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Variation of Serratus Anterior Muscle Originated from the Clavipectoral Fascia: A Case Report

Variación del Músculo Serrato Anterior Originado en la Fascia Clavipectoral: Reporte de un Caso

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SUMMARY: The variations in the serratus anterior (SA) muscle are common. Here, we report a rare variation of the muscle origin with a potentially great clinical implication. We found an aberrant SA variation in an 81-year-old Korean male cadaver during a routine dissection for medical students. Additional slip (AS) of the SA originated from the clavipectoral fascia and the pectoralis minor. It traveled inferiorly and merged to the typical SA part. Precise knowledge about SA variations is clinically valuable; therefore, clinicians should be aware of the possible variation.

KEY WORDS: Serratus anterior; Clavipectoral fascia; Pectoralis minor; Anatomical variation.

INTRODUCTION

The serratus anterior (SA) muscle is a fan-shaped and serrated muscle at the lateral wall of the thorax. The SA usually originates on the superolateral surfaces of the 1st to 8th ribs at the side of the chest, inserts along the entire anterior length of the medial margin of the scapula, and is located deep under the scapula and the pectoral muscles. The SA is further subdivided into three parts according to the points of insertion and origin: SA superior, SA intermediate, and SA inferior. The origin of the SA superior is at the first and second ribs, SA intermediate is at the second and third ribs, and SA inferior at the fourth and ninth ribs. The primary function of the SA muscle is to protract the scapula and hold the medial margin of it against the rib cage. Additionally, it functions as a scapular upward rotator during the elevation of the shoulder (Castelein *et al*., 2016). The superior part of the SA muscle is supplied by the lateral thoracic artery and the inferior part by the branches of the thoracodorsal artery. The SA muscle is innervated by the long thoracic nerve (Erdogmus & Govsa, 2005). However, the anatomical function of the SA muscle and the long thoracic nerve have not been fully elucidated (Castelein *et al*., 2016).

The variations in SA attachment are common (Hamada *et al*., 2008). For example, a variation known as the axillary arch, in which the slips from the digitations associated with the sixth and seventh ribs may join the pectoralis minor and/or coracobrachialis muscles, is possible. Complete absence of the SA muscle has been reported as well. SA variation is clinically important due to the muscles' stabilization of the scapula. Thus, the clinicians should have a thorough understanding of the muscles that control the scapula and normal scapular biomechanics (Paine & Voight, 1993).

In this study we report the SA variation with an additional slip from clavipectoral fascia. And we discuss this case from both, gross anatomical and clinical, and perspectives.

CASE REPORT

During a routine dissection at the Keimyung University Medical School in 2020, we found an aberrant variation of the muscle in an 81-year-old Korean male cadaver. First, we reflected the skin from the anterior thoracic wall, medial to lateral. Then, we cut and removed the subcutaneous fascia, breast, pectoralis major and minor. We

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also removed neurovascular bundle associated with the muscle. After removing the pectoralis minor, we identified the SA muscle. The left serratus anterior was typical and originated in the 1st to 8th ribs and inserted on the medial margin of the scapula. However, an atypical SA was found on the right side (Fig. 1). Under the pectoralis minor, an additional slip (AS) of the SA originated from the clavipectoral fascia and the pectoralis minor. The height of the pectoralis minor was 84 mm, and AS originated at its 60-percentile level from the coracoid process. It traveled inferiorly 137 mm and merged to the typical SA, which inserted into the medial margin of the scapula. The width of the AS was 7 mm. Its blood supply and innervation showed typical patterns. We did not find any other variations both sides.

DISCUSSION

In this report, we showed a rare variation of the SA muscle originated from the clavipectoral fascia. Usually, variations of the serratus anterior appear in the attachments of the SA. According to a previous report, the number of digitations varied mostly in the inferior digitations, between seven and twelve, attaching to either the seventh (1 %), eight (40 %), ninth (38 %), tenth (10 %), or eleventh rib (0.5 %) (Hamada *et al*., 2008). Another case of an anomalous attachment of the upper portion of the SA to the posterior scalene muscle has been reported. Sometimes the intermediate portion is missing, being replaced by the connective tissue (Hamada *et al*., 2008). However, a variation of the SA in this report has not been reported previously. Our case showed a variant SA that begun in the 60th percentile of the pectoralis minor, fused into the normal form of SA at the 5th rib, and inserted into the medial margin of the scapula. The presence of AS would not have affected the blood supply and nerve branches.

The exact origin of the tissue, which gave rise to the SA remains uncertain. However, it is reported that the SA is derived from a myotome. It is generally known that the scapulothoracic muscles, including the pectoralis minor, trapezius, SA, levator scapulae, and rhomboid major, play a crucial role in providing mobility and stability of the scapula during the movements of the humerus (Tubbs *et al*., 2016). Because the pectoralis minor and SA have a role in the protraction of the scapula, AS of the SA was thought to have no effect in the protraction of the scapula. However, we expected that AS of the SA would affect the retraction, due to the origin and insertion of it. The variation slip we observed might cause pain when performing functional tests to evaluate the retraction the scapula. Also, a misdiagnosis can lead to the injury during local procedures due to the easy exposure.

In this paper, we described a rare variation of the SA that has never been reported previously. Precise knowledge about SA variations are clinically valuable because such information helps to increase the understanding of the origins of muscle pain. Therefore, clinicians should be aware of this variation due to its clinical significance.

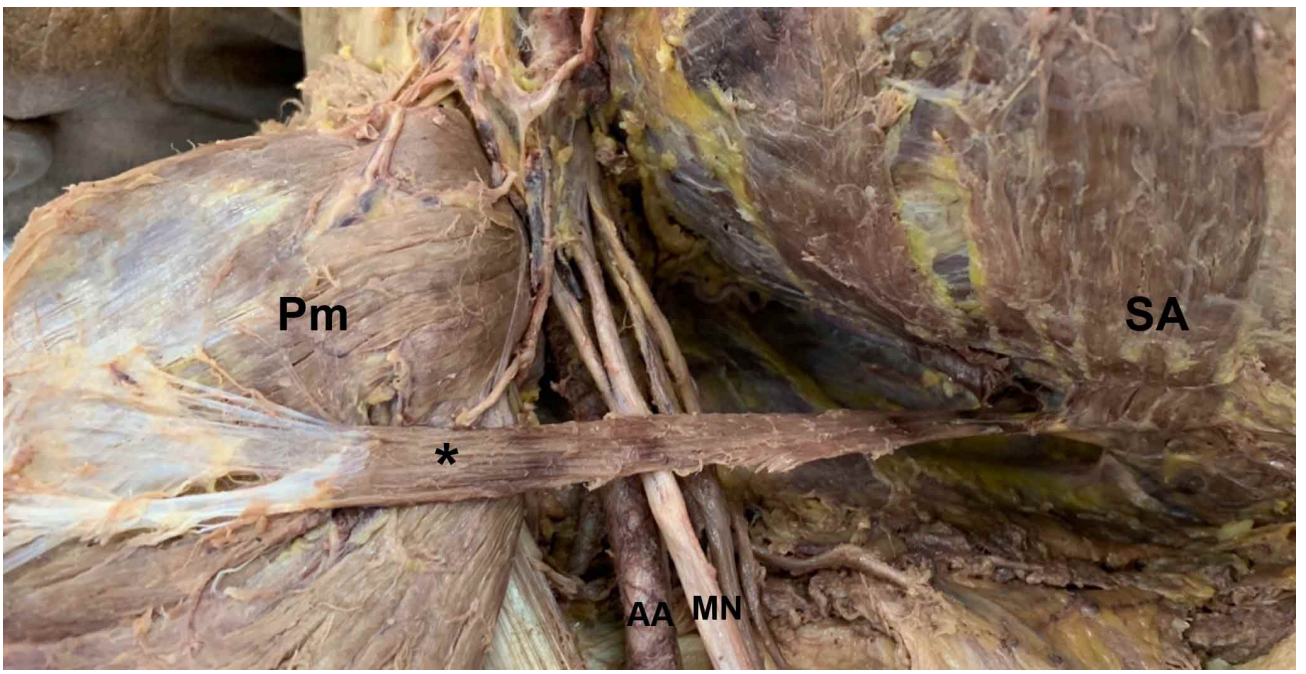

Fig. 1. The photography of the variant muscle (*) in right axilla. It originated from the clavipectoral fascia and the pectoralis minor (Pm) and inserted to the serratus anterior (SA). AA, axillary artery; MN, median nerve.

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RESUMEN: Las variaciones en el músculo serrato anterior (MSA) son comunes. En este trabajo informamos una variación rara del origen muscular con una implicación clínica potencialmente importante. Encontramos una variación aberrante del MSA en un cadáver masculino, coreano de 81 años, durante una disección de rutina para estudiantes de medicina, con un fascículo adicional del MSA originado en la fascia clavipectoral y el músculo pectoral menor. Este fascículo se dirigió inferiormente y se fusionó con la parte común de MSA. El conocimiento preciso sobre las variaciones de MSA es útil clínicamente; por lo tanto, los médicos deben ser conscientes de esta posible variación.

PALABRAS CLAVE: Serrato anterior; Fascia clavipectoral; Pectoral menor; Variación anatómica.

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