Axillary arch: Clinical significance in breast cancer patients

**Deep Lamichhane, Sanjit Kumar Agrawal,
Sumit Mukhopadhyay, Rosina Ahmed**

ABSTRACT

Introduction: Langer's axillary arch is a muscular slip extending from the anterior border of latissimus dorsi muscle to tendons, muscles or fascia around the superior part of humerus, lying anterior to the neurovascular bundle. It is the best-known anatomic variant of the axilla, with definite clinical and surgical implications.

Case Report: A 55-year-old female presented with a 3x3 cm carcinoma in the superomedial quadrant of the right breast, with no palpable regional lymph nodes. She underwent breast conservation surgery with axillary nodal clearance. During axillary dissection, an unusual muscle slip was identified crossing the axilla, connecting the anterior border of latissimus dorsi to the posterior surface of pectoralis major, anterior to the axillary artery, vein and brachial plexus.

Conclusion: Preoperative knowledge is essential to identify such unusual anatomy and to appropriately tackle it to avoid surgical complications and adequate axillary lymph node clearance.

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CASE REPORT

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Keywords: Axillary arch, Axillary lymph node dissection, Breast carcinoma

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INTRODUCTION

Anatomical variations in the axilla are of great relevance during all surgical procedures performed in this region. This includes minimal axillary procedures such as sentinel lymph node biopsy, where precision in recognizing anatomical landmarks is essential, axillary dissection in case of malignancy and also a number of larger reconstructive procedures and vascular bypass operations [1].

Various accessory muscular slips have been described in the axilla. The best known variant, the axillary arch (AA), is a muscular or fibromuscular slip of variable dimensions extending from latissimus dorsi muscle, which crosses over the neurovascular structures to join the under surface of the tendon of pectoralis major, coracobrachialis or the fascia over the biceps brachii [2, 3].

The presence of the axillary arch has important clinical implications. This variation occurs unilaterally in about 7% of the population, more commonly in females than in males [3].

Deep Lamichhane¹, Sanjit Kumar Agrawal², Sumit Mukhopadhyay³, Rosina Ahmed⁴

Affiliations: ¹Fellow, Department of Surgical Oncology, Tata Medical Center, Kolkata, West Bengal, India; ²Fellowship in Surgical Oncology, European Board of Surgery (Qualification in Breast Surgery), Consultant Breast Surgeon, Department of Breast Surgery, Tata Medical Center, Kolkata, West Bengal, India; ³Consultant Department of Radiology, Tata Medical Center, Kolkata, West Bengal, India; ⁴Senior Consultant Breast Surgeon, Department of Breast Surgery, Tata Medical Center, Kolkata, West Bengal, India.

Corresponding Author: Deep Lamichhane, Fellow, Department of Surgical Oncology, Tata Medical Center, 14-Major arterial road (EW), New town, Rajarhat, Kolkata 700156, West Bengal, India; Email: deeplamichhane@gmail.com

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CASE REPORT

A 55-year-old female presented with a right breast lump of six months duration. Clinical examination revealed a 3x3 cm lump in the superomedial quadrant of the right breast, with no palpable regional lymph nodes. Mammography showed a BIRADS 5 lesion at 1 o'clock, with suspicious axillary lymph nodes on ultrasonography. Core biopsy showed invasive ductal carcinoma (IDC) Grade III, estrogen and progesterone receptor negative, HER-2 positive. She underwent breast conservation surgery with axillary nodal clearance.

During axillary dissection, an unusual muscle slip was identified, which crossed the axilla, connecting the anterior border of latissimus dorsi to the posterior surface of pectoralis major, anterior to the axillary artery, vein and brachial plexus. It was measured 7 cm in length and 1.5 cm in width (Figure 1). The lymph nodes medial and deep to the arch were successfully dissected and the arch was left undisturbed. The procedure and recovery were uneventful.

Pathological assessment confirmed IDC 3 cm, grade III with two lymph nodes positive for malignancy out of 36 dissected. Metastatic staging was normal, and she received adjuvant chemotherapy, trastuzumab and radiotherapy. Postoperative imaging showed a bilateral axillary arch along with postoperative changes in the right breast and right axilla (Figure 2).

DISCUSSION

Langer's axillary arch, a variation in axillary musculature, was first identified by Ramsay in 1795 and later described in detail by Langer in 1846 [2]. Testu's classification (1884) described the complete axillary arch, extending between the latissimus dorsi muscle and the tendon of the pectoralis major near its insertion on the humerus, and the Incomplete Arch, extending from the latissimus dorsi muscle to the axillary fascia, biceps brachii muscle, coracobrachialis, inferior edge of pectoralis minor muscle or the coracoid process [2]. In an additional classification, two forms of arch-shaped variations have been described, muscular (type I) and tendinous (type II), with different subtypes based on nerve supply and site of attachment. The term clinical axillary arch was introduced by Jeleu, who described it as a site of entrapment for nerves and vessels, and also classified the condition into superficial and deep [2]. Superficial arches cross in front of the vessels and nerves and primarily present with features of intermittent obstruction of veins. Deep arches occur on the posterior or lateral walls of the axilla and cross-only parts of the neurovascular bundle, axillary or radial nerves [2, 4]. The patient we described had a complete, superficial, muscular axillary arch.

The prevalence of this variation appears to be higher in dissected cadavers than found during surgery in the axilla. The prevalence of axillary arch in cadaveric dissection in

Figure 1: Axillary arch crossing neurovascular bundle. a: Axillary arch, b: Latissimus dorsi muscle, c: Neurovascular bundle, and d: Pectoralis major muscle.

Figure 2: Computed tomography scan showing right and left axillary arch (see arrow).

Japanese, Turkish and Bulgarian populations is 9.1%, 1.9% and 3.6% respectively [5–7]. On the other hand, it has been recognized in only 0.25% of patients during axillary surgical procedures [8]. The difference in prevalence in anatomical and surgical reports may be due to a failure to identify or report the variation when observed during surgery, whereas the specific aim of cadaveric studies is to identify anatomical anomalies [8].

Clinically, axillary arch may be palpable during physical examination as an axillary mass and may be confused with lymphadenopathy or soft tissue tumor. Most patients, similarly to the one described here, are asymptomatic. However, entrapment of the axillary neurovascular bundle by an axillary arch during arm movements has been described, and may cause circulatory insufficiency, chronic pain or paraesthesia [8]. The simple division of the arch is curative in such situations [9].

During axillary surgery, it may be mistaken for the lateral margin of the latissimus dorsi muscle, leading

dissection to be extended superior to the axillary vein, with the risk of injury to the axillary artery and brachial plexus [10]. It can also pose difficulty during sentinel node biopsy as it stretches in the hyper abducted position, shifting the nodes higher [11]. During axillary clearance for breast cancer some groups of axillary nodes such as lateral nodes, may be concealed under the axillary arch, and may be missed during routine dissection [10]. This may lead to inaccurate staging, which would negatively affect adjuvant systemic therapy decisions and also to an increased chance of local recurrence [10]. The possible presence of accessory muscle slips should also be kept in mind while draining axillary abscesses and while constructing latissimus dorsi flaps.

Some authors suggest routine division of axillary arch at the level of the axillary vein to be able to identify anatomical landmarks and to facilitate dissection of lymph nodes. Division might also reduce the possibility of postoperative axillary vein compression and associated lymphedema [10, 11]. The possibility of precipitating lymphedema is higher in patients having latissimus dorsi flaps for breast reconstruction and in this situation it is advisable that the axillary arch should be divided [11]. In this case, we were able to dissect nodes beneath the arch, without the need to divide it and there were no specific postoperative problems.

CONCLUSION

The axillary arch has both clinical and surgical implications, and surgeons must remember its possible presence and must be cautious during axillary dissection. It may be a reason for confusion during routine axillary surgery and can both affect procedural safety and adjuvant treatment decisions.

Author Contributions

Deep Lamichhane – Substantial contributions to conception and design, Acquisition of data, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Sanjit Kumar Agrawal – Substantial contributions to conception and design, Analysis and interpretation of data, Drafting the article, Revising it critically for important intellectual content, Final approval of the version to be published

Sumit Mukhopadhyay – Acquisition of data, Drafting the article, Final approval of the version to be published

Rosina Ahmed – Acquisition of data, Drafting the article, Final approval of the version to be published

Guarantor of Submission

The corresponding author is the guarantor of submission.

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Conflict of Interest

Authors declare no conflict of interest.

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