SHORT REPORT

Eur J Anat, 12 (3): 169-173 (2008)

Axillary arch: a rare variation

M. Mujahid Khan, H.H. Darwish and W.A. Zaher

Department of Anatomy, College of Medicine, King Khalid University Hospital, King Saud University, Riyadh, Saudi Arabia

SUMMARY

The axillary arch is a muscle slip varying from 7 to 10 cm in length and 5 to 15 mm in breadth. It occasionally arises from the edge of the latissimus dorsi, at about the middle of the posterior fold of the axilla and crosses the axilla in front of the axillary vessels and nerves to join the under-surface of the tendon of the pectoralis major, the coracobrachialis, or the fascia over the biceps. During the dissection of a human cadaver, an unusual muscle band was encountered and identified as an axillary arch on the right side of a 60-year old male cadaver. The anomalous muscle band was an extension from the lateral border of the latissimus dorsi muscle. The muscle measured 6 cm in length, 2 cm wide and 2 mm thick. Since this muscle may be the cause of different pathologies, we were prompted to discuss the clinical relevance of our findings.

Key words: Axillary – Latissimus dorsi – Clinical – Entrapment

INTRODUCTION

The axillary arch is a muscular slip, varying from 7 to 10 cm in length and 5 to 15 mm in breadth, that occasionally arises from the edge of the latissimus dorsi, at about the middle of the posterior fold of the axilla, and crosses the axilla in front of the axillary vessels and nerves to join the under-surface of the tendon of the pectoralis major, the coracobrachialis, or the fascia over the biceps. It is present in about 7% of subjects and may be multiple (Williams et al., 1995). Several accessory muscles slips originating from the latissimus dorsi, pectoralis major or from the ribs and costal cartilages have been discussed in the literature (Davies and Davies, 1962; Hollinshead, 1982; Bergman et al., 2008). Occasionally, this muscle may pass between the latissimus dorsi and pectoralis major, forming a complete arch across the axilla (Dharap, 1994). It may then blend with the coracobrachialis, biceps brachii or triceps brachii (Davies and Davies, 1962), teres major (Bergman et al., 1988), or coracoid process of the scapula (Bonastre et al., 2002). As a result, the anatomy of the axillary fossa may vary (Hollinshead, 1982; Miguel et al., 2001). Usually, the axillary arch crosses the axilla and has some relation to its neurovascular bundle. The presence of an accessory muscle in the axilla simulating an axillary mass can exert pressure on the neighboring neurovascular bundle or lymph routes, thus leading a broad range of symptoms (Turgut et al., 2005). A mediolater-

Submitted: February 29, 2008
Accepted: October 18, 2008

Correspondence to:
Dr. Muhammad Mujahid Khan. Department of Anatomy, (28), College of Medicine, King Khalid University Hospital, King Saud University, P.O. Box 2925, Riyadh 11461, K.S.A. Phone: 009661-4671486; Fax: 009661-4671300.
E-mail: dralkhan@hotmail.com

al oblique mammogram occasionally reveals an ovoid density that may be confused with a mass in the axilla or a band-like structure overlapped with the pectoralis muscle (Ko et al., 2006). It is not only an interesting variant structure but is also of great clinical significance (Georgiev et al., 2007). This report presents a case of an anatomical variation frequently referred to as axillary arch, which was found in a 60-year old formalin-fixed male cadaver during undergraduate dissection class at the College of Medicine, King Saud University, Riyadh. The variation is studied and discussed in relation to the available literature.

Case Report

During the dissection of a human cadaver, an unusual muscle band was encountered and identified as an axillary arch. This anomaly was present on the right side of a 60-year old male cadaver. The anomalous muscle band consisted of an extension from the lateral border of the latissimus dorsi muscle. When this band was traced along its course through the axilla, it passed obliquely upward, crossing over in front of the axillary vessels and nerves of the brachial plexus. At the end, the triangular muscular part blended with the coracobrachialis muscle (Fig. 1). The muscle measured 6 cm in length, 2 cm wide and 2 mm thick and was supplied by the fibers from the thoracodorsal nerve.

Discussion

The axillary arch is an anatomical variation of latissimus dorsi muscle insertion (Keshtgar et al., 1999) or an anomalous slip of muscle that arises from the body of the latissimus dorsi and inserts into the pectoralis major muscle (Turgut et al., 2005). Ramsay (1812) was the first author to observe this anomaly and stated that in 1795 he observed an oblong muscle that stretched from the pectoralis major to the latissimus dorsi and teres major. Since the first descriptions of the axillary arch were made by Langer (1846), the arch has sometimes been referred to as Langer's axillary arch, althoug other names are also given to this anomalous structure: the Langerscher Armbogen and the Langerscher Achselbogen (Corning, 1911), the axillopectoral muscle (Merida-Velasco et al., 2003; Sachatello, 1977; Turgut et al., 2005). Axillary arch is a fleshy slip of varying dimensions, often divided by a tendinous intersection, which extends from the latissimus dorsi, through the axillary fascia, to the pectoralis major, the short head of the biceps brachii, the coracobrachialis, or to the coracoid process of the scapula (Bergman et al., 1988). In our case it was blended with the coracobrachialis muscle (Fig. 1).

A frequency of 7-8% of this muscle anomaly appears in many anatomical text books (Eisler, 1912; Clemente, 1985; Haagesen, 1986; Tountas and Bergman, 1993; Williams et al., 1995). In fact, however, the frequency varies among different populations (Kasai and Chiba, 1977; Clarys et al., 1996; Serpell and Baum, 1991) (Table 1) and the incidence is much higher in cadaver dissections than that reported after surgical interventions (Georgiev et al., 2007; Le Double, 1897; Sachatello, 1977; Kasai and Chiba, 1977; Serpell and Baum, 1991; Kutiyanwala et al., 1998; Merida-Velasco et al., 2003) (Table 1). However, Merida-Velasco et al. (2003) noted that this low incidence may reflect a previous lack of knowledge about this anatomical variation.

The length and width of the axillary arch muscle has been measured by different authors (Serpell and Baum, 1991; Dharap, 1994; Yuksel et al., 1996; Miguel et al., 2001), but they failed to describe the thickness of the muscle, which in the present case measured 2 mm (Table 2). Also, the arch width has usually been found to be 1 cm or less (Table 2), the case described by

Table 1. Frequency of axillary arch as described by different authors.

Authors	Frequency (%)
Clarys et al. (1996)	10
Kasai and Chiba (1977)	9
Le Double (1897), Eisler (1912), Sachatello (1977), Clemente (1985), Haagesen (1986), Tountas and Bergman (1993), Williams et al. (1995)	7-8
Kutiyanwala et al. (1998), Merida-Velasco et al. (2003)	6
Serpell and Baum (1991)	0.2

Table 2. Length and width of the axillary arch as described by different authors.

Authors	Length (cm)	Width (cm)
Miguel et al. (2001)	6 - 15	0.5 - 0.7
Yuksel et al. (1996)	11	1
Serpell and Baum (1991)	7	1
Dharap (1994)	3.5	2.5
Present case	6	2

Fig. 1. Right axilla showing the axillary arch muscle. PM = Pectoralis minor; CB = Coracobrachialis; SHB = Short head of biceps; LHB = Long head of biceps; LD = Latissimus dorsi; LTN = Long thoracic nerve; MN = Median nerve; TDN = Thoracodorsal nerve; MCN = Musculocutaneous nerve; RN = Radial nerve; UN = Ulnar nerve; MCNF = Medial cutaneous nerve of the forearm; AA = Axillary artery; BR = Brachial artery; BV = Basilic vein.

Dharap (1994) being an exception, although in his case the muscle was transformed into a long slender tendon. In the present case the muscle was fleshy along its course.

The axillary arch muscle is innervated by the medial pectoral nerve, because it is embryologically developed from the pectoral muscle mass (Wilson, 1989), or by the thoracodorsal nerve due to its close relationship with the latissimus dorsi (Hollinshead, 1982; Dharap, 1994), although sometimes it is innervated by the nerve to the pectoralis minor (Sachatello, 1977). Afshar and Golalipour (2005) reported a case where a branch of the pectoral loop innervated the muscular axillary arch. In our case it was supplied by the thoracodorsal nerve.

The axillary arch may be the cause of several pathologies: axillary vein entrapment (Sachatello, 1977; Boontze, 1979), major thrombosis of the upper limb (Saitta and Baum, 1962; Tilney et al., 1970), lymphodermia (Kissin et al., 1986), costoclavicular compression syndrome (Boontze, 1979), hyperabduction syndrome (Sachatello, 1977; Merida-Velasco et al., 2003) and thoracic outlet and shoulder instability syndromes (Clarys et al., 1996). The presence of a muscular arch may cause difficulties in staging lymph nodes, and cosmetic problems (Ucerler et al., 2005).

This muscle predisposes to local recurrence in patients with melanoma and breast cancer. In such cases, inaccurate staging information could negatively affect systemic treatment decisions after surgery (Petrasck et al., 1997). Moreover, injury to the axillary vessels and branches of the brachial plexus may be encountered, unless it is recognized before surgery because of the possibility of mistaking the arch for the true lateral edge of the latissimus dorsi muscle and dissecting along it (Kutiyanwala et al., 1998; Petrasck et al., 1997). The diagnosis can be made using mammography and cross-sectional imaging, including CT or magnetic resonance imaging (Ko et al., 2006). Accordingly, we suggest that knowledge of the axillary muscular arch is clinically important before patients are subjected to surgery in the axillary region.

Acknowledgements

The authors are thankful to Dr. Khalid Abdoun for technical assistance and Mr. V. Salvador for illustrations.

References

Afshar M and Golalipour MJ (2005). Innervation of muscular axillary arch by a branch from pectoral loop. *Int J Morphol*, 23: 279-280.

Bergman RA, Thompson SA and Afifi AK (1988). *Catalog of human variations*. 8th edn. Urban and Schwarzenberg, Baltimore, pp 26-27.

Bergman RA, Afifi AK and Miyauchi R (2008). *Illustrated encyclopedia of human anatomic variations*. Opus I: Muscular System: Alphabetical listing of Muscles: A. pp 1.

Boontze AH (1979). Axillary vein entrapment. *Br J Surg*, 66: 331-332.

Bonastre V, Rodriguez-Niedenfuhr M, Choi D and Sanudo JR (2002). Coexistence of a pectoralis quartus muscle and an unusual axillary arch: Case report and review. *Clin Anat*, 15: 366-370.

Clarys JP, Barbaix E, Van Rompacy H, Caboor D and Van Roy P (1996). The muscular arch of the axilla revisited: its possible role in the thoracic outlet and shoulder instability syndromes. *Man Ther*, 1: 133-139.

Clemente CD (1985). Gray's Anatomy. 30th ed. Lea and Febiger, Philadelphia, pp 515.

Corning HK (1911). Lehrbuch der topographischen Anatomie. 3. Aufl. J.F. Bergman, Wiesbaden, pp 635.

Dharap A (1994). An unusually medial axillary arch muscle. *J Anat*, 184: 639-641.

Davies DV and Davies F (1962). Gray's Anatomy, Descriptive and Applied. 3rd ed. Longmans, London, pp 638.

Eisler P (1912). Die Muskeln des Stammes. Gustav Fischer Verlag, Jena, pp 607.

Georgiev GP, Jelev L and Surchev L (2007). Axillary arch in Bulgarian population: clinical significance of the arches. *Clin Anat*, 20: 286-291.

Haagesen CD (1986). Diseases of the breast. 3rd ed. Saunders, Philadelphia, pp 882-883.

Hollinshead WH (1982). Anatomy for surgeons. The back and limbs: vol. 3, 3rd ed. Harper and Row, Philadelphia, pp 280-281.

Kasai T and Chiba S (1977). True nature of the muscular arch of the axilla and its nerve supply. *Kaibogaku Zasshi*, 52: 309-336.

Keshtgar MRS, Saunders C, Ell PJ and Baum M (1999). Langer's axillary arch in association with sentinel lymph node. *The Breast*, 8: 152-153.

Kissin MW, Querci Della Rovere G, Easton D and Westbury G (1986). Risk of lymphoedema following the treatment of breast cancer. *Br J Surg*, 73: 580-584.

Ko K, Han BK, Shin JH, Choe YH, Chung HW, Lee EH and Choi SJ (2006). The axillopectoral muscle seen on mammography. *Clin Radiol*, 61: 625-629.

Kutiyanwala MA, Stotter A, and Windle R (1998). Anatomical variants during axillary dissection. *Br J Surg*, 85: 393-394.

Langer C (1846). Zur Anatomie des musculus latissimus dorsi. *Oester Med Wochenschrift*, 15: 454-458.

Le Double AF (1897). Traite des variations du systeme musculaire et de leur signification au point de vue de l'anthropologie zoologique. Tome premier. Schleicher Freres, Paris, pp 197-202.

Merida-Velasco JR, Rodriguez Vazquez JF, Merida Velasco JA, Sobrado Perez J and Jimenez Collado J (2003). Axillary arch: potential cause of neurovascular compression syndrome. *Clin Anat*, 16: 514-519.

Miguel M, Llusa M, Ortiz JC, Porta N, Lorente M and Gotzens V (2001). The axillopectoral muscle (of Langer): report of three cases. *Surg Radiol Anat*, 23: 341-343.

Petrasck AJ, Semple JL and Mccready DR (1997). The surgical and oncologic significance of the axillary arch during axillary lymphadenectomy. *Can J Surg*, 40: 44-47.

Ramsay A (1812). An account of unusual conformation of some muscles and vessels. *Edinburgh Med Surg J*, 8: 281-283.

Sachatello CR (1977). The axillopectoral muscle (Langer's axillary arch): A cause of axillary vein obstruction. *Surgery*, 81: 610-612.

Saitta GF and Baum V (1962). Langer axillary arch, an unusual cause of axillary mass. *JAMA*, 180: 696.

Serpell JW and Baum M (1991). Significance of «Langer's axillary arch» in axillary dissection. *Aust N Z J Surg*, 61: 310-312.

TILNEY ML, GRIFFITHS HJ and EDWARDS EA (1970). Natural history of major venous thrombosis of the upper extremity. *Arch Surg*, 101: 792-796.

TOUNTAS CP and BERGMAN RA (1993). Anatomic variations of the upper extremity. Churchill Livingstone, pp 79-81.

TURGUT HB, PEKER T, GULEKON N, ANIL A and KARAKOSE M (2005). Axillopectoral muscle (Langer's muscle). *Clin Anat*, 18: 220-223.

UCERLER H, AKTAN IKIZ ZA and PINAN Y (2005). Clinical importance of the muscular arch of the axilla (axillopectoral muscle, Langer's axillary arch). *Acta Chir Belg*, 105: 326-328.

WILLIAMS PL, BANNISTER LH, BERRY M, COLLINS P, DYSON M, DUSSEK JE and FERGUSON MWJ (editors) (1995). Gray's Anatomy. 38th ed. Churchill Livingstone, New York, pp 838.

WILSON JT (1989). Further observations on the innervation of axillary muscles in man. *J Anat Physiol*, 24: 52.

YUKSEL M, YUKSEL E and SURUCU S (1996). An axillary arch. *Clin Anat*, 9: 252-254.