

A STUDY OF MORPHOLOGICAL VARIATION OF ANTERIOR CHEST WALL MUSCULATURE: RECTUS THORACIS BIFERCALIS

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ABSTRACT

Introduction: The Sternalis muscle (Rectus Sternalis muscle) is an uncommon variant of the human anterior thoracic wall musculature.

Aim: A cadaveric study was conducted to report the incidence and morphological features of sternalis muscle. The rare occurrence of rectus sternalis might be very informative and helpful in various clinical and academic fields.

Materials and Methods: The present study was undertaken in 32 formalin fixed adult human cadavers in the department of anatomy to find out the incidence of sternalis muscle.

Conclusion: The incidence of rectus sternalis in the present study was estimated as 3.2 %. Although a rare muscular variation, because of its resemblance to a soft tissue mass on radiological evaluation, it gained popularity among Anatomists, Radiologists and Surgeons. Hence its presence causes implication during mastectomy, implant reconstruction surgeries of mammary gland and modifying the approach during mammoplasty.

KEY WORDS: Sternalis, Rectus Sternalis, Rectus Thoracis bifurcalis, Unilateral.

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INTRODUCTION

Generally Anatomists are interested in rare unusual variations. But the same variation gains popularity among clinicians if it mimics a pathology. One such variant is the Rectus Sternalis muscle, which is a thin, long Strap like vertical muscle band in the anterior thoracic wall, lying superficial to sternocostal fibres of pectoralis major, with an incidence of 8% [1].

The muscle takes origin as a superficial slip (or) slips from lower costal cartilages and rectus sheath to blend with sternocleidomastoid (or)

to attach to upper sternum (or) costal cartilages [2]. This muscle has never been related to any clinical symptoms; however, its presence may evoke alterations in the electrocardiogram and may cause breast or chest asymmetry [3]. As the muscle presents many variations on radiological studies, the radiologist must be aware of all these variations to avoid misdiagnosis as a tumour or recurrence after surgery in breast cancer patients. Being the muscle with more morphological relevance, it can be used for reconstruction procedures of breast and head & neck region.

MATERIALS AND METHODS

The present study was carried out on 32 formalin fixed adult human cadavers. Out of 32 cadavers, 26 were male and 6 were female cadavers. The human cadavers were used for teaching the under graduate medical students in the department of Anatomy at Govt Mohan Kumaramangalam Medical College, Salem. A detailed cadaveric study of the anterior chest wall especially pectoral region was carried out. Any muscular variation in the paramedian region of anterior chest wall was observed and its attachments, nerve supply, morphological features were noted and photographs were taken. The length and breadth were measured.

RESULTS

Fig. 1: Photograph of anterior thoracic region displaying the following: RS- Rectus Sternalis Muscle, PM – Pectoralis Major Muscle, EO – External Oblique Aponeurosis, RSCM – Right Sternocleidomastoid Muscle, LSCM – Left Sternocleidomastoid Muscle, JN – Jugular Notch.

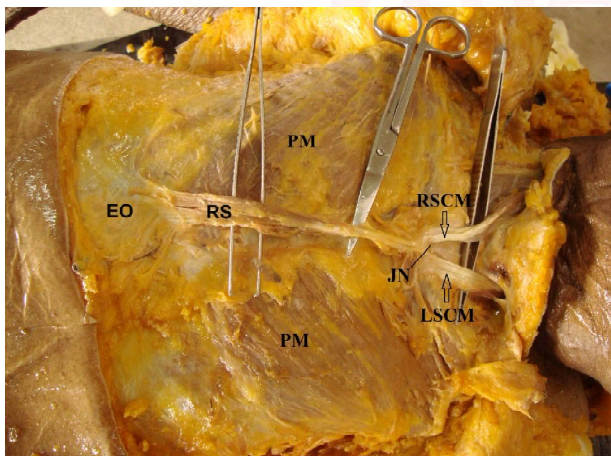


Fig. 2: Photograph displaying the nerve supply to the muscle: RS - rectus sternalis muscle, ICN – intercostals nerve.



Present study shows the presence of Rectus sternalis muscle, in a 70 year old female cadaver. The muscle was situated on the anterior thoracic wall on the right side of the sternum in the paramedian position. The muscle was deep to skin and superficial fascia but superficial to pectoral fascia and sternocostal fibres of pectoralis major. The muscle was vertically placed taking origin from external oblique aponeurosis within the anterior layer of rectus sheath at the level of seventh intercostal space (Fig 1). Then it ran upwards along right lateral border of sternum and was fleshy here. It forms a tendon at the level of second costal cartilage. At the sternal angle, the tendon bifurcated into two diverging bands which were continuous with the respective sternocleidomastoid muscle. The muscle derived its innervation from third and fourth Intercostal nerves (Fig 2), which emerged from its lateral border. It measured 13 cm long and 1.5cm wide. The ipsilateral pectoralis major muscle and contralateral chest wall musculature were normal.

DISCUSSION

The sternalis, a rare muscle was first coined by Carbriotus in 1604 and was described accurately in 1726 by Dupuy (1). It has been studied with various synonyms by the anatomists which includes episternalis, rectus thoracis and superficial rectus abdominis [4]. It is also referred as the presternalis, abdomino-guttural, abdomino-cutaneous, sternalisbrutorum or thoracicus and also known as cutaneous pectoris [5].

Embryologically, the muscle is derived from ventral longitudinal myotonic hypomeres from which infrahyoid muscles of the neck and rectus abdominis are derived(6). Morphologically, it may be a remnant of panniculus carnosus [7] (or) from pectoralis major innervated by pectoral nerves [8] or from Rectus abdominis innervated segmentally by intercostal nerves [9]. The muscle of present study was innervated by third and fourth intercostal nerves which ascertains its origin from Rectus abdominis.

It can be regarded as "Rectus Thoracis" as it is confined to the thoracic wall and is continuous with ventral longitudinal sheet of trunk muscles

[10]. Here it can be called as "Rectus thoracis bifurcalis" as it bifurcates at the level of sternal angle into two diverging bands and continuous with sternocleidomastoid which coincided with Vandana Mehta [11].

According to Barlow, the incidence of sternalis muscle is 11% in Asians, 2% in Europeans 6% in Afro-Americans [7]. Shah found out the incidence as 4 to 8% in Indian population [12]. Another study conducted by Bharathi et al, revealed the incidence to be 2.5% [13]. According to Sumalatha et al, the incidence is 3.3% [14]. The present study showed the incidence is 3.2% which is closest to the above study.

It gained popularity among clinicians, surgeons and radiologists as it leads to diagnostic confusion. In mammogram, its appearance as tumour, which may sometimes leads to unnecessary open biopsy. During mastectomy, there is a possibility to miss the breast tissue present deep to the muscle, and also this may be mistaken as recurrence during follow-up⁽¹⁵⁾ In case of breast carcinoma, the presence of sternalis muscle might affect the depth of irradiation of internal mammary nodes [3].

In spite of its different origin, incidence and clinical confusions, it has hardly any functional significance unless it is of large size replacing the absent pectoralis major [16]. Even though this is a functionally inactive muscle, anatomists emphasize about its variation in order to create awareness among the clinicians. Sometimes its association with anencephaly (48%) and adrenal gland anomalies is observed [17].

Preoperative diagnosis of this muscle is difficult as it varies from few muscle fibres to an aponeurotic band. Hence if it is diagnosed preoperatively, it can be utilized as a flap. Infact conjoint sternalis-pectoralis muscle flap in immediate tissue expander reconstruction after mastectomy was offered by reconstructive surgeons [18]. It is also useful to hold prosthetic implants in position by constructing suitable submuscular pocket in aesthetic breast augmentation surgeries [19]. Hence the knowledge of this muscle becomes inevitable for surgeons and radiologist.

CONCLUSION

Rectus thoracis bifurcalis or sternalis, a rare

subcutaneous vertical strap like muscle present with an incidence of 3.2%, creates bewildering situations among radiologists and surgeons. Despite its rarity, this muscle is reported here because of its potential to create significant impact on clinical diagnosis and patient management.

Conflicts of Interests: None

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