Rectus sternalis muscle - a rare anatomical variant

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Abstract

The Rectus Sternalis muscle is an unusual muscle that is observed on the anterior chest wall. The origin of this muscle is a highly debated variation of the pectoral musculature. We report a case of an abnormal vertically placed muscle - The rectus sternalis muscle, on the right medial side of the anterior chest wall of a male cadaver aged about 80 years. The abnormal presence of this muscle can be misdiagnosed as a breast mass on a routine mammogram. The advantage is its role in reconstruction flap surgeries. Hence knowledge of such an anatomical variant should be kept in mind during diagnostic investigations and surgical procedures.

Key words: pectoralis major muscle, cadaver, unilateral, mammography, origin, dissection.

Introduction

Sternalis muscle is an anatomical variant of the anterior chest wall musculature. It is a flat longitudinally placed muscle, which is anterior to sternum and the chest wall. It has been called variously by authors as musculus sternalis, presternalis, rectus sternalis, sternalis brutorum or thoracicus. It is thought to be a phylogenetic remnant carried over from primates, though there are controversies existing regarding this aspect1. Sternalis muscle was first mentioned by Cabrolius in 1604 and later, in 1726, the formal description of this muscle was given by Dupuy2. This muscle is reportedly found in 3±5% of the population, with no predilection for sex3 though few other anatomists postulate it to be more common in females4. This muscle is classified as a pectoral group muscle. It is important in the differential diagnosis of breast masses and in reconstruction surgeries4.

Observation

During routine dissection and teaching in M.S.Ramaiah medical college Bangalore, we came across an abnormal muscle in the right medial region of the anterior chest wall. It was unilateral and superficial to the pectoralis major muscle. It took origin from the 7th, 6th, 5th costal cartilage, and coursed upwards 1.5cm lateral to the mid sternal point towards the sternal notch. This flat muscle stretched for 20 cm. The origin and insertion of the muscle was tendinous, it measured 4cm long and 1.4cm wide; 5 cm long and 2cm wide at its origin and insertion respectively. The muscle belly measured 11cm in length and 4cm in width (at its widest part). The muscle continued into the sternocleidomastoid muscle of both sides. Few superior fibres of the right and left pectoralis major took origin from the upper part of this muscle; these are called pectoral slips3 (Fig 2). It derived its blood supply through small branches of right 2nd to 5th intercostal vessels and nerve supply from the anterior intercostal nerves of the right 2nd to 5th intercostal spaces (Fig 1).

Discussion

The rectus sternalis muscle is a slip of muscle ascending from the lower costal cartilage and rectus sheath to blend with the sternocleidomastoid or the sternum or costal cartilages5. Worldwide studies indicate that the incidence of this muscle varies with age, ethnicity and race. The incidence has been reported as: Europeans - 4.4%, Africans - 8.4%, Asian 11.5%, Indians 4.8%, Japanese 31.1%, Chinese 1%34. Another study has reported the incidence in Indian population to be rare- 1.2%7. The chances of finding this muscle in cadavers is - 18.2%, in Mammograms is 0.019%, in multidetector CT is 6.2%4.
Fig 1: Right rectus sternalis muscle- attachments and nerve supply. 1-Rectus Sternalis muscle. 2,3,4,5- 2nd, 3rd, 4th and 5th anterior intercostal nerves.

Various theories have been put forward regarding the development of this muscle. One theory being that it is derived from primitive ventral, longitudinal muscle sheet which also gives rise to rectus abdominis, sternocleidomastoid muscles; second that it is derived from the pectoralis and third that it is a derivative of panniculus carnosus. Embryologically, Rectus sternalis is considered as a derivative of the hypaxial myotomes/dermomyotomes from which the ventral and lateral body wall muscles of thorax and abdomen are developed. The development and the innervations of rectus sternalis can be understood by the three laws of nerve muscle relationship- laws of migration, fusion and separation. A large proportion of anencephalic foetuses have shown sternalis muscle indicating a neurological role in its development.

The origin of rectus sternalis in majority of cases is from lower costal cartilage and rectus abdominus, with other sites being sternum, ribs and pectoralis major. The insertion is to sternum, upper costal cartilages or ribs. They can be unilateral - 4.5% or bilateral- less than 1.7%.

The innervations of this muscle though still inconclusive have been reported to be by external and internal thoracic nerves (55%); branches of anterior intercostals nerves (43%), or by both groups (3%). In this case, the rectus sternalis was supplied by the branches of anterior intercostal nerves.

The probable action of this muscle is elevation of the lower chest wall and shoulder joint movement. Rectus sternalis is classified based on its unilateral/bilateral presence, each of which is further sub classified based on the attachments. A case has been reported, with three bellies of rectus sternalis in a single cadaver, which cannot be included under any of the existing categories indicating the need for a review of the classification. The rectus sternalis in the present case belongs to I- 4 category, i.e. unilateral belly passing into another muscle, which in our case is pectoralis major of the right side and sternocleidomastoid of both sides - Fig 2.

The rectus sternalis muscle can be misdiagnosed as a breast mass - benign or malignant breast lesion on a routine cranio-caudal projection in mammography. Four such misdiagnosed cases among 32,000 mammograms where an open biopsy for the breast mass yielded rectus sternalis muscle have been reported.

Fig 2: Illustration of right rectus sternalis muscle - I - 4 category.

During mastectomy whenever this muscle is encountered it is important to identify the correct dissection plane, and care should be taken not to leave behind any breast tissue under this muscle. The rectus sternalis, though a vestigial muscle plays an indispensible role in flap reconstruction surgeries of head and neck, anterior chest wall and breast.
Conclusion

The rectus sternalis is a rare variation in the anterior chest wall musculature, whose phylogenetic origin is still an enigma. Although it is a benign anomaly, it may pose a diagnostic dilemma to the surgeons and the radiologists. The knowledge of the presence of this muscle will avoid inadvertent interventional procedures. Hence reporting such a variation is of immense importance in anatomical and surgical fields.

References


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