Case report

Unilateral Sternalis muscle: A rare variation in the anterior chest wall

Dr. G. Sundar¹, Dr. S. S. Rajasekar²

¹Post graduate, Department of Anatomy, Sri Manakula Vinayagar Medical College and Hospital, Pondicherry- 605107
²Professor and Head of Department, Department of Anatomy, Sri Manakula Vinayagar Medical College and Hospital, Pondicherry- 605107
Corresponding author: Dr. G. Sundar
Date of submission: 12 July 2014; Date of Publication: 15 September 2014

Abstract:
During routine undergraduate dissection in the department of Anatomy, Sri Manakula Vinayagar Medical College, Puducherry, of a 60 years old male cadaver, the dissection of anterior thoracic wall revealed an abnormal strap muscle on the right side. This muscle was identified as sternalis muscle. It extended from 5th costal cartilage to 2nd costal cartilage. It is a rare morphological variation of the anterior chest wall. The knowledge of this unique variation is very vital for academical, radiological and surgical practice due to its varies clinical significance.

Keywords: Unilateral sternalis muscle, anterior chest wall

Introduction:
The sternalis muscle was first defined by Cabrolius in 1604 and its portrayal was first made by Dupuy in 1726¹. The other names for the same variation cited in various articles are musculus sternalis, presternalis, rectus sternalis, sternalis brutorum and thoracicus². The sternalis muscle is actually a rare variation of the anterior chest wall. It is found overlying the pectoralis major extending from the jugular notch to the costal region, parallel to the sternum³ ⁴. The area of deliberation in case of this unique variation is the unidentified function, the unfamiliar embryological development and its clinical significance⁵. In a study it has been indicated that the probable functions of sternalis muscle include proprioception and respiration⁶. In another study it has been expressed that it may also assist in elevation of the lower chest wall and shoulder joint movement to a certain extent⁶. In certain studies it has been recorded that the sternalis muscle originates from contiguous muscles like sternocleidomastoid, rectus abdominis or as a vestige of panniculus carnosus. While in some studies it has been stated that it arises from the underlying pectoralis major³.

The sternalis muscle is clinically significant due to the fact that it can often mimic tumors of the thoracic wall and mammary region giving rise to radiological misinterpretations. It is also used in reconstructive surgeries following mastectomy as well as head and neck surgeries⁴. Another clinical implication of this discrepancy is the alteration found in electrocardiographs⁴.

Case reports:
Dissection of the anterior thoracic wall, in a 60 year old male cadaver, in the department of Anatomy, revealed an abnormal strap muscle in the right parasternal region. The muscle was further traced and identified as the sternalis muscle. The muscle as well as the surrounding area were cleared and photographed using a camera. The size of the muscle measured about 8.1 cm in length and 1.3 cm in breadth. The fibers of the muscle were
parallely arranged with tapering ends extending from the 2\textsuperscript{nd} to the 5\textsuperscript{th} costal cartilage. The nerve supply was traced and identified as anterior intercostal nerve. No other structures were found to pierce the muscle. There was no variant sternalis muscle on the opposite side.

**Discussion:**
The unilateral sternalis muscle on the right side lies subcutaneously between anterior thoracic superficial fascia and the pectoral fascia and parallel to the sternum. The incidence of presence of the sternalis muscle has been observed to vary with ethnicity. However, it is present in equal proportions in the male and female gender. From the preceding studies it has been noted that the incidence of presence of sternalis muscle is about 8\%, ranging from 2\% in European Caucasians to 11\% in Asians. In yet another study it was mentioned that the incidence was 4.4\% in Europeans, 8.4\% in Africans, 11.5\% in Asians, 4.8\% in Indians, 31.1\% in Japanese and 1\% in Chinese. Unilateral sternalis has been reported in 4.5\% subjects while bilateral manifestation is less than 1.7\%.

In a study by Hung LY et al. it has been noted that there are 2 embryological explanations for the sternalis muscles. One, being based on the traditional facts of embryology; myotomes differentiate into a dorsal myogenic column, the epimeres, and a ventral myogenic column, the hypomeres. The epimeres give rise to deep muscles of the back (i.e. erector spinae) and are innervated by the posterior primary rami of the spinal nerves. The hypomeres form the lateral and anterior muscles of the thorax and abdomen (i.e. external, internal, and innermost intercostal muscles at the level of the thorax) and the flat muscles of the anterolateral abdominal wall (i.e. external oblique, internal oblique, and transverse abdominis). The ventral most tip of the hypomeres form the rectus abdominis muscle at the level of the abdomen and in the cervical region, in the region of the scalene and infrahyoid strap muscles, and occasionally at the level of the thorax forming the sternalis muscle.

Secondly, some anatomists also suggest that the sternalis muscle develops from unusual migration of pectoral mass. Cunningham and Huntington (1904) believed that this mass splits into a superficial (pectoralis major) and deep layer (subclavius, pectoralis minor, pectoralis abdominis [abdominal part of pectoralis minor]) which eventually migrates caudally to the costal region where it splits into two bundles: the clavicular portion and the sternocostal portion. The sternocostal portion differentiates into the sternocostal part of pectoralis major and pectoralis minor. An abnormal migration or cleavage of the pectoral mass may lead to the formation of sternalis muscle.

Based on the theory that a muscle is the end organ of a nerve, the nerve supply of the sternalis can be traced. It is usually found to be supplied by the pectoral or intercostal nerves, which is why it can be said that the sternalis muscle is a part of the thoracic or abdominal group of muscle. The clinical significance of the sternalis muscle lies in the following notable findings in the review of literature.

The awareness of the sternalis muscle is wide spread amongst anatomists, however it is lacking in physicians, surgeons and radiologists. The sternalis can mimic a tumour on mammography, which results in misdiagnosis and unnecessary invasive investigations or procedures. It may also be mistaken for a recurrence of a tumor following surgery on follow-up. Surgeons and radiologists should be aware of this rare entity during breast surgery so that if present, it can be identified and the appropriate dissection plane recognised.
Another important aspect of the presence of a sternalis muscle is its use in reconstructive surgeries of head and neck and following mastectomy\(^4\). Yet another aspect of the sternalis muscle is the alteration of electrocardiographic findings, which can again lead to unnecessary apprehension to the patients and treating physician.

**Conclusion:** Adequate knowledge of the sternalis muscle, a distinctive anatomical variation will go a long way to prevent misdiagnosis, needless expenses and pointless invasive procedures. The incidence of this particular variation is not very high; however awareness of the same will help not only anatomists academically, but also physicians, surgeons and radiologists in their clinical practice.

**Acknowledgements:** I would like to thank Dr. Raveendranath for all his help and support during the dissection and preparation of the material.

**Figure 1:** Figure showing the Unilateral Sternalis muscle on the right side of the anterior chest wall, parallel to the sternum

### References:
