

CASE REPORT

THE RARE SKELETAL VARIATION OF THE CONGENITAL BIFID RIB

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Received 29 Jan 2019, Accepted 27 Febr 2019

<https://doi.org/10.31688/ABMU.2019.54.2.25>

ABSTRACT

A bifid rib is a congenital anomaly of the thoracic wall, being presented most commonly unilateral with a higher incidence among male individuals. We present a case of a 4th right rib, unearthed during an educational study of the donated cadavers in the Anatomy Department of the Democritus University of Thrace, Greece. We have studied 251 skeletons, resulting at an incidence of only 0.4%.

Keywords: bifurcated rib, intercostal space, thoracic wall, Gorlin-Goltz, anatomy variations.

RÉSUMÉ

La rare variation squelettique de la côte bifide congénitale

Une côte bifide est une anomalie congénitale de la paroi thoracique, présentée le plus souvent unilatéralement avec une incidence plus élevée chez les hommes. Nous présentons le cas d'une 4^{ème} côte droite découverte lors d'une étude pédagogique sur les cadavres donnés dans notre Département d'Anatomie de l'Université Démocrite de Thrace, Grèce. Nous avons étudié 251 squelettes, pour une incidence de seulement 0,4%.

Mots-clés: côte bifurquée, espace intercostal, paroi thoracique, Gorlin-Goltz, variations anatomiques.

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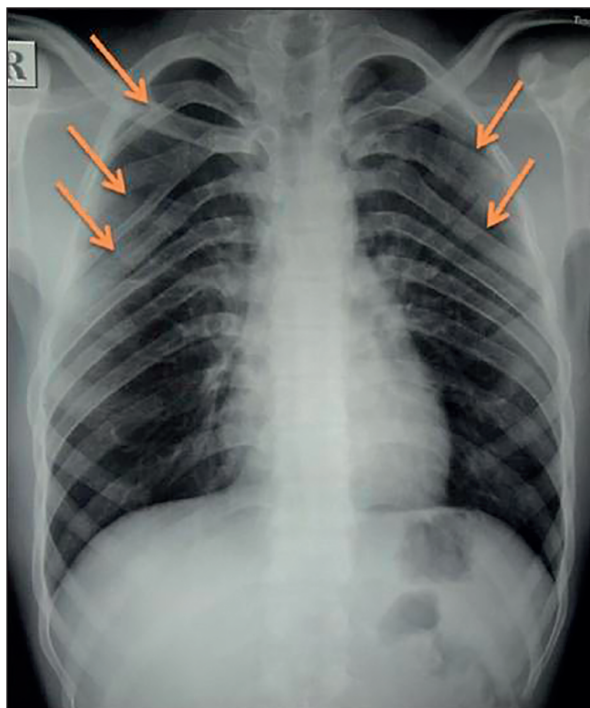


Figure 1. Multiple bifid ribs, published under the license of Open Access Biomedical Images, <https://openi.nlm.nih.gov>, accessed 04/01/2019.

INTRODUCTION

The ribs are bones considered as fundamental structures of the osseous thorax. They develop from the costal process of the developing thoracic vertebrae through endochondral ossification. A bifid rib depicting an additional intercostal space is considered as a quite rare anomaly. This may be caused due to defect or failure during the process of segmentation of the developing somites^{1,2}. So, this is a congenital skeletal variation of the anterior chest wall with an incidence of about 1.2% among the human population³.

Bifid ribs existed since the prehistoric times, as indicated by a research from the Neolithic site of Vinka in Croatia⁴. Most commonly, it appears in the 4th rib as an asymptomatic variation, most usually discovered incidentally by radiologists. However, a cluster of bifid ribs may appear simultaneously (Figure 1)^{3,5}. We present a case of such a bifurcated rib.

CASE PRESENTATION

251 human skeletons of Caucasian (Hellenic) origin were examined during educational study among the skeletons of 4 major cemeteries of the Magnesia region (Volos, Nees Pagases, Nea Demitriada and Agios Georgios, all now placed in the New Central Municipal Cemetery of Volos) under the licence of the Volos Municipal Authorities. Only one case of a



Figure 2. Bifid rib, 4th of the right side of the thorax. The bifurcation starts 15.8 cm from the head (blue line C).

bifid rib is discovered (probably from a male skeleton, pelvic differentiation), with an incidence of 0.4%.

The bifid rib in our case is the fourth of the right part of the thorax, presenting a bifurcation of 15.8 cm from the head (blue line C), with a total length of the upper part of 23.5 cm (black line A) and 25.2 cm of the lower one (black line B) (Figure 2).

DISCUSSION

Bifid ribs represent 20% of all congenital variations of the ribs, with a higher incidence among male individuals and a predisposition in appearance on the right side, usually unilateral⁶. The possible course of a bifid rib and its cartilage result in an additional intercostal space in the thoracic wall, of a fissured or round shape, which may present a misdiagnosis during the physical examination¹. According to the study of Etter and his colleagues, the degree of incidence of bifid ribs are in the order of third-fourth-fifth-sixth-second^{2,7-8}. Others suggest that bifid ribs which depict a sternal end cleaved into two, should be carefully differentiated by the clinicians from the condition of the fusion of two ribs which may give the impression of a bifurcated one¹.

According to the embryology, ribs originate from the mesoderm, and therefore bifid ribs may be associated with other mesodermal abnormalities such as those in heart and kidneys⁹. As a congenital anomaly, they may occur sporadically, presented as an isolated defect, or may be appeared as a part of several genetic syndromes like in Gorlin-Goltz, Jobs and Kindler syndromes¹⁰. The diagnosis of a bifid rib which usually remains asymptomatic, is essential, as it may be misinterpreted during radiological or physical examinations as a tumour of the chest wall or a costal fracture. Careful enumeration of the ribs may

prevent fatal procedures during thoracic interventions³.

CONCLUSIONS

A bifid rib is an uncommon variation of the thorax. Radiologists and thoracic surgeons must be aware of this rare condition in order of a misdiagnosis or a damaging surgical procedure.

Compliance with Ethics Requirements:

„The authors declare no conflict of interest regarding this article“

„The authors declare that all the procedures and experiments of this study respect the ethical standards in the Helsinki Declaration of 1975, as revised in 2008(5), as well as the national law.“

„No funding for this study“

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