

Synostosis of First and Second Rib: A Case Report

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Abstract: Background: Congenital anomalies of the ribs are rare and they are usually discovered as an incidental finding during routine radiography. Bicipital rib results due to fusion of cervical rib with the first rib or the first rib with the second rib. Its occurrence is not uncommon and more frequently unilateral. Case Description: During routine osteology teaching in the Department of Anatomy, B. J. Medical college, Ahmedabad; it has been observed that one of the first rib was fused with the superior surface of the second rib on the left side, 2.5 cm from the tubercle of first rib obliterating the first intercostal space. Conclusion: Involvement of 1st rib is one of the causes of thoracic outlet syndrome. A rib anomaly usually indicates an underlying systemic disease and might need surgical intervention. Precise knowledge and awareness of such anomalies is important for anatomists, clinicians, thoracic surgeons and radiologists.

Keywords: Synostosis of ribs, Bicipital rib, Fusion of ribs, Thoracic outlet syndrome.

1. Background

The ribs are twelve pairs of elastic arches that articulate posteriorly with the vertebral column. It consisting of highly vascular trabecular bone containing large amounts of red marrow, enclosed in a thin layer of compact bone⁵. The twelve pairs of ribs develop in the ninth week of intrauterine life, from the costal processes of the thoracic vertebrae.⁴ Congenital anomalies of the ribs are rare and they are usually discovered as an incidental finding during routine radiography. Its incidence has been reported to be 0.3% in a study based on chest radiograph². The rib anomalies whether pathological or normal variants such as cervical rib, pelvic rib, bifid rib, bicipital ribs etc., often indicate an underlying systemic disorder.⁶ The present paper is a sincere attempt to highlight its embryological basis, morphological and clinical implication of synostosis of first and second rib.

2. Case Description

During routine osteology teaching in the Department of Anatomy, B. J. Medical college, Ahmedabad; it has been observed that one of the first rib was fused with the superior surface of the second rib on the left side, 2.5 cm from the tubercle of first rib obliterating the first intercostal space. The specimen was examined in detail and photographed and relevant measurements were recorded.

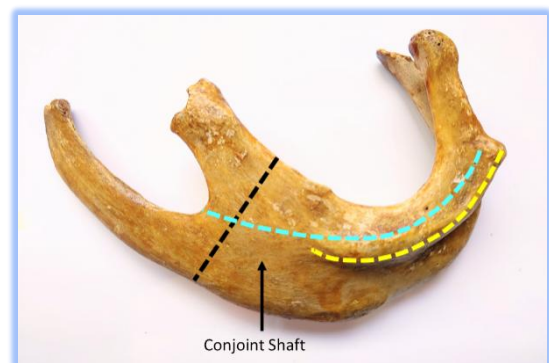


Figure 1: Superior view

- Maximum width of conjoint shaft: 4cm ----- (Fig.1)
- Outline of the outer border of the first rib from its tubercle: 5cm ----- (Fig.1)
- Anterior ends of the two ribs were separated at a distance of 8.5 cm from the tubercle of the first rib. ----- (Fig.1)

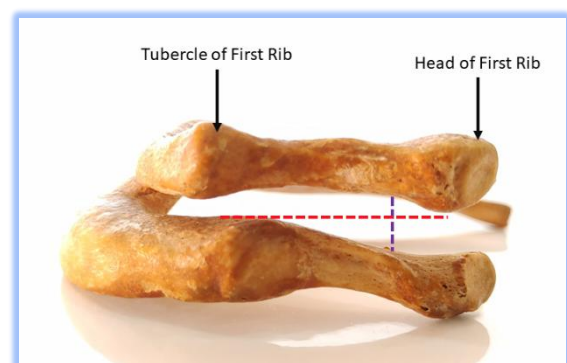


Figure 2: Posterior view

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- Maximum gap separating the neck region of two ribs: 1cm----- (Fig.2)
- Length of cleft from its vertebral end to the tubercle end: 3cm----- (Fig.2)

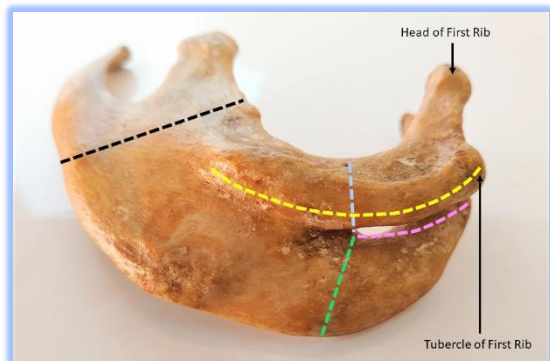


Figure 3: Oblique view

- Length of cleft from the tubercle ends of both ribs to the site of fusion: 2.5 cm ----- (Fig.3)
- Breadth of the shaft of first rib immediately before the fusion: 1.5cm----- (Fig.3)
- Breadth of the shaft of second rib immediately before the fusion: 2cm----- (Fig.3)

3. Discussion

Ribs are developed from the mesenchymal processes of the primitive vertebral arches in the thoracic region. Any malsegmentation of the axial skeleton during the 20th day of intrauterine life may lead to multiple anomalies of the vertebrae and ribs. Mal-expression of some of the myogenic determination factors like MyoD, Myogenin, Myf5 and MRF4 could be the potential cause of these anomalies which were detected in the medial half of somites prior to the myotome formation.⁴ Common congenital rib anomalies can be classified into numerical and structural. Numerical anomalies include supernumerary ribs like cervical, lumbar, pelvic or sacral and deficient pairs like 11 pairs. Structural abnormalities include short ribs; bifid ribs, fused or bridged ribs and pseudoarthrosis of first rib. A rare but well documented cause of thoracic outlet syndrome (TOS) is congenitally fused first and second rib by synarthrosis which may manifest with vascular symptoms due to subclavian vein and arterial compression. Most cases of TOS resulting from first rib aberrations involve hypoplasia of the first rib with fusion at the anterior margin of the second rib, frequently with bony exostosis at this fusion to which scalenus anterior muscle inserts. The exostosis may thereby press surrounding neurovascular structures.³ Rib fusion also causes scoliosis and restriction of chest wall expansion.¹

4. Conclusion

Synostosis of ribs is usually asymptomatic but they may cause musculoskeletal pain or intercostal nerve entrapment. Involvement of 1st rib is one of the causes of thoracic outlet syndrome. A rib anomaly usually indicates an underlying systemic disease and might need surgical intervention. Fused ribs are also encountered in Gorlin's syndrome.⁶ When a

patient presents with the signs and symptoms of neurovascular compression, the possibility of the synostosis defect of the first rib should be kept in mind. when a rib anomaly like bicipital rib is detected, thorough investigations should be done without neglecting any underlying systemic disorder. Precise knowledge and awareness of such anomalies is important for anatomists, clinicians, thoracic surgeons and radiologists.

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Nil

Conflicts of interest

None

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