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Exploring an accessory muscle of the anterior chest wall: The Sternalis – Brief review of its clinical implications.

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ABSTRACT: Accessory muscles are not encountered very frequently in the anterior chest wall. The sternalis muscle when present, shows variability in its morphology, which demands its documentation to increase the awareness among clinicians. In this study, we encountered a bilateral sternalis muscle, parasternal in position, in a 65 year old male cadaver. The incidence and clinical implications of the muscle was reviewed, in order to increase the knowledge of this clinically unnoticed yet significant structure. Knowledge of the presence of this is of utmost importance for radiologist and surgeons to avoid misinterpretation of the muscle to other soft tissue masses. It also gaining importance more recently in the field of reconstructive surgeries.

KEYWORDS: Sternalis, pectoral region, augmentation mammoplasty

I. INTRODUCTION

The sternalis muscle is an uncommon accessory muscle of the pectoral region or the anterior chest wall. This muscle is often termed as rectus sternalis, as it corresponds to the rectus abdominis muscle of the anterior abdominal wall. Parasternalis, presternalis, rectus thoracis are its common synonyms. It was first reported byCarbolio in the year 1604 but an accurate description of the muscle was given by DuPuy in the year 1726. The presence of this anatomical variant is observed both in males and females but the frequency of its occurrence is different in various ethnic groups [1]. Literature review shows that, most commonly this muscle was encountered during routine cadaveric dissections or it was an incidental observation in radiological examination like, ultrasonography or MRI. But the incidences of symptomatic cases of these accessory muscles have also been reported. Knowledge of these supernumerary muscles is important to avoid misinterpretation of a soft tissue mass like, tumour,abscess, hematomas, lymphadenopathies or fat necrosis. These accessory muscles can also be used for reconstructive surgeries. With an increase in the number of case reports on this supernumerary muscle and considerable variations in the morphology in each case, Jevel et al., for all descriptive purposes, classified it into 7 types (A-H) [2]. Hence a detailed description of this muscle is worthy to be reported.

II. METHODS

A 65-year-old male cadaver fixed in formalin, used for routine dissection for the first year MBBS students was studied.

The anterior chest wall was dissected using the standard incision guidelines to expose the pectoral region. The anterior chest wall musculature was studied, after removing the skin, superficial fascia and mammary gland. Morphology of the muscle was described in terms of their origin, insertion and orientation of muscle fibres. Length and breadth of the muscle was measured using callipers.

III. RESULTS

Variation in the musculature of the anterior chest wall and pectoral region was observed. A bilateral sternalis muscle was encountered in the pectoral region. The muscle was situated just deep to the superficial fascia and superficial to the pectoralis major muscle. It was present on the either sides of the body of the sternum (parasternal in position). On both the sides, muscles were fleshy at the origin but aponeurotic at the insertion. The muscle was arising from the external oblique aponeurosis on both the sides. Origin of the muscle was slightly higher on the left side and the right sternalis was comparatively larger than on the left. Muscle fibres ran upwards and medially, where they converged to form a thin tendon. Both tendons fused in the midline to get inserted to the manubrium sterni. Few fibres were continuous with the sternal head of sternocleidomastoid muscle. Few fibres of pectoralis major muscle were taking origin from the tendon of left sternalis muscle. Right sternalis measured 12.5cm in length and 3cm in width at the origin. Left sternalis measured 10cm in length and

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2cm in width at its origin. No other variations in the pectoral region musculature was encountered in this cadaver.

Picture 1: Showing bilateral sternalis muscle. R-right, L-left, EOA-external oblique aponeurosis, SM-sternocleidomastoid

IV. DISCUSSION

Encountering an accessory muscle like sternalis in the anterior chest wall is quite uncommon but most often it is just an anatomical variant. Variability in the morphology of this muscle draws attention for its documentation. This muscle is reported to be encountered in 3% to 6% of population, irrespective of sex and frequency varying in different ethnic groups. The incidence of this muscle is 11% in Asians, 6% in Afro-Americans, 2% in Europeans according to Barlow (1935).

Presence of accessory muscles are generally attributed to embryologic variations. Since sternalis corresponds to the strap muscles of the neck like infrahyoid muscles and rectus abdominis of the anterior abdominal wall, it is considered to be a derivative of ventral longitudinal column of muscles developing from the ventral lip of hypomeres [3]. However, its origin still remains debatable as Ruge (1905) claims it to be a remnant of cuticular muscles of mammals and Barlow (1935) considers it as a remnant of panniculus cornosus. But Clement (1985) reported it as misplaced portion of pectoralis major muscle [4].

Cherian et al., [5] observed the presence of bilateral sternalis muscle, morphology of which were almost similar to the observations of our study. Gnanasundaram et al., [4] named it as a "mystery muscle" owing to its clinical implications and the appearance of the muscle was correlating with our observations.VirendraBudhiraj et al.,[6] also reported a case of bilateral sternalis but the cranial attachment of the muscle was only till the sternum. However, cases of unilateral sternalis muscle were reported by, Raju S et al.,[1] Simhadri et al.,[7] and Sinha MB[2].

Lack of sufficient description of this muscle in the regular curriculum, makes the clinicians to be unaware of this muscle which may lead to difficulty in attaining a proper diagnosis. Quiet a rare case of 'digastric sternalis' muscle having two bellies with an intermediate tendon was reported by Guru A et al.,[8]. Variant form of sternalis having a bifurcated end was encountered by Kumar N et al.,[9].Singh et al.,[10] explored an

exclusive finding of four distinct slips of sternalis muscle with an unique morphology. Even though the sternalis remains clinically silent, Gruber L et al.,[11] diagnosed a case of painful soft tissue swelling in the parasternal region due to the presence of sternalis muscle. Bilateral sternalis can also present with anomalies of pectoralis major muscle[12]. "Sternalis syndrome" is categorised under common causes of musculoskeletal chest wall pain[13].

Lack of sufficient description of this muscle in the regular curriculum, makes the clinicians to be unaware of this muscle, which may lead to difficulty in drawing a proper diagnosis. The presence of this muscle can lead to misinterpretation of radiological images of the chest. It can appear as a soft tissue mass of unknown origin in CT and MRI images. It can be confused for a hernia of pectoralis major muscle. It can be misdiagnosed to be a tumour arising from the mammary gland. Incidental appearance of sternalis muscle during radical mastectomy, demand excision as a part of breast tissue is likely to be present deep to the muscle.

It also serves asa tissue expander material for augmentation mammoplasty[5]. However Khan (2008) opines that when an intra-alveolar or sub mammary approach is used, the muscle may interfere with the submuscular pocket dissection[14].

V. CONCLUSION

Variations of the chest wall musculature is unusual yet important for the surgeons, radiologists and anatomists to know its incidence to avoid misinterpretations and also make use of it for reconstructive procedures. Advancements in the field of reconstructive surgeries, requires a thorough knowledge of such accessory muscles which can help the surgeon carryout a high efficacy fruitful surgeries using the tissue from its source.

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