

An aberrant independent origin of the serratus anterior pedicle: Case report

S. Rabi, I. Indrasingh, S. Koshy and S. Vettivel

Department of Anatomy, Christian Medical College, Vellore, India

SUMMARY

During routine dissection of the right upper limb in a male cadaver by the medical students in the department, an unusual artery was found on the side of the chest wall. The anomalous, aberrant artery was the first branch from the first part of the axillary artery. It crossed deep to the superior thoracic and lateral thoracic arteries, passed in front of the subscapular artery on the serratus anterior muscle and terminated, distributing that muscle, opposite the 8th intercostal space. There are known vascular anatomical variations in the supply to the serratus anterior. Due to serratus anterior or serrato-costal flap reconstructive surgery, an anomalous and aberrant vascular pedicle to the serratus anterior muscle is of interest to anatomists, surgeons, reconstructive surgeons and radiologists.

Key words: Axillary artery – Reconstruction – Serratus anterior pedicle – Thoracodorsal artery

INTRODUCTION

The serratus anterior muscle has been used as a flap for reconstruction. It is a reliable muscle flap with a consistently long pedicle, excellent malleability, and multipennate anatomy, permitting the coverage of complex three-dimensional wounds. The subscapular artery is the largest branch from the third part of the axillary artery; it divides into the circumflex scapular artery and the thoracodorsal artery, which follows the lateral border of the scapula between the latissimus dorsi and serratus anterior muscles and supplies

these two muscles: teres major muscle and intercostal muscles. The lateral thoracic artery, which is a branch from the second part of the axillary artery, supplies the serratus anterior, pectoral muscles and the subscapularis muscle (Gabella, 1995).

MATERIAL AND METHODS

During routine dissection of the right upper limb of a male cadaver by the medical students in the department, an unusual artery was found on the side of the chest wall. A careful dissection was made to trace it proximally and distally. The branches of the axillary artery were also traced.

OBSERVATIONS

The superior thoracic, acromiothoracic, and lateral thoracic arteries were normal. The subscapular artery, from the third part of the axillary artery, gave the circumflex scapular artery, and the thoracodorsal artery continued along the lateral border of the scapula, supplying the subscapularis and latissimus dorsi muscles. The aberrant artery to the serratus anterior muscle, 19 cm long and larger than the subscapular artery, was the first branch from the first part of the axillary artery (Fig. 1); it passed crossing deep to the superior thoracic and lateral thoracic arteries and continued, in front of the subscapular artery, on the serratus anterior muscle and terminated, distributing that muscle opposite the 8th intercostal space.

Correspondence to:

Dr. Suganthy Rabi. Department of Anatomy, Christian Medical College, Vellore 632 002, India.
Phone: 0091 0416 2262603 Ext 4245/2260545. Fax: 0091 416 2262788/2262268.
E-mail: suganthyrobi@cmcvellore.ac.in

Submitted: January 10, 2003
Accepted: March 7, 2003



Figure 1.- Anomalous serratus anterior pedicle. PM – pectoralis minor muscle; S – serratus anterior muscle; M – median nerve; N – thoracicus longus nerve; AV – axillary vein; AA – axillary artery; 1 – serratus anterior pedicle; 2 – superior thoracic artery; 3 – acromiothoracic artery; 4 – lateral thoracic artery; 5 – subscapular artery.

DISCUSSION

Variations of the serratus anterior pedicle

There are known vascular anatomical variations in the supply to the serratus anterior. The blood supply to the serratus anterior may come from the thoracodorsal pedicle, from the subscapular pedicle, or directly from the axillary artery. The most common pattern is the serratus anterior branch, which comes from the thoracodorsal artery and, more rarely, from the subscapular or axillary arteries. An independent artery from the first intercostal artery supplies the serratus anterior muscle (De Fontaine et al., 1994). The main blood supply to the serratus anterior comes from the lateral thoracic artery (Percival and Earley, 1989; Lipa and Chang, 2001). An aberrant, independent serratus anterior pedicle has been reported to originate directly from the subscapular artery from the proximal third of the axillary artery; the thoracodorsal artery arose separately, directly from the distal third of the axillary artery

(Goldberg, 1990). This anomaly of the subscapular vascular tree has not been reported previously and this vascular pattern was not encountered in any previous patient in the series of serratus anterior muscle transfers.

Application of the serratus anterior for flap reconstruction

The serratus anterior muscle is used for flap reconstruction of lower limbs (Saeed et al., 2002), dorsal surface hand defects (Fassio et al., 1999), head, neck and extremity injuries (Kim et al., 1999), bony and soft tissue defects in the face, the lower extremities and first metacarpal defects (Hui et al., 1999), small to moderate-sized defects (Cuadros et al., 1995), complex three-dimensional wounds of the face and limbs (Sabri et al., 1993), the mandible (Breton et al., 1992; Richards et al., 1985), and head and neck, chest wall (Vu et al., 1989) and vascular reconstruction and revascularization of extensive ischemic areas such as cerebral hemispheres (Yoshioka et al., 1996).

Present case

The serratus anterior pedicle was the first branch from the first part of the axillary artery. A similar vascular pattern has only been reported once previously (De Garis and Swartley, 1928). It is a very rare aberrant artery. Embryologically, the persistence of various segmental arteries in the axilla seems to be responsible for the anomalies described (Lengale and Dhem, 1989). Due to potential serratus anterior or serrato-costal flap reconstructive surgery, an anomalous and aberrant vascular pedicle to the serratus anterior muscle is important and is of interest to anatomists, surgeons, and radiologists. It is suggested that these anomalies should be evaluated pre-operatively. Reconstructive surgeons should be aware of possible variations in the vascular anatomy of the flap.

REFERENCES

- BRETON P, HENRY JF, CREZOIT E, SOUCHERE B and FREIDEL M (1992). Osteomuscular serrato-costal free flap: application to mandibular reconstruction. *Ann Chir Plast Esthet*, 37: 258-262.
- CUADROS CL, DRISCOLL CL and ROTHKOPF DM (1995). The anatomy of the lower serratus anterior muscle: a fresh cadaver study. *Plast Reconstr Surg*, 95: 93-97.
- DE FONTAINE S, DECKER G and GOLDSCHMIDT D (1994). Anomalous blood supply to the serratus anterior muscle flap. *Br J Plast Surg*, 47: 505-506.
- DE GARIS CF and SWARTLEY WB (1928). The axillary artery in white and Negro stocks. *Am J Anat*, 41: 353-397.
- FASSIO E, LAULAN J, ABOUMOUSSA J, SENYUVA C, GOGA D and BALLON G (1999). Serratus anterior free fascial flap for dorsal hand coverage. *Ann Plast Surg*, 43: 77-82.
- GABELLA G (1995). Cardiovascular system. In: Williams PL (ed.). *Gray's Anatomy*. Churchill Livingstone, Edinburgh, pp 1451-1626.
- GOLDBERG JA, LINEAWEAVER WC and BUNCKE HJ (1990). An aberrant independent origin of the serratus anterior pedicle. *Ann Plast Surg*, 25: 487-490.
- HUI KC, ZHANG F, LINEAWEAVER WC, MOON W, BUNCKE GM and BUNCKE HJ (1999). Serratus anterior-rib composite flap: anatomic studies and clinical application to hand reconstruction. *Ann Plast Surg*, 42: 132-136.
- KIM Y, CHUNG Y, KWON T, LEE D and CHA J (1999). Reconstruction of soft-tissue defects using serratus anterior adipofascial free flap. *Plast Reconstr Surg*, 13: 925-929.
- LENGALE B and DHEM A (1989). Unusual variations of the vasculonervous elements of the human axilla. Report of three cases. *Arch Anat Hist Embryol*, 72: 57-67.
- LIPA JE and CHANG DW (2001). Lateral thoracic artery as a vascular variant in the supply to the free serratus anterior flap. *J Reconstr Microsurg*, 17: 413-415.
- PERCIVAL NJ and EARLEY MJ (1989). Anomalous blood supply to the serratus anterior/rib composite flap. *Br J Plast Surg*, 42: 98-100.
- RICHARDS MA, POOLE MD and GODFREY AM (1985). The serratus anterior/rib composite flap in mandibular reconstruction. *Br J Plast Surg*, 38: 466-477.
- SABRI F, LECLERCQ A and VANWIJCK R (1993). Surgical anatomy of the serratus anterior-rib composite flap. *Acta Chir Belg*, 93: 271-275.
- SAEED M, RUFAL AA, ELSAYED SE and SADIQ MS (2002). Variations in the subclavian-axillary arterial system. *Saudi Med J*, 23: 206-212.
- VU P, GUEDON C, GEHANNO P and ANDREASSIAN B (1989). Anatomical basis of the serratus anterior muscle, Study of 40 dissections. *J Chir (Paris)*, 126: 45-53.
- YOSHIOKA N, TOMINAGA S and INUI T (1996). Cerebral revascularization using omentum and serratus anterior muscle free flap transfer for adult moyamoya disease: case report. *Surg Neurol*, 46: 430-435.

