

Variant Form of Axillary Arch Muscle and its Clinical Significance

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Abstract

Axillary arch muscle is a variant muscular structure of the axilla which is described as Langer's muscle, axillary arch or muscular axillary arch by different authors. During the routine dissection of the left axillary region we found a muscular slip which originated from the anterior border of the latissimus dorsi muscle and got inserted on the under surface of the tendon of pectoralis major muscle. Arterial, venous and nervous structures passed under this muscular slip. This has been observed for the first time in the last 20 years in which around 200 cadavers were dissected in this institute. Although axillary arch is not very rare, it is generally neglected and not explored or described well. It has immense clinical and morphologic importance for surgical operations performed on axillary region; thus, surgeons should well be aware of its possible existence.[1]

Keywords: Axillary arch muscle; Breast; Langer's Muscle; Latissimus dorsi; Reconstruction.

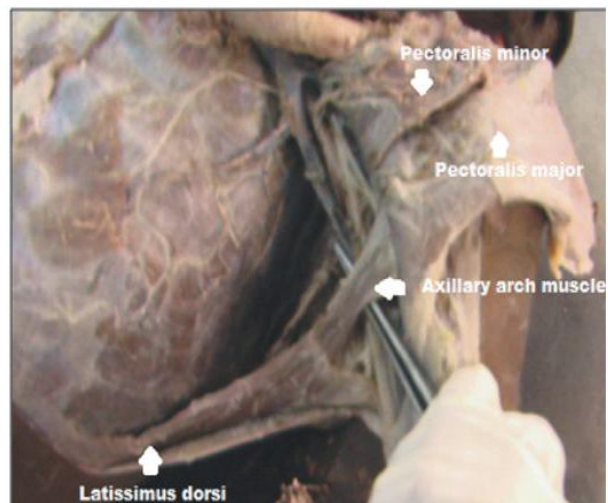
Introduction

One of the anatomic variations within the axilla is a muscular band extending from the latissimus dorsi muscle to pectoralis major muscle, called variously as Langer's axillary arch, aschelsbogen[2], axillopectoral muscle, pectodorsal muscle or arcus axillaris. Many variants of this muscular anomaly have been described. Macalister described this muscle as "very liable to vary". Interest has been further stimulated by increasing surgical importance of this region during axillary surgery for breast cancer, reconstruction and axillary bypass operations.[3]

Case Report

During the routine undergraduate dissection of the left axillary region of a 50 year old male cadaver, a muscular slip was encountered which originated from the anterior border of the latissimus dorsi muscle. This has been observed for the first time in the last 20 years in which around 200 cadavers

Figure 1: Axillary Arch Muscle (Lifted Up by Forcep)

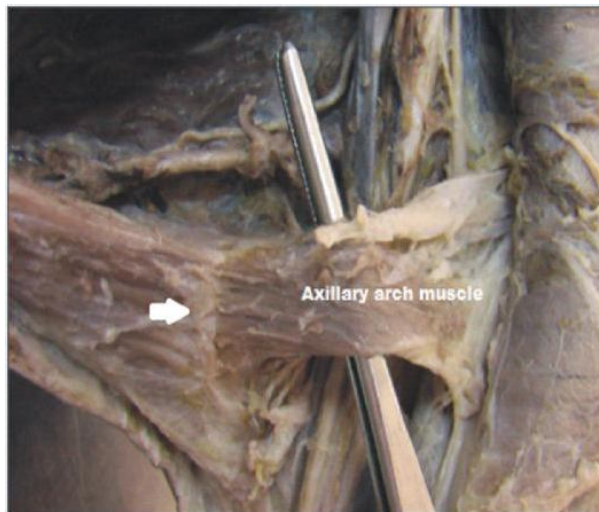


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Figure 2: Axillary Arch Muscle – Tendinous Origin Indicated by Arrow



were dissected in this institute. This muscular slip originated from the anterior border of the latissimus dorsi and crossed the axillary vessels and cords and the branches of brachial plexus (Fig 1). It then got inserted on the under surface of pectoralis major muscle tendon. It was 12 cm in length and 2.5 cm in width throughout its entire extent. It was identified as axillary arch muscle (AAM).

Fascinating fact about it was the presence of tendinous intersection (full thickness) at the site of its attachment to the main muscle mass of latissimus dorsi (Fig 2). Also its thickness was 6.02mm as measured by vernier caliper along its major extent. The axillary arch muscle received its nerve supply from thoracodorsal nerve (which is a branch of the posterior cord of brachial plexus) and a branch from the lateral cord of brachial plexus arising 2 cm proximal to the point of origin of the musculocutaneous nerve (mimicking lateral pectoral nerve). Blood supply was from the thoracodorsal vessels.

Pectoralis minor on the left side originated from the 3rd and 4th ribs and it was very thin. Pectoralis minor on the right side was thick in comparison to its counterpart and originated from the 3rd to 5th ribs on the right side. The latissimus dorsi on the left side was observed to originate from the iliac crest and from T7 to

L5 spines. There was absence of muscular origin of latissimus dorsi from the posterior aspect of lower ribs and the inferior angle of scapula.

Discussion

Ramsay had first described the AAM in 1795.[4] Testut observed what he referred to as the axillary arch of Langer in 1884, while Sachatello used the term “axillopectoral muscle” in 1977, followed by Sisley in 1987 and Turgut *et al* in 2005. The AAM is the most common variation in the axilla with a reported occurrence of 7%.[1]

Frequencies vary from 0.25%” 43.8% [3], depending on the population studied (Table 1). Variations of this muscle typically involve a bidirectional slip with one origin and one insertion. Few cases have been described where the muscle’s connections are more complex, extensively branching, inserting at multiple sites; into three of the more common sites; the pectoralis major, pectoralis minor and coracoid process.[3]

The embryological derivation of Langer’s arch remains unknown, but the most reliable theory supports its origin from the panniculus carnosus, which is an embryological remnant of a more extensive sheet of skin associated musculature, lying at the junction between the superficial fascia and subcutaneous fat.[2,3] In the present case the AAM could be considered as the displaced part of pectoralis minor, as it also received its innervations from a branch from the lateral cord of brachial plexus (mimicking lateral pectoral nerve) and the fact that the pectoralis minor on the same side was very thin.

The presence of an AAM may not necessarily result in any functional deficits. However, similar muscular anomalies such as the chondro-epitrochlearis have resulted in limiting arm abduction to 85°. Clinically, AAM has been implicated in costoclavicular compression syndrome, axillary vein

Table 1: The Incidence of the Axillary Arch Muscle Reported in the Literature[9]

Author (year)	No. of arches	No. of subjects	Percentage	Population
Clarys <i>et al</i> (1996)	16	183	8.7	Caucasian
Georgiev (2006)	2	56	3.6	Caucasian
Kalaycioglu (1998)	1	60	1.7	Caucasian
Krause (1880)	7	100	7	Caucasian
Kasai (1977)	10	88	11.4	Japanese
Langer (1846)	1	4	25	Caucasian
Le Double (1897)	6	95	6.3	Caucasian
MacAlister (1875)	1	16	6.25	Caucasian
Princeteau (1892)	25	208	12.02	Caucasian
Schramm (1984)	9	60	15	Caucasian
Struthers (1854)	8	105	7.62	Caucasian
Takafuji (1991)	3	47	6.4	Japanese
Turgut (2005)	1	26	3.8	Caucasian
Wagenseil (1927)	7	16	43.8	Chinese

entrapment and median nerve entrapment.[5] Major thrombosis of the upper extremity was one of the earliest lesions to be associated with the AAM. Other lesions linked to the AAM include thoracic outlet syndrome, shoulder instability syndrome etc. Aziz's report of bilateral AAM in a case of trisomy 13 points to a possible genetic basis for the formation of AAM.[6]

It has been suggested that a physical examination seeking evidence of an AAM should be performed for cases of compression syndrome in the cervico-axillary region. The presence of an AAM during physical examination may be detected as a palpable mass within the axilla or a loss of the typical axillary concavity. However, a physical examination may not necessarily reveal all AAMs; magnetic resonance imaging may then be needed for an accurate diagnosis.[7]

Daniels and della Rovere have described the importance of being aware of variations of the AAM while performing lymphadenectomy for

breast carcinoma and the potential for the inadequate clearance of level 1 nodes as a result of coverage of the nodes by the AAM.[8] An understanding of the spectrum and complexity of this anatomical variation may be of benefit to any surgeon performing an axillary lymphadenectomy.[8]

In conclusion it is important that surgeons operating in the axilla be aware of this not uncommon anatomic variant. When present, Langer's arch should always be accurately identified and formally divided to allow adequate exposure of axillary contents to achieve a complete lymphatic dissection and preserve vascular, lymphatic and nervous structures.

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