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CADAVERIC STUDY ON LANGER'S AXILLARY ARCH

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ABSTRACT

Axilla is a pyramidal shaped fossa present in between the upper limb and trunk. Langer's axillary arch is an important anatomical variant of the axillary region, connecting the latissimus dorsi and the pectoralis major muscle. Lack of awareness about this variant, may lead to complications while treating the patient among clinicians. In our study, seventy upper limbs in 35 embalmed cadavers were dissected and out of this three axillary arch variations were found in 2 cadavers, Out of which one male cadaver showed bilateral axillary arch variation and one female cadaver showed variation only in right axilla, which extended from lateral border of latissimus dorsi, crossing axillary neurovascular structures and getting inserted over brachial fascia. In conclusion, this study and literature overview point out the clinical importance of anatomical variant, Langer's axillary arch. Its misidentification can lead to wrong diagnosis and surgical complications, which could easily be avoided by intimate anatomical knowledge of the axillary region and its most frequent variants.

KEYWORDS: Langer's axillary arch; Axillary region; Latissimus dorsi muscle; Pectoralis major muscle; Brachial fascia.

INTRODUCTION

The axillary region is a clinically important area because it possesses neurovascular and lymph node structures associated between the neck and the upper limb. Langer's axillary arch is an important anatomical variant of the Axillary region, occasionally found to extend from the lateral border of latissimus dorsi muscle across, infront of axillary vessels and nerves to join with pectoralis major muscle, coracobrachialis or fascia over the biceps brachii.[6] It's about 7-10cm in length and 5-15 mm in breadth.[6] Axillary arch may cause obstructions of axillary vessels and nerves. Muscular variations in the axillary region may be involved in thoracic outlet syndrome, shoulder instability, development of lymph edema of the upper limb, and surgical interventions such as breast surgery.[2] By shoulder Magnetic Resonance Imaging examination, Guy et al.[3] suggested that the axillary arch can cause lymph node concealment and brachial plexus impingement.

Jelev[5] summarized the three main characteristics of a typical axillary arch in his literature review:

- The axillary arch has a constant origin from the latissimus dorsi muscle.
- The axillary arch inserts into structures around the anterosuperior part of the humerus.
- The axillary arch crosses the axillary neurovascular bundle from dorsomedial to ventrolateral.

The Aim of this study is to show the high variability of this anatomical variant, to emphasize the importance of its correct identification and to summarize existing literature on muscular variants in axilla with an example of a muscular axillary arch found during dissection.

MATERIALS AND METHODS

The present study was conducted in 70 upper limbs (35 right side and 35 left side) from 35 embalmed cadavers dissected during routine dissection and seen for axillary arch variation. Whenever found, the arch was dissected carefully from its origin to insertion and its nerve supply was noted. Its relation to the structures in the axilla, such as axillary artery, vein, and brachial plexus were studied in detail.

RESULT

Out of seventy upper limbs studied, three Langer's axillary arch variations were found in two cadavers. Among which, one male cadaver showed bilateral axillary arch variation (figure1,2), one female cadaver showed variation only in right axilla(figure 3). In all 3 variations the muscular slip of the axillary arch run from the lateral border of latissimus dorsi muscle, crossing over the axillary vessels and inserted into fascia covering the deep surface of pectoralis major muscle. The muscular slips were supplied by a branch of the thoraco dorsal nerve, which supplied the Latissimus dorsi muscle as well.

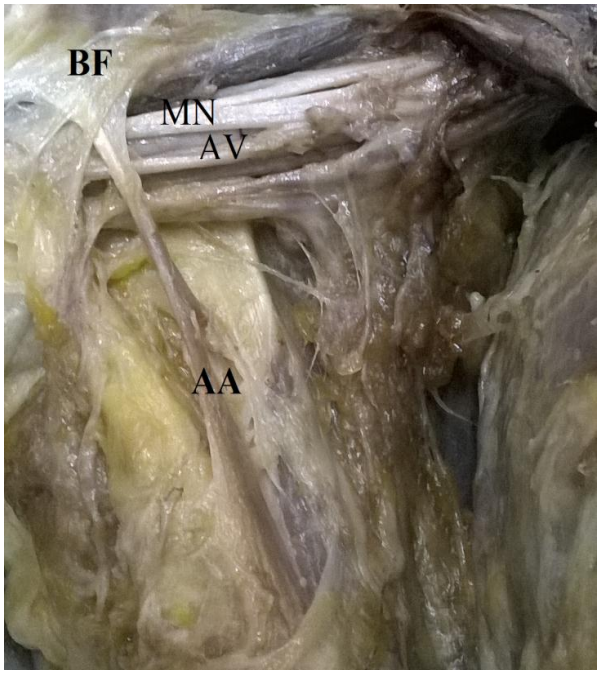

Figure 1: Right side Axillary Arch in male cadaver. MN- Median Nerve, BF-Brachial Fascia, AV-Axillary Vessels AA-Axillary Arch

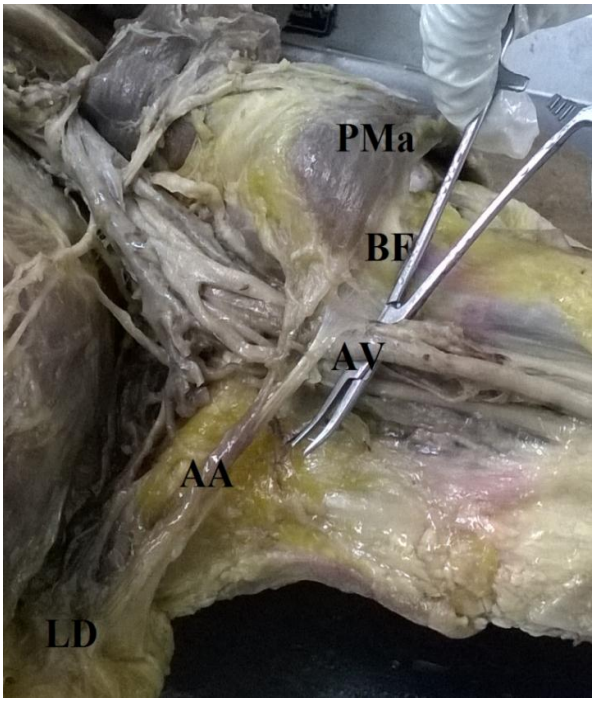

Figure 2: Left side Axillary Arch in male cadaver. PMa-Pectoralis Major, BF-Brachial Fascia, AV-Axillary Vessels AA-Axillary Arch
LD-Latissimus Dorsi Muscle

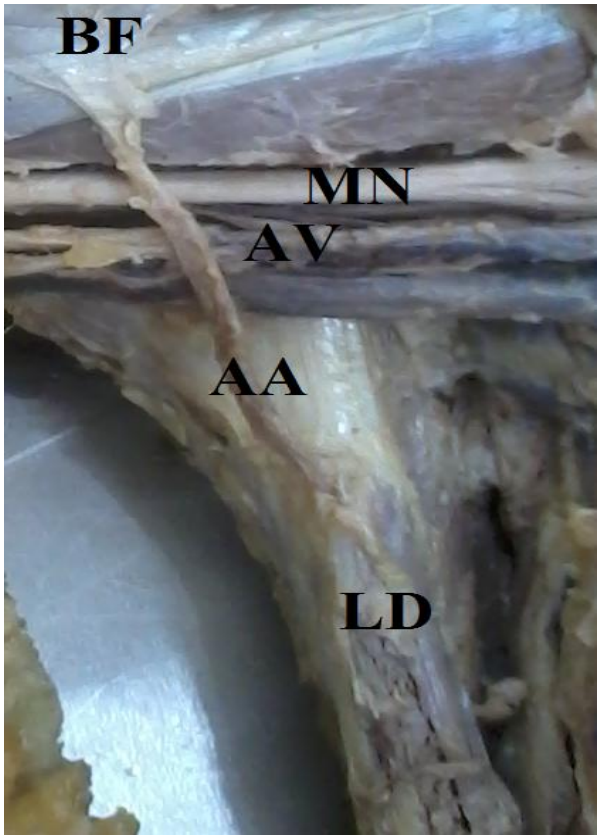

Figure 3: Right side Axillary Arch in female cadaver. MN-Median Nerve, BF-Brachial Fascia, AV-Axillary Vessels AA-Axillary Arch
LD-Latissimus Dorsi Muscle

DISCUSSION

Axilla is a pyramidal shaped fossa present in between the upper limb and trunk. Muscles around this space showed multiple anatomical variations. One of the variation is Axillary Arch.

The Axillary arch –muscle variant in axillary region is not very rare but it is not explored and not described well during dissection. Axillary arch was first identified by Ramsay and later described by Langer.[8] Previously it has also been described as Aschelsbogen, Axillopectoral muscle, Pectodorsal muscle or Arcus axillaris[13], presently known as Langer's Axillary arch.

Variations in this muscle typically involved, one origin and one insertion. Few cases are described with multiple sites of insertion. Axillary arch arises from the Latissimus dorsi muscle and inserted into the either one of the muscles in the arm or brachial fascia.[9] The axillary arch may also arise as a bulkier muscle and the fibres are twisted in the due course, inserted as two groups. Lower fibres blending with Fascia covering pectoralis major, Upper fibres continuous with deep fascia of arm.[15] The axillary arch showed a clear origin solely by tendinous intersection from the muscular bulk of the lalatissimus dorsi muscle.

Smith AR reported a bilateral incomplete type of anomalous musculo tendinous bands, consistent with axillary arch of Langer.[14] Merido-Velasco et al reported four axillary arches in 3 out of 32 adult human dissected cadavers. In first cadaver bilateral and complete type was found and both were innervated by thoracodorsal nerve and it also crossed the axillary neurovascular bundle anteriorly. The unilateral and incomplete type in second cadaver was also innervated by thoracodorsal nerve, crossed anteriorly to the axillary neurovascular bundle and attached to the coracobrachialis muscle. In third cadaver unilateral and incomplete type of axillary arch innervated by medial pectoral nerve and crossed posterior to the axillary neurovascular bundle and attached to the coracoids process.[10]

Bertone VH et al found 9 axillary arches in 78 dissected axillae and stated that the knowledge of such a muscle variation and the possibility of finding it during surgical procedures is essential for lymph node staging, lymphadenectomy and also important in diagnosing the compression of axillary vessels and brachial plexus.[1] Jyothi K C et al reported a unilateral complete type of axillary arch was found in 60 year old female cadaver. Anatomical variations of axilla are of great relevance due to increasing surgical procedures done in this region for breast cancer, reconstructive procedures and axillary by pass operations. If the axillary arch produces upper limb neurovascular compression similar to thoracic outlet syndrome and simple excision of the muscle will be done to alleviate the symptoms.[7]

In the present study axillary arch was described bilaterally in one cadaver, unilaterally in one cadaver out of 35 embalmed cadavers dissected, totally three axillary arch variations found during dissection. All three variations arise from the lateral border of latissimus dorsi muscle, crossing the axillary neurovascular structures and inserted over brachial fascia.

The innervation of the axillary arch is also variable and mainly based on the following three nerves: the lateral pectoral nerve[12] the medial pectoral nerve[12,16], the thoracodorsal nerve. In the present study the innervation of the three axillary arch was derived from the thoracodorsal nerve. But this innervation could give some clue to the embryological origin of the axillary arch whether it originates from an incomplete dorso epitrochlearis muscle, or it is a homologue of the pectoralis quartus muscle, or a remnant of panniculus carnosus, or a remnant of the superficial common layer of the latissimus dorsi muscle and the pectoralis major muscle are the hypotheses mentioned in literatures.

Hollinshead and Wilson proposed to identify the embryological origin of this variant based on the respective innervation: arising from the pectoral nerves it is probably derived from the pectoralis major muscle[4] arising from the thoracodorsal nerve it is probably originating from the latissimus dorsi muscle.

The axillary arch could possibly be mistaken for a tumor or enlarged lymph nodes. Some axillary structures could be entrapped, leading to the impingement of the brachial plexus, hyperabduction syndrome, axillary vein entrapment.[12] But also in axillary surgery[16] or in breast reconstruction using a latissimus dorsi musculocutaneous flap this anatomical variant could lead to complications due to its close relationship to the neurovascular structures of the axilla.

Due to these possible complications, correct identification of Langer's axillary arch is very important in clinical practice to rule out pathology from normal anatomical variant. When Langer's axillary arch develops a contracture, the patients complain of severe difficulties in elevating or even moving their arms. But in all symptomatic cases, transection of this muscular slip cures the problem.[12]

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CONCLUSION

In conclusion, this study and literature overview point out the clinical importance of anatomical variant, Langer's axillary arch. Its misidentification can lead to wrong diagnosis and surgical complications, which could easily be avoided by intimate anatomical knowledge of the axillary region and its most frequent anatomical variation.

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