

A Unilateral Rectus Sternalis: An Important Variant in the Thoracic Region

Dr. Patel M M*, Dr. Singel T C**

*Associate Professor, ** Professor and Head, Department of Anatomy, MP Shah Medical College, Jamnagar

Abstract : During a routine dissection in the Anatomy dissection hall, a unilateral muscle was observed on the left thoracic wall present superficial to pectoralis major muscle. The name of this muscle was Rectus Sternalis muscle and the history of the development of the rectus sternalis muscle provided with interesting explanations by different authors and even in the Anatomy textbooks. Since this muscle was found for the first time in five years by dissecting 70 cadavers, it is considered as a very rare anomaly. The description of rectus sternalis muscle might provide useful details for clinicians exploring the pectoral region.

Key-words: Anatomy dissection , rectus sternalis , Unilateral

Corresponding Author: Dr. M M Patel, "Mital" Park Colony, Bedi Bandar Road, Jamnagar. e-mail: myocyte2002@yahoo.co.in

INTRODUCTION: The prevalence of any variation in the normal anatomy of the human body always captures the eye of imagination of an anatomist. Hence the incidence of rectus sternalis muscle during the routine dissection of pectoral region creates an important landmark for the opening up of debate of the anomalous muscles present in our body.

The sternalis muscle is an uncommon anatomic variation of chest wall musculature. According to Bailey & Tzarnas¹, the rectus sterni muscle has been identified as an infrequent mass of striated musculature in front of the human chest. According to Kida et al², the muscle, when present, received other names as the sternalis, the episternalis, the rectus thoracis and the superficial rectus abdominis.

The prevalence of the rectus sterni muscle has been reported to vary widely among different nationalities, Motabagani et al³. Therefore, the aim of this study was to determine the incidence of the rectus sterni muscle and the results of the study might highlight the exact location and extension of the muscle that would help the clinicians during various surgical and diagnostic procedures.

MATERIAL AND METHODS: During a routine dissection procedure (over a period of five years), 70 formalin fixed adult Indian cadavers , of both the sexes were utilized in the study. They were used for

the teaching purposes in the dissection hall of Anatomy dept. for the M.B.B.S and dental students of M.P.Shah Medical College, Jamnagar, Gujarat.

The unilateral left sided sternalis muscle was found; and it was finely dissected, cleaned and then it was photographed.

RESULTS: During routine dissection an extra muscle was found in only one cadavers out of 70, present unilaterally on the left side in the pectoral region and the fibers of this muscle were at right angle to the fibers of pectoralis muscle. It was present superficial to the pectoralis major muscle(Fig 1,2).

The upper half of the muscle was tendinous and the lower half was fleshy. The upper end of the muscle was merging with the lower end of left sternocleidomastoid muscle. The lower end was attached to superficial surface of left pectoralis major muscle by fascia at the level of xiphisternal joint.

DISCUSSION: The rectus sterni muscle has been investigated by many authors in different populations. In most anatomical textbooks it is insufficiently mentioned.

According to Jones Wood F⁴, A small variable muscle, the sternalis is sometimes present on one or both sides. It is more or less vertically disposed

lying in front of the pectoralis major, close to the sternum. Its disposition and attachments are very inconstant. It may extend inferiorly to the rectus abdominis and superiorly to blend with the sternal head of sternomastoid.

Figure -1



Figure -2



According to Sadler T.W.⁵, a ventral longitudinal column arises at the ventral tip of the hypomeres. This column is represented by the rectus abdominis muscle in the abdominal region and by the infrahyoid musculature in the cervical region. In the thorax, the longitudinal muscle normally disappears, but is occasionally represented by the sternalis muscle..

According to Williams. S.P.L. et al⁶, when typical, it arises from the sheath of the rectus abdominis muscle, aponeurosis of the external oblique muscle, pectoralis major muscle, or costal cartilages and ends above onto the upper costal cartilages,

manubrium, or may be joined to the sternal head of sternocleidomastoid muscle.

Sarikcioglu L et al⁷ stated that , the sternalis muscle is a fleshy band of longitudinal fibers of varying length and width, located close to and generally parallel to the sternum. He also stated that sternalis muscle is occasionally imaged on mammography, magnetic resonance imaging or computerized tomographic scans.

Motabagani M.A. et al³ stated that, the bilateral rectus sterni muscle was supplied by intercostals nerves and supported the opinion that the rectus sterni muscle was derived from rectus abdominis muscle as the two muscles have the same innervation and run in accordance to the proposal that a ventral longitudinal paramedian muscular sheet is represented in human being by the hyoid muscles in the neck, the rectus abdominis muscle in the abdomen, and occasionally the rectus sterni muscle in the thorax. According to Motabagani M.A. et al³, the rectus sterni muscle is derived from the rectus abdominis muscle as the two muscle masses are supplied by the segmental intercostal nerves. He reported the incidence of rectus sterni muscle was 1.54% per German cadavers dissected in Saudi Arabia, 1% in Taiwanese to 23.5% in Chinese.

Saeed M. et al⁸ was of the opinion that the incidence of rectus sterni muscle is 4% in the cadaveric specimens in Saudi Arabia.

Sarikcioglu L. et al (2008) was of the opinion that the incidence of the sternalis muscle varies widely between nationalities, and its reported incidence is 4% to 7% in white population, 8.4% in black population, and 11.5% in Asian population, and 9.3% in Turkish population. He had reported three sternalis muscles (one on right side, two on the left side) covered by superficial fascia and located anterior to pectoralis major muscle.

There has been much debate regarding the innervation of sternalis muscle. Oneill & Folan – Curran⁹ reviewed the literature and found that 55% of the sternalis muscles were innervated by

branches of internal and external thoracic nerves, 43% by branches of intercostals nerves, and 2% both from intercostal and thoracic nerves.

Kida et al² reported some difficulties for finding the innervation source of sternalis muscle, as it is difficult to find twigs from the pectoral nerves supplying the sternalis muscle since when the lateral rim of sternalis muscle has been clearly dissected, the very fine twigs, easily confused with the connective tissue, are almost always removed or damaged. They supported the opinion of the sternalis muscle derivation from pectoralis major muscle.

The present study had observed a unilateral sternalis muscle on the left side and the innervation by the nerves could not be identified due to some difficulties reported by Kida et al².

Kulkarni D.U. & Kulkarni U.K.¹⁰ had found the muscle located unilaterally on the left side in the pectoral region and suggesting that sternalis is nothing more than misplaced developed muscle tissue, arising from variable sources in a localized region at the anterior thorax, and serving no apparent function but to befuddle diagnosticians. Barlow¹⁰ claims that the sternalis muscle represents the remains of the panniculus carnosus.

Thus different authors suggest different theories regarding the origin of sternalis muscle; but almost all of them converge on the verdict that its presence could jeopardize the diagnosis in the region by radiologists and surgeons.

Hence the present study believes that the sternalis muscle is a very rare occurrence in Indians (1.3%) and its presence should be noted by advanced tests (mammograms, CT scans, ultrasound, MRI etc); and thus with proper interpretation, the doctors working in that area should be careful of its diagnostic value and hence be aware of it.

CONCLUSION: The rectus sternalis or sternalis muscle as it is known assumes much importance in the field of radiology or surgery as its presence and knowledge of it might be effective as well as useful

for the radiologists and surgeons diagnosing and operating in the pectoral region. Thus the knowledge of it may prevent a human error.

REFERENCES:

1. Bailey, P.M. and Tzarnas, C.D. : The sternalis muscle : a normal finding encountered during breast surgery. *Plast. Reconstt. Surg.* 1991; 103 : 1189 – 1190.
2. Kida, M.Y., Izumi, A. and Tanaka, S. : Sternalis muscle : Topics for debate. *Clin. Anat.* 2000; 13 : 138 – 140.
3. Motabagani, M.A., Sonalla, A., Abdel-Meguid, E. and Bakheit, M.A. : Morphological study of the uncommon rectus sterni muscle in German cadavers. *East African Medical Journal.* 2004; 81(3); 130 – 133.
4. Jones Wood F – Buchanan's manual of Anatomy. 8th edition. London. Bailliere, Tindall and Cox. Henrietta St., 1953 : 397.
5. Sadler T W. – Langman's Medical Embryology. 9th edition. Lippincott Williams & Wilkins, 2004 : 202 – 203.
6. Williams S P L : Gray's Anatomy. 38th edition. Churchill livingstone, 1995 : 838.
7. Sarikcioglu L, Demirel B M, Oguz N, & Ucar Y. : Three sternalis muscles associated with abnormal attachments of the pectoralis major muscle. *International journal of experimental and clinical Anatomy.* 2008. 67 – 71.
8. Saeed M, Murshid K, Rufai A, EL – Sayed S, and Sadig. : M. Sternalis : An anatomic variant of chest wall musculature. *Saudi Med. Journal.* 2002; 23 : 1214 – 1221.
9. Folan – Curran J, O'Neill M N. : Case report : bilateral sternalis muscles with a bilateral pectoralis major anomaly. *Journal of Anatomy.* 1998; 193 : 289 – 92.
10. Kulkarni D U. & Kulkarni U K. : Unilateral Rectus sternalis muscle – A case report. *Al Ameen Journal of Medical Science;* 2010, 3(2) : 169 – 171.
11. Barlow R N : The sternalis muscle in American whites and Negroes. *Anatomical Record.* 1935 : 64 : 413 – 26.