Case Report

A New Anatomic Variant of T14 Vertebra: A Unique Case Report

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The most common morphologic design of the spine comprises of 24 presacral mobile segments allocated to 7 non–rib-bearing cervical, 12 rib-bearing thoracic, and 5 non-rib-bearing lumbar vertebrae. However, there are significant variations in the number of thoracic and lumbar segments. The authors presented a case of a 65-year-old female with back pain radiating to hips and legs. Plain radiography and magnetic resonance imaging (MRI) of the whole spine revealed fourteen thoracic vertebrae and bilateral ribs, which were found incidentally on preoperative investigation. To the authors' knowledge, it has never been referenced in the literature.

Keywords: Spine variation; T14 vertebra; Supernumerary thoracic ribs; Transitional vertebra

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Imaging of the total spine makes a difference in recognizable proof and precise labeling of the vertebral segments, which is important before a surgical or a percutaneous procedure to dodge wrong-level exposure. The most common morphologic design of the spine comprises of 24 presacral mobile segments allocated to 7 non-rib-bearing cervical, 12 rib-bearing thoracic, and 5 non-rib-bearing lumbar vertebrae. However, there is significant variation in the number of thoracic and lumbar segments[1].

In the present case, an incidental fourteen thoracic vertebrae and bilateral ribs detected on plain radiography and magnetic resonance imaging (MRI) of the whole spine, was reported.

Case Report

A 65-year-old female with no significant past medical history, came to the orthopedic out-patient department with back pain radiating to hips and legs for a year. The patient also had symptoms of neurogenic claudication. Her physical examination demonstrated non-specific findings. Radiography revealed a degenerative process of the lumbar spine with L4-L5 spondylolisthesis. However, it was noted that the thoracic spine comprised 14 vertebrae and bilateral ribs instead of the usual 12 (Figure 1 A, B).

The patient underwent MRI of the spine for preoperative planning. The complementary MRI study of the whole spine showed 26 presacral mobile segments, compatible with 7 non-rib-bearing cervical, 14 rib-bearing thoracic, and 5 non-rib-bearing lumbar vertebrae detected on the prior plain radiography (Figure 2). The other findings included L4-L5 spondylolisthesis with disc protrusion producing severe central canal stenosis and nerve root compression. The patient was informed about anatomic variation that had no need for any specific treatment. For the condition of lumbar spinal stenosis, posterior decompression surgery was the preferred option.

Discussion

During development, each somite differentiates into the dermomyotome, which forms dermis and skeletal muscle, and the sclerotome, which forms vertebral components and their ribs[2]. Twelve paired ribs evolve from cartilaginous costal forms of the creating thoracic vertebrae. Rib development starts at nine weeks then secondary ossification centers emerge at 15 years[3]. When normal development is

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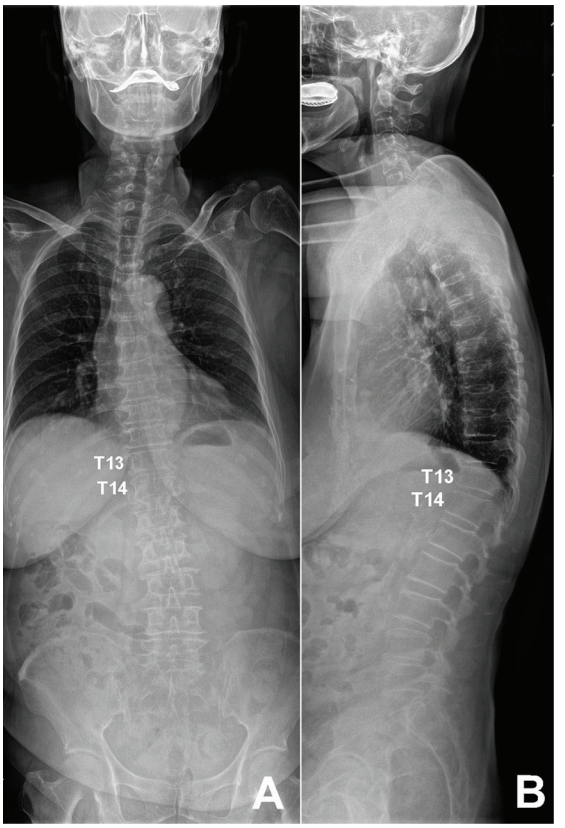

Figure 1. (A) Anteroposterior and (B) lateral radiograph of the whole spine showing 14 thoracic vertebrae and bilateral ribs.

Figure 2. The complementary sagittal T2-weighted MRI of the whole spine showing 26 presacral mobile segments.

disrupted, it can cause abnormal skeletal formation and numeric variation. Vertebral hypersegmentation indicates that embryonic somatization has likewise been abnormal. The presence of a supernumeric thoracic vertebra is very rare and a prevalence has not yet been reported in the literature[4]. The authors reported a unique case of fourteen thoracic vertebrae and bilateral ribs, presented with clinical symptoms of lumbar spinal stenosis. This normal variation was an incidental finding detected on plain-radiography and MRI of the whole spine in preoperative planning for spinal decompression surgery. Plain-radiography and MRI of the whole spine are useful to improve accuracy in spine labelling due to caudal counting from C2 to identify the number of presacral segments. Developmental anomalies of vertebrae and ribs may be isolated or related with other congenital anomalies.

From the literature review, the authors found 75% of 44 patients with tracheoesophageal fistula that have extravertebrae, predominantly in the thoracic spine. Stevenson theorized that hyper-somatization secondary to excessive flexion of the fetus, brought on an increased occurrence of tracheoesophageal fistula[5]. Thirty-one patients with combined esophageal and anorectal anomalies were studied. Piekarski and Stephens found a 74% incidence of vertebral anomalies and 64% of them had extra thoracic or lumbar vertebrae[6].

The reported cases of fifteen thoracic vertebrae and bilateral ribs with associated congenital anomalies and Hirschsprung's disease are found in the literature[7,8]. The authors found that vertebral hypersegmentation had been described in some patients with syndromes of dysmorphogenesis, the VATER association, and other anomalies, even in post-mortem evaluation[4,9-11]. However, a case such as the presenting with fourteen thoracic vertebrae and bilateral ribs without any associated congenital anomalies has not been reported previously, to the authors' knowledge.

Conclusion

The authors reported a case of fourteen thoracic vertebrae and bilateral ribs, which was an incidental

finding in patient that underwent plain radiography and MRI of the whole spine in preoperative planning for spinal decompression surgery. The awareness of this normal variation is of important practical value to avoid wrong-level spinal procedure or surgery.

What is already known on this topic?

There is significant variation in the number of thoracic and lumbar segments. The presence of a transitional vertebra may confuse the clinician and inaccurate numbering of the vertebral segments might cause serious implications in spinal interventional procedure.

What this study adds?

The present case reported a unique case of fourteen thoracic vertebrae and bilateral ribs without other associated congenital anomalies. It was an incidental finding in a patient that underwent plain radiography and MRI of the whole spine in preoperative planning for spinal decompression surgery.

Ethic consideration

The study was approved by Ethic Committee of Naresuan University (IRB No.0877/62) and Buddhachinaraj Hospital.

Conflicts of interest

The authors declare no conflict of interest.

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