

Morphology of Rectus Sternalis: A Cadaveric Study

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Abstract: The Rectus Sternalis is a rare anatomic variant muscle in the anterior chest wall. Its overall incidence is 3-5% worldwide. The present study was conducted on 40 cadavers in the Department of Anatomy, Rajarajeswari Medical College & Hospital to evaluate the incidence of Rectus sternalis. We observed a case of Rectus sternalis in an adult male cadaver. The frequency of this variant muscle on the basis of our study is 2.5%. The Knowledge of this variant muscle is necessary for morphologists but more importantly for clinicians & radiologists as it avoids misinterpretation of mammographic findings.

Keywords: sternalis muscle, anatomic variation, chest musculature, mammography.

I. INTRODUCTION

The rectus sternalis muscle is an uncommon anatomic variant muscle in the anterior thoracic region, lying superficial to the sternum and the sternocostal fascicles of the pectoralis major muscle. The first report on the literature about the sternalis muscle was done by Cabrolus (1604), but its formal description was done only in 1776 by Dupuy [1]. This muscle has been reported in both males and females, and with a variable frequency in different ethnic groups [2].

The incidence of sternalis varies widely between nationalities with maximum frequency of 23.5% reported in Chinese population and minimum prevalence (1%) in Taiwanese [9]. Some authors have reported an overall incidence of 3-5% worldwide [3,4].

The occurrence of the sternalis muscle, in most cases, is unilateral and, when it is present, the muscle has its origin on the superior part of the manubrium of sternum and its insertion is localized on the superior part of the rectus abdominis muscle. The sternalis muscle's innervation is derived from perforating branches of the intercostals nerves and its blood supply is derived from perforating branches of the anterior intercostals arteries.

It is insufficiently mentioned in most of the anatomical textbooks, although it has been well described in the literature. An attempt has been made through this study to evaluate the incidence of rectus sternalis in South Indian population.

II. MATERIAL & METHODS

The present study was done on 40 formaldehyde fixed adult human cadavers over the period of 3 years in the Department of Anatomy at Rajarajeswari Medical College and Hospital, Bangalore. These cadavers were used for teaching medical students. Out of 40 cadavers, 32 were males and 8 were females. Prior approval of institutional ethics committee was taken.

Routine dissection of pectoral region was performed as per the guidelines. Rectus sternalis, a rare variant muscle if observed was studied for its proximal & distal attachment, nerve & vascular supply.

III. RESULTS

During dissection of pectoral region in a male adult cadaver, we found a rectus sternalis on right side of pectoral region. Topographically it was a longitudinally oriented muscle on the right half of the sternum on the anterior thoracic wall. The muscle was superficial to the pectoral fascia and sternocostal fascicles of the pectoralis major muscle. The proximal attachment of the muscle is to the superior part of the anterior surface of sternum & distal attachment to the anterior lamina of rectus sheath in the form of an aponeurosis as shown in Fig. 1.

The rectus sternalis had a length of 14.4 cm (from the sternal angle to the distal insertion) and a maximal width of 2.6 cm. It is supplied by two anterior cutaneous branches of intercostals nerves and blood supply is derived from the perforating branches of internal thoracic arteries.

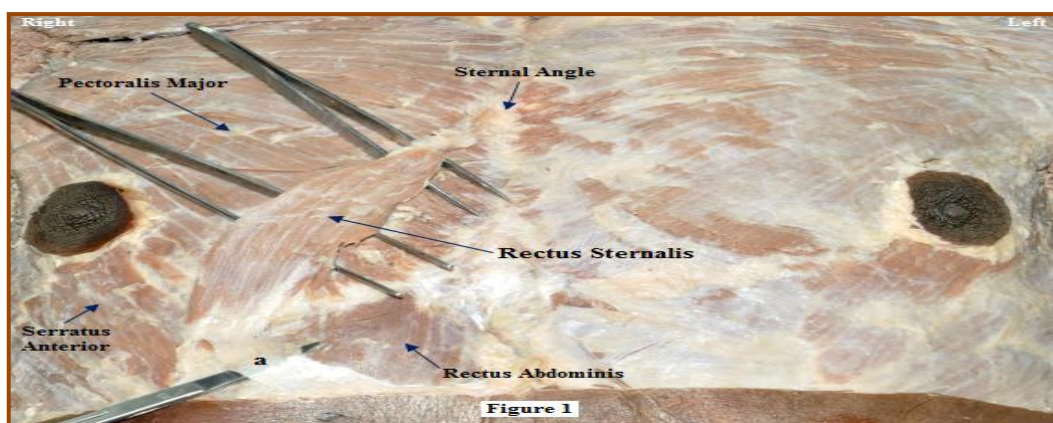


Fig. 1. Anterior thoracic region of the cadaver showing the proximal and distal attachment of rectus sternalis. (a - aponeurosis extending from rectus sternalis to the rectus sheath)

IV. DISCUSSION

Recent reports by Scott-Conner and Al-Jurf [5] and Bailey and Tzarnas [6] indicate that despite numerous descriptions of the sternalis muscle in the literature, the muscle is relatively unknown by clinicians.

The sternalis muscle is present, in most cases, on the anterior chest wall, beside the sternum. Its origin is in the superior part of the manubrium of sternum and its insertion is localized in the anterior lamina of the rectus abdominis muscle or in the external oblique muscle, in the costal cartilages and in the anterior faces of the ribs [7].

The longitudinal parasternal location of sternalis muscle suggests it represents an aberrant extension of Rectus abdominis muscle; however it is always superficial to rectus abdominis and not continuous with it. The author further claims that the sternalis muscle represents the remains of the panniculus carnosus or to be a variant of pectoralis major [4].

Rectus sternalis is also described as part of a ventral longitudinal column of muscle arising at the ventral tips of the Hypomeres represented by the infrahyoid muscles in the neck, rectus abdominis in abdomen and occasionally by sternalis in thorax [8].

The following table depicts its incidence which varies among different ethnic groups though its overall incidence is 3-5% worldwide.

TABLE I: Frequency of occurrence of sternalis according to various studies

Study	No. of cadavers examined	Rectus sternalis found	Frequency (%)
Jelev	102	3	2.9
Saeed ⁷	75	3	4
Deepa ¹⁶	50	1	2

In general, when a muscle contracts the insertion is pulled toward its origin. Therefore, because of its particular location, it has been suggested that contraction of the sternalis muscle can elevate the lower part of the chest. Thus, sternalis plays only an accessory role in this function [9]. According to a recent review by Bradley et al [10], the sternalis muscle is identified in only four of approximately 32,000 patients during mammography screening. The sternalis can present alterations on the ECG [11] or occasionally be wrongly interpreted as a mass requiring surgical resection.

It is occasionally observed as an irregular focal density in the medial aspect of mammograms and provokes serious difficulty in mammographic interpretation [12], [13]. However improved mammographic positioning and application of CT & MRI can establish the presence of this uncommon variant muscle with certainty [14].

Presence of rectus sternalis may interfere with the submuscular pocket dissection when an intraalveolar or Submammary approach is used. This muscle can also be used for reconstruction surgery after mastectomy [15].

V. CONCLUSION

Anatomical variations such as rectus sternalis may cause confusion or sometimes iatrogenic injury. Thus anatomical knowledge is essential for operating surgeons. Further emphasis has to be laid on its clinical anatomy. The present study has shown its incidence to be 2.5% in south Indian population.

This anatomic variant muscle has puzzled radiologists and surgeons in confirming diagnosis or mistaking it for a tumour on mammography or CT scan. Since anatomy is auxiliary to surgery, it is important for the surgeons and also radiologists to be aware of this variant muscle.

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