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Unilateral Pectoralis Quartus Muscle – A Case Report

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Historically, numerous variations of thoracic wall muscles have been reported in literature. In addition to the classically described pectoralis major and pectoralis minor muscles, supernumerary muscles such as the pectoralis quartus muscle are sometimes registered. During a routine educational dissection of a 72-year-old Caucasian male cadaver, a unilateral accessory muscle was encountered on the left anterior thoracic wall, which showed the morphological characteristics of pectoralis quartus. We believe that knowledge of such anatomical variations is important for surgical interventions in the axillary region, as the presence of pectoralis quartus may affect axillary lymphadenectomy by causing limitations to the surgical field, and thus leading to dissection of the lymph nodes at a lower level.

Key words: pectoralis quartus, accessory thoracic muscle, pectoralis major, anatomical variation, axillary lymphadenectomy

Introduction

The pectoral region classically contains the pectoralis major (PMa) and pectoralis minor (PMi) muscles, which partake in upper limb movements. In literature, throughout the years, many different variations in the anterior thoracic wall have been described. The pectoralis quartus (PQ), when present, runs parallel to the lateral border of the PMa and over the brachial neurovascular bundle [5]. Failure to recognise PQ by the surgeon could lead to transposition of the medial border of the axillary lymphadenectomy's surgical field laterally and downwards, which could lead to dissection of the lymph nodes at a lower level [12].

Material and Methods

The hereby reported variant muscle was found during a routine educational dissection of a 72-year-old Caucasian male cadaver, embalmed in formalin. All the materials were available at the Department of Anatomy, Histology, and Embryology of the Medical University - Sofia.

Case report

The dissection was carried out in the left pectoral region and left axillary fossa. The overlying skin was removed and dissection through the subcutaneous fat tissue was carried out in order to demonstrate the superficial neurovascular structures. After the removal of the subcutaneous fat tissue and the superficial fascia of the region, the superficial layer of the pectoral fascia was encountered. It laid superficial not only to the PMa, but also to a supernumerary muscle slip which, based on its morphological characteristics, was determined to be PQ (**Fig.1a**). It appeared to originate by a thin aponeurosis from the anterior layer of the rectus sheath, overlying the external oblique muscle in the region of the sixth and seventh costochondral junctions. Its fibres ran superolaterally, parallel to the inferior border of PMa and completely separated from the latter. The aberrant muscle joined the lower portion of the tendon of PMa (**Fig. 1b**), and thus attached distally to the lateral lip of the intertubercular groove. It measured 16 cm in length and 3 cm in width. Thin nerve fibers from the medial pectoral nerve were identified to supply the PQ.

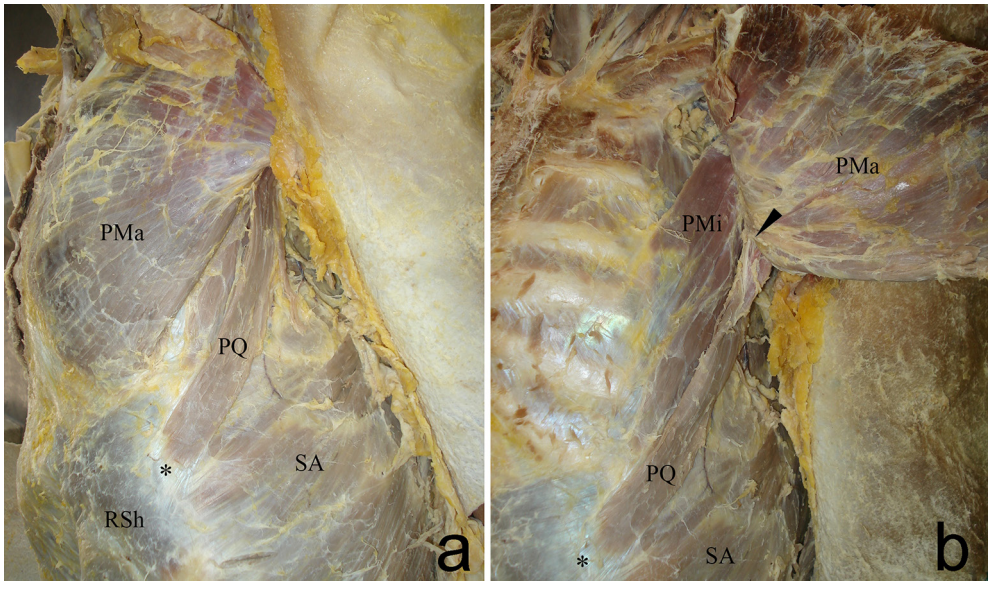

Fig. 1a, b. Photograph of the described dissection in the left anterior thoracic wall, taken after removal of the superficial layer of the pectoral fascia **(a)**, and after detachment of the PMa from its origin **(b).** The aponeurotic origin of the PQ is marked with an asterisk. Distally PQ joins the PMa's tendon as they enter the axillary fossa (arrowhead). PMa – pectoralis major; PMi – pectoralis minor; PQ – pectoralis quartus; SA – serratus anterior; RSh – rectus sheath.

Discussion

PQ was first described in the XIXth century and a prevalence of 11-16% of the dissected cadavers was reported [4]. More recent studies indicate that the PQ is much rarer, with frequency of 2.8% [8]. To our knowledge, PQ has been described in literature only once intraoperatively [12], which could be attributed to a more thorough dissection during anatomical cadaveric studies and the fact that considering its low prevalence, surgeons might not recognise PQ, even if the muscle is present.

The origin (thoracic attachment) of the PQ is fairly constant, as most case reports describe the muscle's origin from the costochondral junction of the 5th and 6th ribs [5]. There have been reports, such as ours, of PQ originating from the anterior wall of the rectus sheath [4, 10]. The muscle insertion (upper limb attachment), however, shows much more variability. Usually, the PQ runs superolaterally from its origin, crosses the axilla anteriorly and has been reported to attach to the PMa fascia [6], the lateral lip of the intertubercular groove and the tendon of the short head of biceps brachii [1] or the coracobrachialis fascia [10,11].

Other supernumerary muscles, originating from the anterior thoracic wall and crossing the axilla anteriorly have been described previously, namely the chondrofascialis and the chondroepitrochlearis. Those muscle variants, however, attach to the medial part of the brachial fascia and the medial epicondyle of the humerus, respectively [2]. There have been reports that when PQ is found in co-existence with Langer's axillary arc, the two of them have a common distal attachment via a shared tendon [4].

The PQ is innervated by the medial pectoral nerve, as most case reports suggest [5], although there have been reports of the PQ receiving innervation from the IVth intercostal nerve [1]. In 1889, Birmingham describes the different theories about the embryological origin of PQ and its homology in other species. According to him, the assumption that the PQ is a derivative of the panniculus is wrong. Consequently, in terms of embryologic development, he defines it as a segmented portion of the PMa. His claims stem from the fact that in terms of origin, insertion and innervation, PQ corresponds to PMa [3]. As far as comparative anatomy is concerned, PQ has been reported in common chimpanzees *(Pan troglodytes)*, where it shows similar morphological characteristics of the human's PQ [9].

The clinical significance of PQ is debatable. To the best of our knowledge, there has been a single report of the variant muscle intraoperatively, and even though the PQ limited the surgical field, the result was satisfactory [12]. A PQ has also been reported during a mammographic screening, and although the authors suggest that it would not raise suspicions about neoplasia, they state that knowledge of such anatomical variations is important to avoid additional examinations [7]. It could be possible that due to PQ's course through the axilla, the muscle may compress the neurovascular structures of the brachial region, thus leading to the corresponding pathology.

Conclusions

The hereby presented case is peculiar, as it shows an anatomical variation, rarely described in most anatomy textbooks. Knowledge of such structures, that pass over the

axilla, is important for surgeons, as they might alter the operating field. In our case, the PQ's lower margin passed significantly lower than that of the PMa, which might lead to confusion of the surgeon, if not recognised.

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