

# The Axillary Arch Inserted to the Coracoid Process Compressing the Brachial Plexus

El Arco Axilar Insertado en el Proceso Coracoideo Comprimiendo el Plexo Braquial

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**SUMMARY:** The axillary arch is a variant slip extending between the latissimus dorsi muscle and the pectoralis major. During educational dissection, a variant muscle was found in left arm of 70-year-old female cadaver. A slip muscle originated from the lateral margin of the latissimus dorsi and crossed the axilla obliquely. Therefore, we defined this muscular variation as axillary arch. It ran anterior (superficial) to the medial and lateral cords of the brachial plexus, and then it inserted to coracoid process. We reported this variant muscle and discussed its clinical significances.

**KEY WORDS:** Axillary arch; Coracoid process; Langer's muscle; Latissimus dorsi; Variation.

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## INTRODUCTION

Continuous attention has been developed on the anatomical variations of the axilla in anatomist and surgeon due to their clinical importance. One of the most common muscular anatomical variation within the axillary region is Langer's axillary arch, which is called as variously axillopectoral muscle, pectodorsal muscle or arcus axillaris (Langer, 1846; Bergman *et al.*, 2016). The axillary arch is generally in the form of a thin muscular slip and extends between the latissimus dorsi muscle and the pectoralis major muscle (Langer; Bergman *et al.*). Its insertion varied as pectoralis minor, teres major, biceps brachii, coracobrachialis, and coracoid process. The prevalence of this variation muscle ranges from 7 % to 8 % (Loukas *et al.*, 2009). Its size may vary from 7 to 10 cm (2.8 to 3.9 in) in length and 5–15 mm (0.2–0.6 in) in width (Standring, 2008). Therefore, the shape, size, and insertion of the arch can vary widely.

Here, we reported a rare pattern of axillary arch muscle compressing the brachial plexus directly. Though most of axillary arch is usually asymptomatic, this case may be associated with neurovascular structures accompanying clinical significance (Daniels & della Rovere, 2000; Kil *et al.*, 2014). Therefore, clinicians should be aware of this anatomical variation to avoid the misdiagnosis and complications during surgical interventions or procedure in axillary region.

## MATERIAL AND METHOD

During educational dissection in Keimyung University School of Medicine, the upper limbs were dissected and observed carefully to study the compartments of the pectoral and axillary regions.

## RESULTS

A variant muscle was founded in left arm of 70-year-old female cadaver. There was no gross evident pathology or evidence of past surgical procedures involving the axilla, the shoulder or the anterior thoracic wall.

A slip muscle originated from the lateral margin of the latissimus dorsi and continued 89 mm more crossing the axilla obliquely (Fig. 1). Therefore, we defined this muscular variation as axillary arch. It lied superficial to the lateral and medial cords of the brachial plexus. The width at broadest point was 4 mm, where it crossed to lateral cord of the brachial plexus. And then, this variant muscle inserted into the coracoid process of the scapulae. Its arterial supply and innervation were not found. There were no other frequently accompanying variations, especially chondroepitrochlearis.

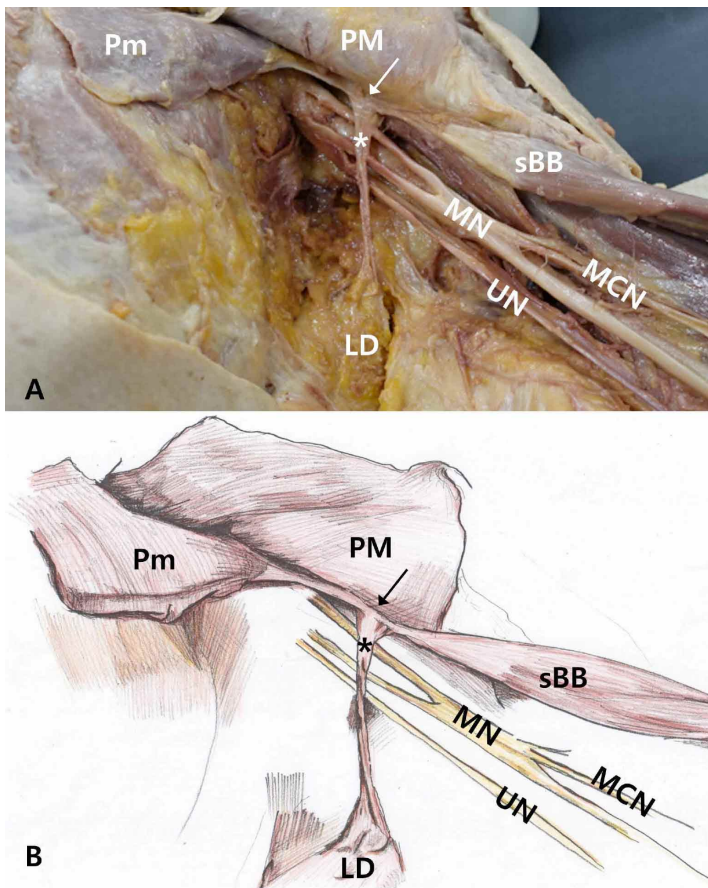


Fig. 1. Photograph (A) and schematic drawing (B) of the left axilla showing the axillary arch (\*). It extended from the latissimus dorsi (LD) to the coracoid process (arrow) and crossed the brachial plexus. MCN, musculocutaneous nerve; MN, median nerve; PM, pectoralis major; Pm, pectoralis minor; sBB, short head of the biceps brachii; UN, ulnar nerve.

## DISCUSSION

The axillary arch is known as an anomalous slip of muscle that arises from the latissimus dorsi in axilla (Langer; Bergman *et al.*). This variation was identified first in 1846, as the axillary arch, or Langer's arch, named after the surgeon (Langer). Various patterns of axillary arch have been reported until now, and its most common form extends from the latissimus dorsi to pectoralis major (Langer; Standing; Loukas *et al.*; Bergman *et al.*). Its frequency varied from the 0.25 % to 37.5 %, depending on the ethnic groups (Loukas *et al.*). In Korean, axillary arch was found in 7.4 % (79/1069) of patients with breast cancer (Kil *et al.*), which is similar with Europeans and Japanese; lower in the Turkish population and more prevalent in the Chinese population (Loukas *et al.*). Axillary arch may be rudimentary remnants of homologous structures in other species, as panniculus carnosus muscle which is well developed in some lower mammalian species (Yüksel *et al.*, 1996). However,

additional information about its embryological aspect has not established.

Testut (1884) classified axillary arch as complete and incomplete according to its insertion site. The complete form extended the tendon of the pectoralis major near its insertion on the humerus; in the incomplete form, the axillary arch inserted to the axillary fascia, biceps brachii muscle, coracobrachialis muscle, the bicipital groove, pectoralis minor muscle or the coracoid process (Testut). Axillary arch in present case was incomplete form originated from latissimus dorsi and inserted into the coracoid process, which is in agreement with above mentioned cases.

However, this insertion pattern to the coracoid process was extremely rare (Takafuji *et al.*, 1991; Mérida-Velasco *et al.*, 2003). And an axillary arch in present case compressed both cords of the brachial plexus directly though axillary arch by Mérida-Velasco *et al.* was located deep to neurovascular bundles. Its widest at crossing point may support this hypothesis about the compression of the brachial plexus by axillary arch. However, we cannot check related symptoms of donor, therefore, its clinical significance should be confirmed further.

Axillary arch may induce potential clinical implications including neurovascular compression, axillary vein thrombosis, hyperabduction syndrome, and misdiagnosis. Many axillary archs tended to coexist other muscular variation, especially chondroepitrochlearis, extended from the pectoralis major to the medial epicondyle (Takafuji *et al.*). Though other variant muscle was not shown in our case, their co-existence may induce unexpected and uncommon clinical conditions (Takafuji *et al.*; Mérida-Velasco *et al.*). Therefore, clinician should be aware of knowledge about these variations due to their close relationship to the neurovascular structures in the axilla.

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**RESUMEN:** El arco axilar es una variante que se extiende entre el músculo dorsal ancho y el pectoral mayor. Durante la disección educativa, se encontró una variante muscular en el brazo izquierdo de un cadáver de una mujer de 70 años. El músculo deslizador se originó en el borde lateral del dorsal ancho y cruzó la axila oblicuamente. Por lo tanto, definimos esta variación muscular como el arco axilar. Se extendió anterior (superficial) a los cordones medial y lateral del plexo braquial, y luego se insertó en el proceso coracoideo. Reportamos esta variante muscular y discutimos sus significados clínicos.

**PALABRAS CLAVE:** Arco axilar; Proceso coracoideo; Músculo de Langer; Dorsal ancho; Variación.

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