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Bifid Rib – Boon or Bane

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Abstract

Bifid rib is a rare anatomical anomaly, and it accounts for approximately 1.2 % of all the known rib abnormalities. The bifurcation usually occurs at the sternal end of the rib and its two extremities are joined to a bifid costal cartilage. These anomalies remain asymptomatic and can create misinterpretation during physical or radiological examinations. This case report provides a comprehensive summary about bifid ribs reported in the literature.

Introduction

Bifid rib or bifurcated rib or sternum bifidum is a rare congenital anomaly of the anterior chest wall. It's a rare skeletal abnormality found in 1.2% of humans. While congenital rib anomalies are associated with vertebral defects, bifid rib is generally not associated with vertebral defects. The disease has a predilection for males and is more common on the right side. This anomaly is usually asymptomatic and is diagnosed incidentally; however, it can be associated with rare genetic syndromes such as Gorlin Goltz syndrome. The clinical importance of isolated bifid rib has not been established yet. We report a case series of isolated bifid rib presenting at a peripheral hospital in north-east India. Written informed consent of the patients was taken for the publication of this case report and accompanying images.

Clinical cases

Case 1 was a 36 year old male who was diagnosed to have bifid 3rd right rib while he was being worked up for the varicose vein surgery. The physical examination of the chest and back was normal. X ray of the chest showed bifid 3rd rib (Fig 1) while the X ray of the rib was normal.

Case 2, a 24 year old male was incidentally detected to have bifid rib while he was being evaluated for ventral hernia repair. The clinical examination of the chest and back was unremarkable and chest X ray showed bifid left 6th rib (Fig 2).

Case 3 was a 27 year old male whose X ray Chest was done due to persistent pain in left anterior chest wall. X ray Chest revealed bifid rib (Fig 3 a). He was initially managed as a case of costochondritis, but in view of persistent pain, NCCT chest and spine was done. NCCT chest showed bifid left 4th rib and the vertebrae didn't show any abnormalities (Fig 3 b). He was continued on conservative management with analgesics and physiotherapy to which he responded. He has been on follow up for six months after the diagnosis and has been responding well to the conservative management.

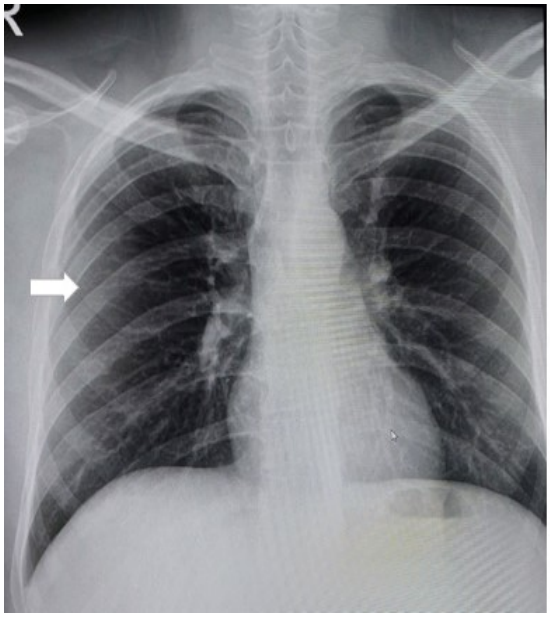

Figure 1.
X Ray Chest PA view showing bifid right 3rd rib.

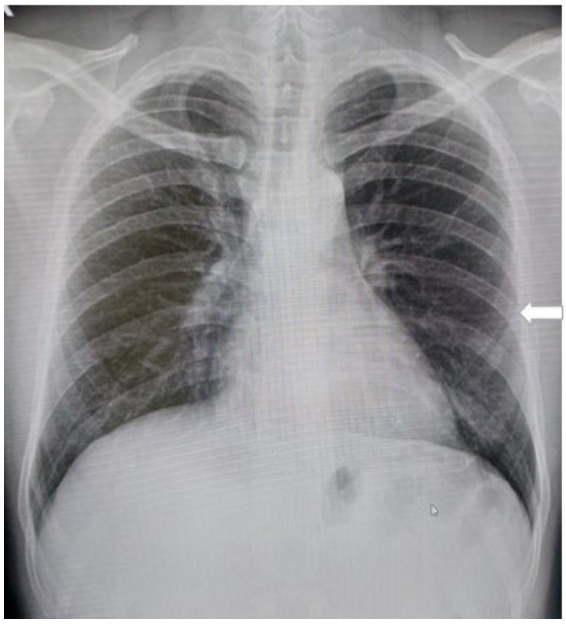

Figure 2
X Ray Chest PA view showing bifid right 6th rib.

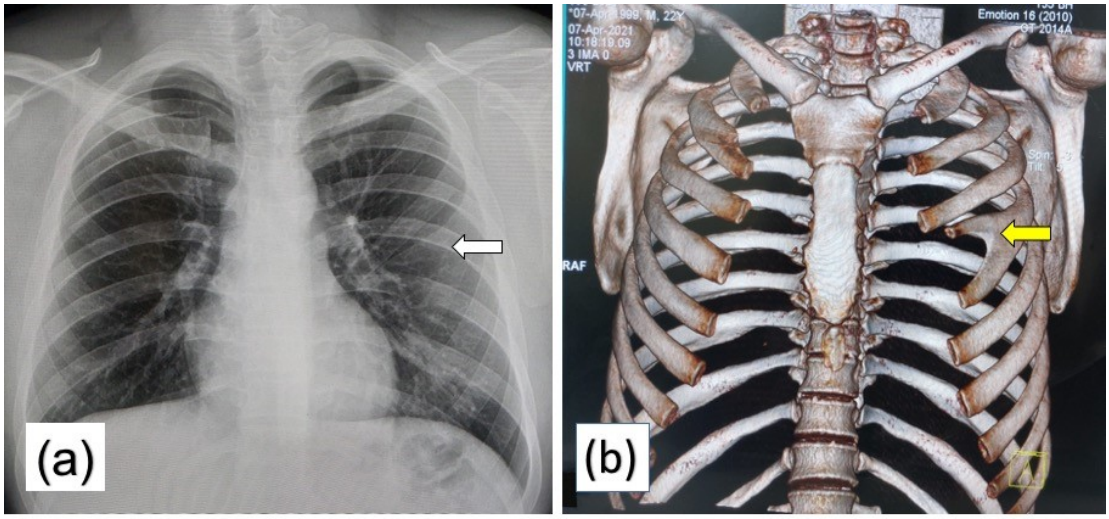

Figure 3.
(a) Chest X ray PA view showing bifid left 4th rib with solid arrow. (b) CT chest showing bifid left 4th rib, marked with yellow arrow.

Discussion

The congenital rib anomalies can be classified into either a numerical anomaly or a structural anomaly. The numerical anomalies include either an extra or supernumerary rib like cervical rib; or there may be a missing rib. The structural anomalies of the ribs include a fused, hypoplastic, forked or bridging rib, short rib, bifid rib and pseudo arthrosis of the 1st rib. [1, 2, 3, 4].

BR is congenital neuroskeletal anomaly in the anterior chest wall, in which the sternal end of a rib is split into two, enclosing an additional intercostal space. It's a rare skeletal abnormality found in 1.2% of humans and it makes up 20% of all the congenital rib defects [4, 5, 6]. BR usually occurs at the junction of the sternal end of the rib and costal cartilage. It has been postulated that mesodermal abnormalities during embryogenesis could be a cause of this anomaly and results from an incomplete fusion of cephalic and caudal segments of sclerotome at around the 4th –6th week of fetal life [4, 7].

BR has a predilection for males as well as the right side of the chest wall. It is more common in the third and fourth ribs and the rate of incidence as per literature is 3rd > 4th > 5th >6th >2nd [4, 5, 7].

BR is asymptomatic in most of the cases and the diagnosis is made incidentally, on X-rays or at post-mortem examination. In contrast to other rib malformations, bifid ribs generally occur in absence of vertebral anomalies. [4, 8]. BR has been associated with genetic syndromes like Gorlin Goltz syndrome, also known as nevoid basal cell carcinoma syndrome. Gorlin-Goltz syndrome is an autosomal dominant condition caused due to mutation in PTCH1 gene. It has a prevalence of about 1 in 57,000. It is characterized by multiple basal

cell carcinomas, craniofacial anomalies like odontogenic keratocysts of the jaw, medulloblastoma & cardiac fibromas in childhood and ovarian fibromas in women. BR merits no treatment in asymptomatic cases however if it's associated with Gorlin-Goltz syndrome further work up and follow up is required to rule out associated malignancies. [9, 10, 11, 12, 13, 14].

The knowledge about bifid rib has clinical significance. Firstly, the ribs and the intercostal spaces provide important surface marking during the clinical examination and also while carrying out many diagnostic and therapeutic procedures. Secondly, BR can be misinterpreted as some other disease of the ribs like the costal fracture and chest wall tumors. [15]

Conclusion

BR is a rare congenital anomaly, more common in males. The anomaly although rare, should always be kept under mind as it may lead to serious misinterpretation during clinical examination. The possibility of this rare skeletal anomaly should be considered while performing clinical examination or procedures as it may lead to serious misinterpretations.

Ethical considerations

This work was developed respecting all bioethical principles, anonymity of the patient and prior obtaining informed consent.

Conflicts of interest

The authors declare no conflict of interest for the development of this article.

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