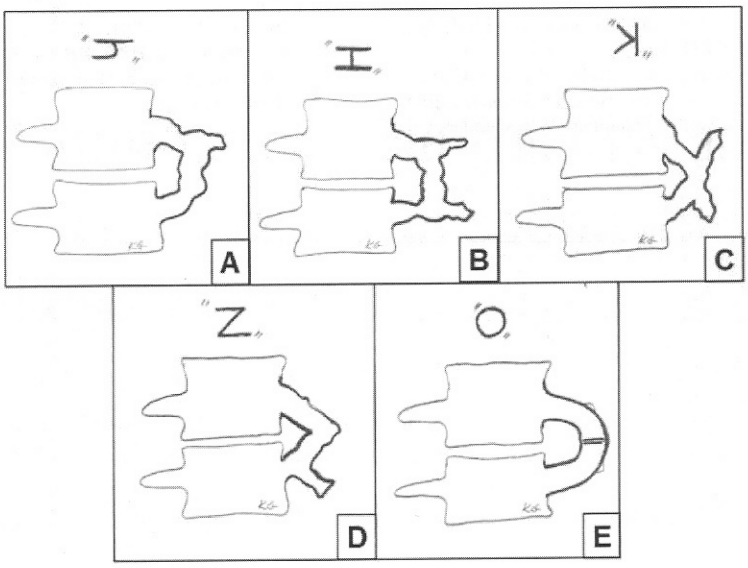


Fig. 3. A schematic drawing of the configuration and the shape of traumatic and congenital osseous bridging of transverse processes. It displays bony bridges of traumatic origin consisting acute angles with irregular and asymmetrical outlines (like the letters "h", "H", "K", "Z") (A-D) and of congenital origin resembling 'O' shape with symmetrical, smooth, regular contours (E) (Adapted from 3).

ing of transverse processes displays figures consisting acute angles with irregular and asymmetrical outlines (like the letters "h", "H", "K", "Z", Fig. 3) [1]. Osseous bridging of congenital-developmental etiology consists of 'O' shape with symmetrical, smooth, regular contours; convexity of the lumbar spine on the contralateral side and absence of degenerative changes in the corresponding intervertebral space. Other congenital skeletal anomalies such as; spina bifida occulta of first sacral segment, rudimentary ribs, six lumbar vertebrae, sacralization of fifth lumbar vertebrae may accompany congenital bone bridges but not obligatory [1,3,6].

The radiologic findings that supports the congenital etiology in this case are the presence of continuity between the vertebral body and transverse process, smooth concavity and curvilinear contours of the left L4, L5 transverse processes, opposition of tips of transverse processes rather than an "en-bloc" formation, resembling the shape of letter "O" and lack of degenerative changes in the adjacent osseous structures. In contrast to theory of Billet et al. [1] there was convexity of lumbar spine at the same side with the bridge in our case.

The minimal right foraminal protrusion of L4–L5 disc detected in our case might be due to imbalanced mechanical stress caused by bony bridging. In spite of presence of minimal right foraminal protrusion of L4–L5 disc, there were no symptoms and findings of neural compression by physical examination in this case.

It might be postulated that if the transverse process of L5 has downward concavity and is making an articulation with sacrum instead of upward concavity and making an articulation with L4 transverse process, it is named as "sacralization". Therefore depending on this similarity, congenital bridging or sacralization might be considered alike in both developmental mechanisms and clinical findings.

In conclusion this rare anomaly should be kept in mind while evaluating lumbar vertebras for the etiology of low back pain in adult population. X-ray and reconstructed CT images can both demonstrate the shape of transverse processes and give information about the nature of bridging. We present imaging findings of a girl with lumbal pain as the youngest case in the literature with congenital bridging of transverse proceses in this report.

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