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Case Report

A RARE CASE WITH ABSENT SECOND RIB, BIFID COSTAL CARTILAGES AND BIFID XIPHOID PROCESS

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ABSTRACT

Thoracic cage is made up of twelve thoracic vertebrae, twelve pairs of ribs and costal cartilages (CC) and a sternum. Ribs articulate anteriorly with sternum through CC which are flattened bars of hyaline cartilage considered as unossified anterior part of embryonic cartilaginous ribs. Numerical and structural variations of ribs are well documented. In the present study, we observed both structural and numerical variations of thoracic cage, bilaterally. On both the sides, eleven pair of ribs were present, instead of seven, six true ribs were found and second rib with CC was absent. Second and third CC and third CC of right and third CC of left side were bifid. Cartilaginous bridges were present between various CC on both sides. In the midline xiphoid process was found to be bifid. These variations are of immense help to the physicians, surgeons and radiologists.

KEY WORDS: Costal cartilage, Ribs, Sternum, Absent rib, Xiphoid process, Bifid, Cartilaginous Bridges.

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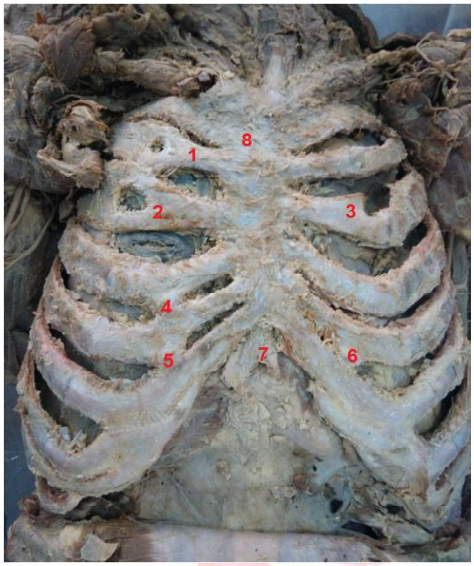
INTRODUCTION

Thoracic cage is made up of twelve thoracic vertebrae, twelve pairs of ribs & costal cartilages (CC) and a sternum. Ribs articulate anteriorly with sternum through CC which are flattened bars of hyaline cartilage considered as unossified anterior part of embryonic cartilaginous ribs. CC of upper seven pairs of ribs join with sternum directly (true ribs) while that of eight to tenth ribs join sternum indirectly through lower borders of adjacent upper CC (false ribs) and CC of eleventh & twelfth ribs do not articulate with sternum or adjacent CC (floating ribs). [1] Numerical and structural variations of ribs are well documented; particularly cervical or lumbar ribs being more common [2].

CASE REPORT AND OBSERVATIONS:

During routine dissection of a male cadaver of approximately 60 years of age for undergraduate students, we observed following variations on anterior aspect of thoracic cage (Fig 1).

Fig. 1: Photograph showing anterior aspect of rib cage.



1, 2: bifid 2nd & 3rd right CC, 3: bifid 3rd left CC, 4, 5& 6: cartilaginous bridges, 7: bifid xiphoid process, 8: manubriosternal junction.

Bilaterally: There were only eleven ribs; and instead of seven, six true ribs were present. At manubriosternal junction there was no marking of CC attachment. Second CC was found to be solely attached with the body of sternum. Seventh, eighth and ninth CC were joining lower border of the adjacent upper CC. Tenth and eleventh ribs were floating.

On right side: Second and third CC were found to be bifurcated. Both limbs of these CC were laterally uniting with each other and continuing as wider plate of second and third ribs (2.1 cm and 4.1 cm wide, respectively) till mid axillary line; beyond which they continued as normal width second and third ribs. In this course, lateral to sternum bifurcated limbs of these CC were leaving an oval gap laterally (horizontal distance 0.8 cm and 2.2 cm, respectively and vertical distance 0.9 cm and 1.3 cm, respectively). These gaps were filled up with external intercostal membrane and internal intercostals muscle. Additionally, a cartilaginous bridge was present between lower limb of second CC and upper limb of third CC, dividing second intercostal space into a medial triangular portion (maximum horizontal distance 4cm and vertical distance 1.6 cm) and a rectangular lateral portion.

Similarly cartilaginous bridge was also present between fourth & fifth and fifth & sixth CC dividing fourth & fifth intercostal spaces into medial triangular (maximum horizontal distances 2.7cm & 4cm, respectively and vertical distances 1cm & 0.6 cm, respectively) and lateral rectangular parts.

On left side: Third CC was bifid with its upper limb represented by a small conical projection, not uniting with any structure. Lower limb of which was continuous laterally with corresponding rib as normal rib course follows. Cartilaginous bridge was present between fifth & sixth CC, medial to costochondral junction, dividing fifth intercostal space into a quadrangular portion medially (maximum horizontal distance of 3.4cm & vertical distance of 0.5cm) and a rectangular portion laterally.

In the midline: Xiphoid process was found to be bifid.

DISCUSSION

Variations of ribs are being classified into numerical and structural varietes. Numerical variations include supernumerary ribs like cervical, lumbar, pelvic or sacral rib or deficient rib. [2] In the present case, at manubriosternal junction there was no marking of CC attachment and six true ribs were present instead of seven, suggesting absence of second rib. The etiology of absence of rib remains unclear. It was hypothesized that insufficient blood supply to the developing rib might result in rib dysplasia during embryonic period.[3] Structural variations of ribs include bifid rib, bridged rib and synostosis of ribs and many more [2,4,5]. Bifid rib and bifid CC are congenital variation of anterior thoracic wall, in which sternal end of rib or CC or both split into two limbs at their lateral end [2]. Prevalence of bifid rib reported in literature varies between 0 .15-3.4 percent [4]. Various authors reported isolated cases of bifurcation of different numbered ribs or CC or both [2, 6-8].Presence of cartilaginous bars [9], absent ribs [3] or xiphoid process variations [10] are described by various authors. Xiphoid anomalies need to be kept in mind while labeling pathological conditions as traumatic fissures or fractures in cross sectional imaging of the sternum [10].

Bifid ribs are indication of presence of systemic diseases like pathologic malformation such as Gorlin-Goltz Syndrome [11] & malignancy in

childhood, congenital bone dysplasia, malabsorption disorders etc [12].

CONCLUSION

Presence of multiple variations in the present case makes it important, interesting and unique. In the present study, we observed both structural and numerical variations on the anterior aspect of thoracic cage on the both sides. These variations are of immense help to the physicians, surgeons and radiologists.

ABBREVIATIONS

CC (costal cartilage)

Conflicts of Interests: None

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