Expansion of the Rib Head: A Novel Computed Tomographic Feature of Supernumerary Intrathoracic Ribs

Kosta Başı Ekspansiyonu: Süpernumerer İntratorasik Kosta Tanısı için Yeni BT Bulgusu

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ABSTRACT

Intrathoracic ribs are very rare congenital anomalies. Approximately 50 cases have been reported in the literature till date. They are usually present on the right side, between the third and eighth ribs without sex predominance. They may originate from a vertebral body or the proximal or distal part of a rib. In most cases, they are asymptomatic, but they may be associated with developmental abnormalities of ribs and vertebrae. The diagnosis is important to prevent further investigation or intervention. Here we present two rare cases with supernumerary intrathoracic rib and describe a novel sign, namely expansion of the rib head. To the best of our knowledge, this is the shortest supernumerary intrathoracic rib, reported in the literature, on the left side originating from the head of the second rib, which could have been misdiagnosed as osteochondroma due to its atypical features.

Keywords: Intrathoracic rib, supernumerary, expansion of rib head, computed tomography, congenital anomaly

ÖZ

Intratorasik kostalar çok nadir görülen anomaliler arasında yer almaktadır. Şimdiye kadar literatürde 50'ye yakın vaka bildirilmiştir. Genellikle sağ tarafta ve 3.-8. kosta orjinli olup cinsiyetler arasında sıklık farkı bulunmamaktadır. Vertebra gövdesinden, kostaların proksimal veya distal kesimlerinden köken alabilir. Vakaların çoğunda semptoma neden olmazken kosta ve vertebra gelişimsel anomalisi ile ilişki gösterebilir. Tanının doğru konulması ileri araştırılma veya girişimsel işlemlerin önlenmesinde önemlidir. Bu vaka takdiminde, süpernümerer intratorasik kosta anomalisi olan 2 hasta sunduk ve daha önce tanımlanmamış "kosta başı ekspansiyonu" bulgusunu tanımladık. Hastalarımızdan birindeki atipik bulguları nedeniyle osteokondrom ile karışabilecek süpernümerer intratorasik kosta anomalisi (Sol 2. kosta baş kesminden köken alan) şimdiye kadar tanımlanmış intratorasik kosta anomalileri arasında en kısası idi.

Anahtar Kelimeler: İntratorasik kosta, süpernümerer, kosta başı ekspansiyonu, bilgisayarlı tomografi, konjenital anomali

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Introduction

Intrathoracic ribs are very rare congenital anomalies. They usually occur on the right side between the third and eighth ribs without sex predominance. They may originate from a vertebral body or the proximal or distal part of a rib. In most cases, they are asymptomatic, but they may be associated with developmental abnormalities of the ribs and vertebrae [1]. Diagnosis is important to prevent further investigation or intervention. We present two rare cases of supernumerary intrathoracic rib, which showed expansion of the rib heads. We also present the shortest supernumerary intrathoracic rib reported in the literature. To the best of our knowledge, expansion of the rib heads in supernumerary intrathoracic ribs has not been previously described.

Case Reports

Informed consent was obtained from the patients for the publication of this case report.

Case 1

A 14-year-old girl presented with dyspnea on exertion and fatigue. Complete blood count and biochemical test results were within normal limits. Posteroanterior chest radiography revealed

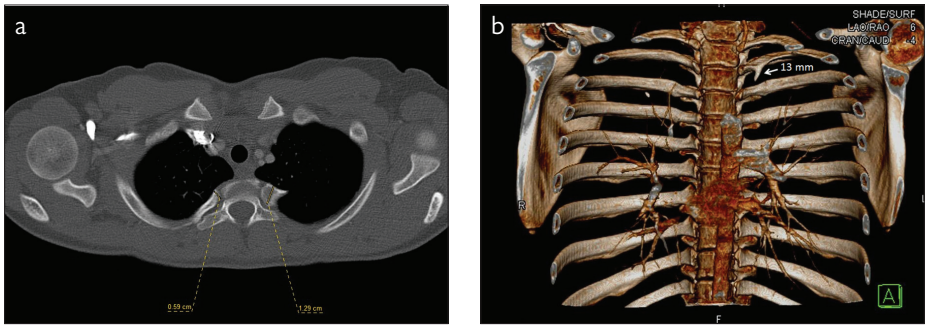

Figure 1. a, b. Axial computed tomography (CT) image at the level of the second rib of a 14-year-old girl showing the diameter of the supernumerary intrathoracic rib head, which is more than twice that of the normal rib head at the corresponding level (a). Volume-rendered CT image demonstrating the shortest (13 mm) supernumerary intrathoracic rib (arrow) originating from the the left second rib head (b).

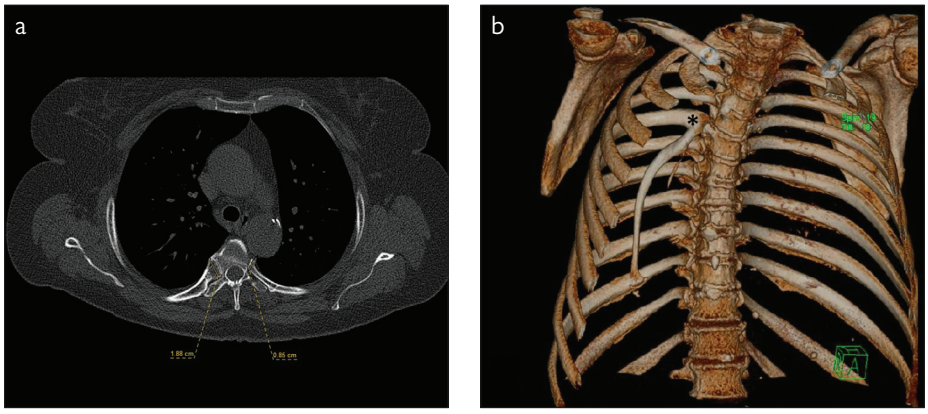

Figure 2. a, b. Axial computed tomography (CT) image at the level of the fifth rib of a 59-year-old woman showing the diameter of the supernumerary intrathoracic rib head, which is more than twice that of the normal rib head at the corresponding level (a). Volume-rendered CT image demonstrating the right-sided supernumerary intrathoracic rib arising from the the right fifth rib head (*) (b).

no pathology. Contrast-enhanced computed tomography showed mosaic attenuation pattern, pectus excavatum deformity with 2.68 Haller index, and downward bony projection arising from the head of the left second rib. The anteroposterior (AP) diameter of the left second rib head was 13 mm, more than twice that of the right second rib (6 mm) (Figure 1a). Volume-rendered image showed that the length of the supernumerary intrathoracic rib was 13 mm, which is the shortest supernumerary intrathoracic rib reported till date (Figure 1b).

Case 2

A 59-year-old woman with cervical paraganglioma was scheduled for surgery. Preoperative chest radiography showed no pathology other than an inward, downward bony projection arising from the head of the right fifth rib. The AP diameter of the right fifth rib head was 19 mm, more than twice that of the left fifth rib (8.5 mm) (Figure 2a). Right-sided supernumerary intrathoracic rib was seen in the volume-rendered image, originating from the head of the fifth rib (Figure 2b).

Discussion

Congenital rib anomalies affect 1% of the population. Although rib anomalies are relatively common, supernumerary intrathoracic ribs are very rare. Since its first description by Lutz in 1947, only approximately 50 cases have been described [2]. Vertebral somites give rise to sclerotomes and dermomyotomes. Sclerotomes form the axial skeleton and all vertebral ribs. Ventral parts of sclerotomes interact with the notochord and neural tube, giving rise to proximal parts of the ribs. On the other hand, the development of distal parts of the ribs depends on the interaction between dorsal parts of sclerotomes and the surface ectoderm. During embryonic development, any abnormal signal that disturbs the interaction is believed to cause congenital anomalies of the rib [1]. As in our cases, the abnormal signal that results in supernumerary intrathoracic rib originating from the head or proximal part also causes some changes in parts that have the same embryonic origin. We recognized that the expansion of the rib head could be a new sign for proximal rib congenital anomalies such as supernumerary intrathoracic ribs, as in our cases.

Bifid costae are congenital anomalies of distal parts of the ribs [3]. We reviewed six cases with bifid costae to see whether the proximal parts were also affected. We found no proximal part abnormality such as head expansion of the rib head, and the proximal parts of the ribs were completely normal. These findings support the different embryological origin of proximal and distal parts.

The morphology of supernumerary ribs resembles that of normal ribs. Smooth cortical bone layer is important to differentiate it from bone tumors such as osteochondroma. Intrathoracic extrapleural fat tissue is usually present around the intrathoracic ribs [4, 5]. Supernumerary intrathoracic ribs have a tendency to project downward and are usually located between the third and eight ribs on the right side. Our first case is unique in its location (the left second rib) and its length (13 mm) and is the shortest supernumerary intrathoracic rib presented till date.

Informed Consent: Informed consent was obtained from patients who participated in this study.

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