Case Report

The Morphological and Histological Study of Achselbogen Muscle—A Case Report

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Abstract

A muscular or fibromuscular slip that extends from the latissimus dorsi to the pectoralis major, pectoralis minor, coracobrachialis, or fascia across the biceps brachii characterizes the Achselbogen muscle, an anatomical variation of the axilla. Even though it is frequently asymptomatic, its existence is clinically significant during axilla-related surgical, radiological, and diagnostic procedures. The purpose of this case study is to highlight the significance of anatomical variations that are not only of interest to scholars but also crucial during axillary dissections to avoid complications and ensure the best possible surgical results. We observed an odd muscular slip that extended from the middle of the latissimus dorsi, passed laterally to the pectoralis muscle, and merged with the fascia covering the biceps brachii during normal dissection for Phase I MBBS students. Surgeons and radiologists need to be aware of Langer's arch to reduce accidental injury to neurovascular structures and prevent misinterpretation during imaging and surgical procedures in the axillary region. Safer, more effective clinical procedures can result from understanding these variations.

Keywords: Langer's axillary arch, anatomical variation, Latissimus dorsi, axilla, clinical significance.

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Introduction

The intricate anatomical area known as the axilla is a key site for vital neurovascular connections linking the neck and upper limb. Widespread variations in its vascular, muscular, and neuronal components have important clinical and surgical ramifications. One such muscular variety is Langer's axillary arch, also known as the muscular axillary arch or the axillary arch of Langer. After Ramsay initially characterized this feature in 1795, Karl Langer recognized it as a muscular or fibromuscular slip that crosses the axilla in 1864. [1] The length, thickness, and composition of this arch can vary, ranging from small fibrous bands to well-developed muscle slips. The incidence reported in the literature ranges from 4% to 25%, depending on the population studied and the assessment method.

Langer's arch may have important clinical implications, even though it is often asymptomatic and is discovered by chance during dissection or surgery. Despite the axillary arch's apparent lack of functional significance, a small study with 22 cases showed that women with this polymorphism had superior arm strength, motor control, and endurance compared to women without the variant. [2]

Edema, venous obstruction, or nerve entrapment syndromes can result from axillary surgeries because the muscle may alter the normal topography of the axilla, obstruct underlying structures, or compress neurovascular components such as the axillary vein, median nerve, or musculocutaneous nerve. From a surgical perspective, it is crucial to comprehend this variation to avoid inadvertent damage or wrong structural identification during procedures such as mastectomy, reconstructive surgery, axillary lymph node dissection, and neurovascular interventions.

Similarly, radiologically, the axillary arch may appear as soft-tissue abnormalities or lymphadenopathy, which can lead to diagnostic ambiguity. [3] Because of its anatomical and clinical importance, careful study and documentation of Langer's axillary arch enhances understanding, improves surgical safety, and reduces complications during axillary-related clinical operations.

Case Report

An adult female cadaver displayed an abnormal muscle slip known as the axillary arch in the left axilla during the phase I MBBS students' standard axilla dissection at KMCH Institute of Health Sciences and Research, Coimbatore.

The muscle was tendinous near the latissimus dorsi and on the

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underside of the pectoralis major muscle. It was 9 cm long and started at the lateral boundary of the latissimus dorsi before turning muscular in the middle. The maximum width of the muscle was 0.6 cm. Near the insertion, it was aponeurotic and 2 cm broad. Six centimeters from the apex of the coracoid process is where this muscle slip is inserted [Figures 1&2]. The muscle was found to consist of skeletal muscle fibers and connective tissue fibers after being referred to the pathology department for histological examination [Figure 3]. The blood supply and nerve supply of the muscle were absent from this corpse due to the substantial amount of axillary fat. To determine if this change is unilateral or bilateral, the right axillary cavity was also opened; however, no axillary arch muscle was visible.

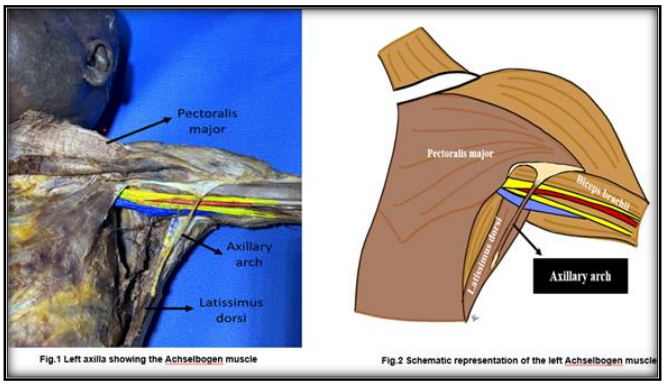

Fig.1 Left axilla showing the Achselbogen muscle

Fig.2 Schematic representation of the left Achselbogen muscle

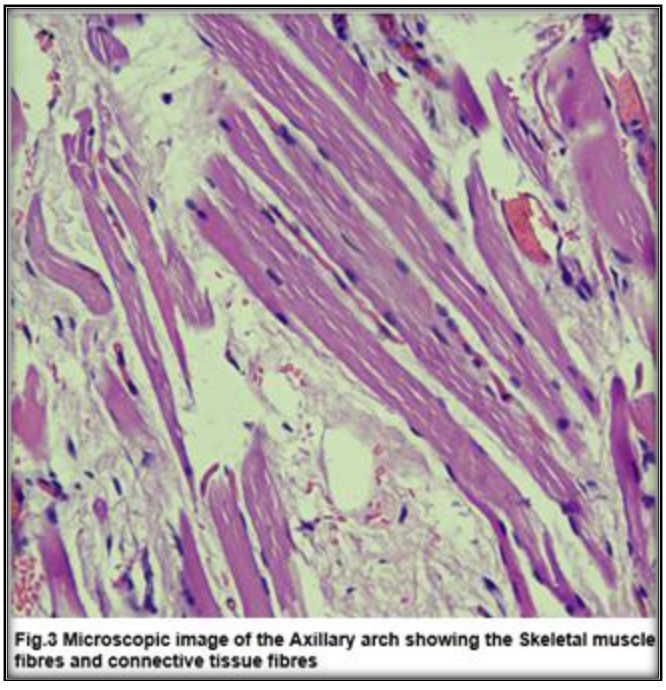

Fig.3 Microscopic image of the Axillary arch showing the Skeletal muscle fibres and connective tissue fibres

Discussion

The axillary arch, a variation or persistence of muscle differentiation in the axillary area, is thought to represent a remnant or descendant of the panniculus carnosus. [4] This peculiar structure is referred to as the axillary arch, arcus axillaris, axillo-pectoral muscle, Langer's axillary arch, and pectoral dorsalis muscle. [5] In the left axilla, a peculiar muscle slip was seen. It started in the latissimus dorsi, inserted under the pectoralis major, and arched across the brachial plexus cords and axillary arteries by Jyothi KC et al. [6]. During a physical examination, if the arm is abducted and the palms are put on the head, an axillary arch impression can be observed in the medial direction of the axillary cavity.

Soo-Jung Jung and associates observed that this small muscle slip began at the lateral boundary of the latissimus dorsi's tendinous portion and extended 90 mm farther, passing through the axilla and resting just above the median nerve. On the same side, musculocutaneous nerve variation was also discovered. The musculocutaneous nerve entered the coracobrachialis muscle after emerging from the brachial plexus's lateral cord. It then extended an additional 107 mm before joining the median nerve. [7]

Merido-Velasco et al. reported that four axillary arches were present in three of the thirty-two adult human cadavers that were dissected. In the first cadaver, bilateral and complete kinds were found; both crossed the axillary neurovascular bundle anteriorly and were innervated by the thoracodorsal nerve. The unilateral and incomplete type in the second cadaver was innervated by the thoracodorsal nerve, connected to the coracobrachialis muscle, and crossed anterior to the axillary neurovascular bundle. The third cadaver had an incomplete, unilateral type innervated by the medial pectoral nerve, attached to the coracoid process, and crossed posterior to the axillary neurovascular bundle. The first two cadavers may have had compression of the neurovascular systems that reach deep into the muscular band, which could have also contributed to hyperabduction syndrome. [8] Larger lymph nodes or soft-tissue tumors could be mistaken for the axillary arch. [9]

The reported prevalence ranges from 0.8 to 37.5% across studies, depending on the population studied and the methods used (cadaveric dissection, intraoperative reports, and imaging). [2] Guy et al. discovered the arch in 71 cases in a North American sample in their 2011 MRI-based examination of 1,109 shoulder scans, with no appreciable variation by side or sex. [10] However, surgical records, especially those related to breast surgery, often show lower prevalences in some circumstances (among Caucasian cadavers or surgical populations where the arch is substantial enough to be clinically evident or to hinder the operation). [1] Geographical and ethnic disparities appear to exist; studies conducted in East Asia show a higher frequency, while those performed in Turkey and among Caucasians go toward the lower end. The lateral thoracic nerve innervates this muscle. [1] Wilson states that it is equivalent to the humeral part of the panniculus carnosus. [11]

The formation of the pectoral region muscle bundle is made possible by the highly developed panniculus carnosus in lower animals. However, as the upper limb muscles have grown in functional significance during evolution, this structure has evolved in humans. This would be a natural tactic based on individual muscle contractions, resulting in segmented and precise movements, as would the decreased frequency of intermuscular linkages in humans (common in animals).

Furthermore, in certain circumstances, innervation from the intercostobrachial, thoracodorsal, and internal thoracic nerves may vary. [11] An unusual example of the axillary arch that started at the scapula's coracoid process and finished at the long head of

the triceps brachii muscle was reported by Turgut et al. [12]. MRI and imaging studies usually estimate prevalence in mixed populations at 5-8%, while large dissection series report varying percentages, driven by geographic/genetic groups and the categories used. The arch is more frequently unilateral and muscular than merely fibrous in several contemporary series. Important large investigations and systemic dissections give current best estimates and detailed descriptions of origin, insertion, tissue composition, and laterality.

In another investigation, Bertone VH et al. found nine axillary arches in 78 dissected axillae. They concluded that knowledge of this muscle variation and the ability to identify it during surgical procedures are essential for lymph node staging, lymphadenectomy, and differential diagnosis of brachial plexus and axillary artery compression. [1]

Even while many cases are asymptomatic and discovered by mistake during dissection or imaging, several serious clinical issues have been documented. Because numerous arches run anterior to the axillary arteries and nerves, complaints of paraesthesia, pain, swelling, and even venous or arterial obstruction have been reported.

Guy et al. found that patients with arches had higher neurological symptoms in their upper extremities than those without. [10]

The arch may impede lymph nodes during breast cancer surgery, making sentinel lymph node sampling, identification, and complete dissection more challenging. Because arch lymph nodes are situated between the arch and the chest wall, they may be concealed in 92% of cases. This could lead to incorrect interpretation of axillary fullness or insufficient axillary node excision. Surgical case studies verify that it can be difficult to identify nodes or landmarks when an arch is present. [13]

Aditya and colleagues noted that three of the five cases of Langer's axillary arches identified were incomplete, whereas the other two were not. Because the surgeons were already aware of this anatomical variation, they were able to identify it immediately and treat all five instances efficiently during surgery, avoiding any potential intraoperative and postoperative complications. [14]

If its nature is not determined, a noticeable arch may appear on imaging or physical examination as a tumor or enlarged lymph nodes, sometimes leading to unnecessary investigation. Understanding the arch is essential when using latissimus dorsi flaps, as different attachment slips may affect harvesting or flap positioning.

Conclusion

Due to the rise in surgical treatments performed in this area, modifications of the axilla are a very important area for axillary bypass surgery, reconstructive surgery, and breast cancer. The presence of an axillary arch may be indicated by fullness of the axilla with a lack of typical concavity and a felt or visible axillary mass. Patients with upper limb neurovascular compression symptoms that resemble thoracic outlet syndrome should be evaluated for it; a straightforward muscle excision is curative. Preoperative knowledge of these muscles is essential for identifying them and preventing potential surgical difficulties.

Limitations: A widely used classification approach does not account for the origin, insertion, tissue type, size, and neurovascular connections. Such a classification would make it easier to compare studies. Most of the research is retrospective or case reports. Determining the clinical relevance of an arch may benefit from research on imaging and clinical assessment. A significant portion of the data is derived from populations in West or East Asia; further information from South Asia, Africa, and Latin America could help identify potential genetic or developmental factors and explain variations in prevalence.

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Conflicts of interest

There are no conflicts of interest.

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