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Case Report

Cartilaginous bridges between the adjacent costal cartilages – a case report

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Abstract

Formation of additional intercostal space by bifurcation of rib and its cartilage is well documented. But division of the intercostal space by cartilaginous bridges between the adjacent costal cartilages is very rare. We report one such case where the 5th and 6th intercostal spaces divided because of the two cartilaginous bridges between the 5th, 6th and 7th costal cartilages. These cartilaginous bridges uniting the adjacent cartilages were about 2.5 cm broad. Knowledge of this variation is of importance to plastic surgeons, radiologists and other medical disciplines.

Key words [rib] [costal cartilage] [intercostal space] [thorax]

Introduction

Human thoracic cage is made up of 12 thoracic vertebrae, 12 pairs of ribs and the sternum. The 12 pairs of ribs bound 11 pairs of intercostal spaces. Variations in the ribs such as presence of additional ribs, bifurcation of the ribs and costal cartilages and presence of additional intercostal spaces have been well documented [1–3]. A rib develops from the costal process of the developing thoracic vertebra through endochondral ossification [4]. Splitting of mesoderm during development could be the possible reason for formation of bifid ribs. Past reports on the bifid ribs are from cadavers, radiographic examination or from some symptomatic patients.

Case Report

During the dissection classes for medical undergraduates, we found variations in the thoracic wall of a male cadaver approximately aged 70 years. The right 5th and 6th costal cartilages were connected to each other by a cartilaginous bar of one inch width, about 5 cm away from the lateral border of the sternum (Figures 1, 2). After reflection of the upper part of the rectus abdominis muscle, another bridge connecting the 6th and 7th costal cartilages was noted. Lateral end of this bridge was cartilaginous and medial part was fibrous. The fibrous and cartilaginous parts of the bridge were about 5 cm broad (Figure 2). As a result of the cartilaginous bridges, the 5th and 6th intercostal spaces were divided into two parts; a major posterior part and a minor parasternal part. The parasternal parts of the intercostal spaces were about 4 cm long and had the intercostal muscles.

Discussion

Ribs are the essential parts of the thoracic cage that help to protect the underlying lungs and heart, and have an important role in respiration. They can be counted by palpation and are of radiologic importance to the clinicians. Most of the deformities of the ribs can be viewed radiologically though they are hidden under the pectoral and back muscles. Majority of the rib abnormalities are found to be congenital. These include the cervical rib, lumbar rib, forking of the rib and fusion of the adjacent ribs [3]. Supernumerary intra-thoracic and transthoracic ribs have also been reported [5, 6]. Rib bifurcation is more common on right side [7] and in males when compared to females [8].

Though there are a few cases of bifurcated ribs and cartilages, the reports on connection between the costal cartilages through cartilaginous bars are scanty. The knowledge of this may be useful to doctors performing CT scan examination of thorax, percussion, auscultation, thoracentesis and pericardiocentesis. There are three methods of counting

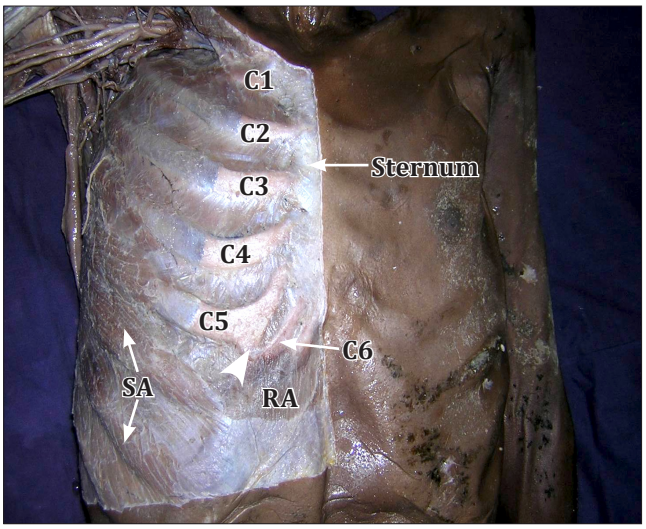

Figure 1. Dissection of the right hemithorax. Skin and pectoral muscles have been reflected to show the *cartilaginous bridge* ***(white arrowhead)*** between the 5th and 6th costal cartilages. ***(C1–C6****: costal cartilages;* ***SA****: serratus anterior;* ***RA****: rectus abdominis)*

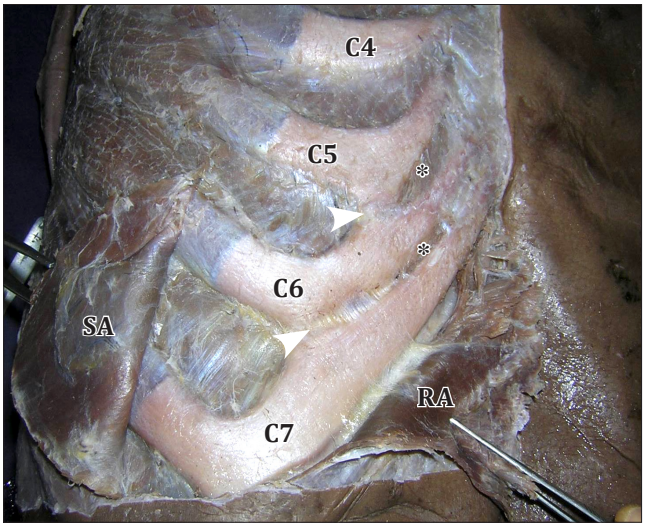

Figure 2. Closer view of the dissection of the right hemithorax. Skin and pectoral muscles have been reflected. ***(C4–C7****: costal cartilages;* ***SA****: serratus anterior;* ***white arrowheads****: cartilaginous bridges between costal cartilages;* ***asterisks****: the parasternal part of the intercostal spaces;* ***RA****: rectus abdominis)*

ribs in the CT scans. These methods make use of the clavicle, sternal angle and xiphoid process as the landmarks [9]. Since the connection between the costal cartilages was at the level of the xiphoid process in our case, it might lead to misinterpretations during the CT scan examinations. The 6th, 7th and 8th costal cartilages are used in the auricular reconstruction surgery [10]. The variation that we are presenting here would prove to be a boon to the individual having additional cartilaginous bridge which could be used instead of the main part of the costal cartilage for this type of surgeries.

In our literature survey, we could not find any such reports where the adjacent costal cartilages were connected by a cartilaginous bridge. We feel that though this variation might not produce any functional disadvantages to the individual, knowledge of the same may be of use to the radiologists, plastic surgeons and cardiothoracic surgeons.

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