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Study on Sterno-Costo-Coracoidian (Pectoralis Minimus).

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ABSTRACT

Presence of accessory pectoral muscles has often been reported in the literature. The present study was carried out on 56 pectoral regions to report the presence of pectoralis minimus. The pectoralis minimus extends between the first costal cartilage and coracoids process. It was lying deep to pectoralis major and superomedial to pectoralis minor muscles. Thoracoacromial vessels were found to be passing between pectoralis minimus and pectoralis minor. Pectoral muscle anomalies may be mistaken for masses or tumours during CT or MRI scans and also difficult for surgeons during pectoral flap surgeries, in breast reconstructive surgery or during breast augmentation

Keywords: pectoralis minimus, clavicle, costal cartilage

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INTRODUCTION

The discovery of anatomic variations in the anterior thoracic region has been well documented in the literature since the nineteenth century. One of the rarely reported muscle variant is pectoralis minimus (Sterno-costo-coracoidian). The pectoralis minimus muscle extending between the first costal cartilage and the coracoid process (Fig.1). Some investigators have reported about the presence of a pectoralis minimus muscle. They state that the variant muscle was lying under the pectoralis major muscle and was medial to the pectoralis minor muscle [1, 2]

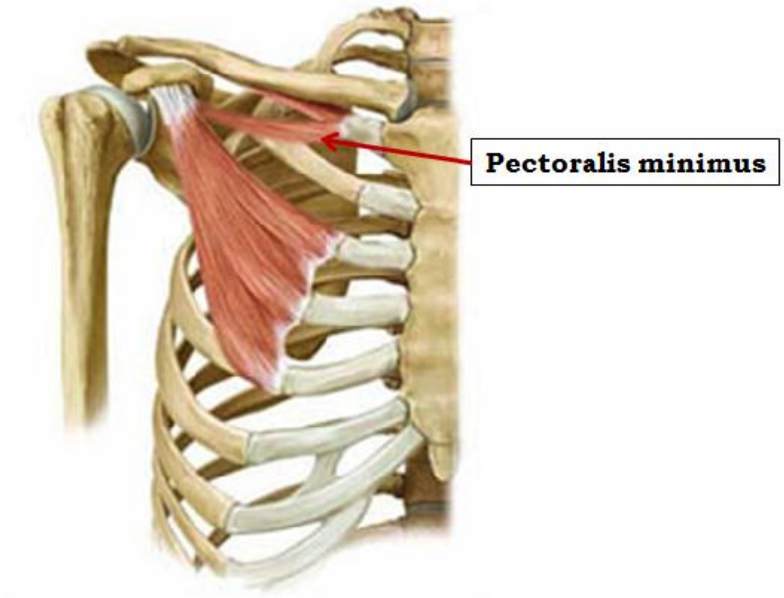

Fig 1: shows the pectoralis minimus

MATERIAL AND METHODS

The present study was carried out on 56 pectoral regions (28 right and 28 left sides) of both sexes of different age groups used for routine dissection in Anatomy department at Sri Siddhartha Medical College, Tumkur, Karnataka. The dissection was carried out according to the cunningham's manual of practical anatomy. The skin, superficial fascia, deep fascia (pectoral fascia) was dissected and reflected. Clavipectoral fascia was identified & dissected. The origin and insertion of the pectoralis major and minor were carefully observed. Innervation of the pectoral muscles were noted and retained. During this dissection an accessory pectoral muscle ie pectoralis minimus was identified.

RESULTS

Out of 56 pectoral regions which were dissected, we found three pectoralis minimus muscle (5.35%) 2 on right and 1 on left side. All the three pectoral minimus arose from the first costal cartilage and inserted into the coracoids process lies deep to pectoralis major & superiomedial to pectoralis minor. Origin is muscular whereas insertion is tendinous. Out of three muscles 2 were bulky and muscular (Fig.2 & 4) and one (Right) was very thin (Fig.3). Clavipectoral fascia was found enclosing the pectoralis minimus along with subclavius. Thoracoacromial vessels were found to be passing between pectoralis minimus & pectoralis minor. All the three muscles were supplied by lateral pectoral nerve (Fig.5). The lateral pectoral nerve before supplying the pectoralis major gives a twig to pectoralis minimus. No variation was found in insertion.

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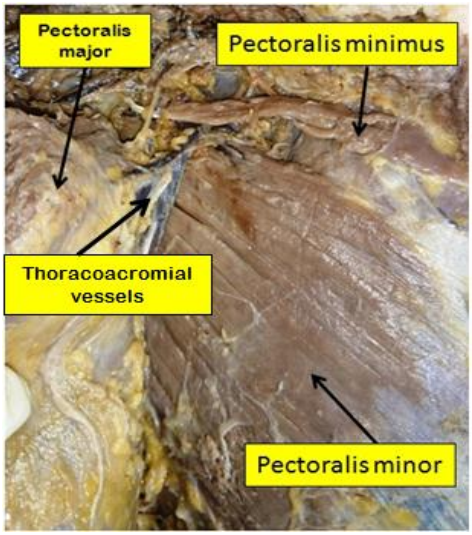

Fig 2: Right Side Pectoralis Minimus

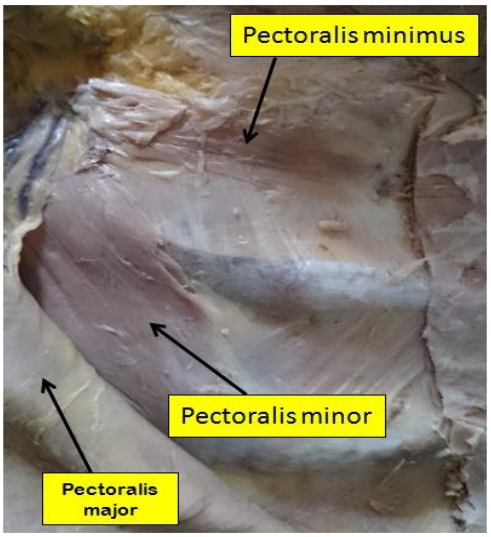

Fig 3: Right Side Pectoralis Minimus

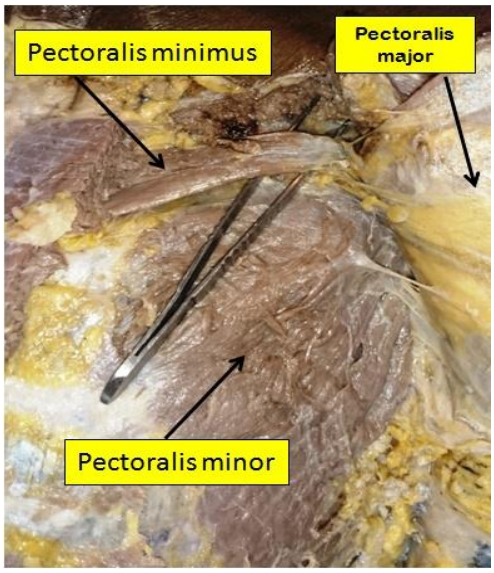

Fig 4: Left Side Pectoralis Minimus

Fig 5: Nerve Supply of Pectoralis Minimus

DISCUSSION

Among the ventral muscles of the shoulder girdle, the pectoralis major and the minor muscles are the most important. Both muscles contribute to the formation of the chest wall. The pectoral muscles connect the upper limbs to the thorax. The pectoralis major is a triangular muscle that has a clavicular head and a sternocostal head. The clavicular head originates from the anterior surface of the medial half of the clavicle & sternocostal head orginates from the anterior surface of the sternum, costal cartilages of the 2nd to 6th ribs and the aponeurosis of the external oblique muscle. The pectoral major inserts on the lateral lip of the intertubercular groove of the humerus. The pectoralis minor is a thin muscle lying deep to the major, arises from the 3rd, 4th, & 5th ribs near their costal cartilages and converges in a triangular pattern before insertion into the coracoids process [3]. Complete or partial absence of the pectoralis muscles are frequently reported in the literature.

Embryological Explanation:

From an evolutionary point of view, the pectoral muscles develop from the pectoral premuscle mass. This pectoral premuscle mass lies in the lower cervical region on the medial side of the arm bud. It is widely

continuous with the arm premuscle sheath, and lies almost entirely anterior to the 1st rib. In an CRL:11 mm (crown rump length) embryo it reaches about the level of the 3rd rib, but the two muscles still form a single columnar mass attached to the humerus, to the coracoid process, and to the clavicular rudiment. As the mass differentiates, it flattens out and extends caudoventrally to the region of the distal ends of the upper ribs. The caudal end of the muscle extends near to the tip of the 5th rib and the muscle begins to assume the adult form, with fibres arising from front of the upper five ribs and sternal angle as well as from the clavicle. At this stage the proximal portion of the muscle has split into the major and minor portions, the one attached by tendon to the humerus and the other to the coracoid process. Both muscles fuse together near the costal attachments. In a CRL: 16 mm embryo the two muscles are quite distinct, the pectoralis major now extending to the 6th rib and showing a distinct cleavage between the costal and clavicular portions. The pectoralis minor muscle has now its distinct attachment to the 3rd, 4th & 5th ribs. If this embryological origin persists later in adulthood that's what we had found. However, some endogenous and exogenous factors can cause total or partial agenesis of pectoral muscles or development of various abnormalities [4].

Various malformations or variations of the pectoral musculature have been reported so far. Most commonly anomaly of pectoralis major is its complete deficiency, which is described as Poland syndrome which is characterised by unilateral absence of pectoralis major and cutaneous syndactyly [5]. A sternalis arises from the sheath of the rectus abdominis muscle, aponeurosis of the external oblique muscle, pectoralis major muscle or costal cartilages and ends above into the upper costal cartilages, manubrium or may be joined to the sternal head of the sternocleidomastoid muscle [6].

Presences of Accessory pectoral muscles are also reported in literature. Accessory pectoral muscles may present either superficial to pectoralis major or intervene between pectoralis major and pectoralis minor muscles. If accessory pectoral muscles intervene between the pectoralis major and minor, it may be named according to their attachment.

Pectoralis quartus origin as a flat tendon from costochondral junction of 5th and 6th rib passes under the pectoralis major and the insertion as pectoralis major or the tendon of the short head of the biceps muscle [7]. Similarly Philip A Fabrizio et al (2009) also reported the presence of the pectoralis quartus. Philip noted that pectoralis quartus had originated from 5th costal cartilage and inserted into the fascia which overlay the coracobrachialis muscle. He also noted an accessory muscle which was found just lateral to the pectoralis minor which had originated from external abdominal oblique muscle and inserted into coracobrachialis fascia deep into insertion of pectoralis quartus [8].

Pectoralis intermedius contrary to this arises from 3rd and 4th ribs and merges with the tendon of short head of biceps brachi [7]. Pectoralis minimus extending between the first costal cartilage and the coracoid process, lie deep to pectoralis major and superomedial to pectoralis minor.

In the present study, we found three pectoralis minimus muscle (5.35%) 2 on right and 1 on left side. Out of which 2 were bulky and muscular and one (Right) was very thin. It was noted that all the three pectoralis minimus muscle were innervated by lateral pectoral muscles. This variant is notable because the thoracoacromial vessels pass between pectoralis minimus and pectoralis minor, and patients can have vascular symptoms with hyperextension of the arm. Hyperabduction and lateral rotation of the shoulder is most likely to press and excessively stretch the neurovascular structures, thereby giving rise to neurological and vascular symptoms in the arm [2].

The presence of these variants may present challenges to clinicians and surgeons unfamiliar with their frequency and morphology. For example the sternalis muscle due to its parasternal location, may be misinterpreted as a malignant mass on a routine mammogram which could potentially lead to more invasive testing. Pectoral muscle anomalies may be mistaken for masses or tumours during CT or MRI scans and also critical and difficult for surgeons during pectoral flap surgeries, in breast reconstructive surgery or during breast augmentation [9].

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CONCLUSION

Anatomy of this region and possible variation should be borne in mind. Knowledge of these are important to surgeons for preventing complications during surgery and henceforth from the outcome of surgery.

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