

BILATERAL ARTERIAL VARIATIONS IN AXILLARY REGION

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Summary

Bilateral variations of the branches of the axillary artery were found on routine anatomical dissection in an 86 year old Caucasian male cadaver. In the right axillary region, the lateral thoracic artery was found to originate from the subscapular artery. And the subscapular artery was arising from the second part of the axillary artery. Also, the lateral thoracic artery gave rise to the thoracodorsal artery in the right. In the left axillary region, the thoracodorsal artery arose from the lateral thoracic artery. The circumflex scapular and muscular branches to the subscapular muscle represented the terminal branches of the subscapular artery in the left. All the other branches of the axillary artery had a typical origin, course, distribution and termination. With relevant literature, developmental and clinical importance of this case has been discussed.

Key words: axillary, subscapular, thoracodorsal, artery, variation

Introduction

The normal gross anatomy of the axillary artery and its branches is well described in all anatomy textbooks. The axillary artery is divided into three parts according to the pectoralis minor muscle. The first part of the axillary artery has one branch, the superior thoracic artery, and the second part of the axillary artery has two branches: the thoracoacromial and lateral thoracic arteries. The third part of the axillary artery has three branches: the subscapular, anterior circumflex humeral and posterior circumflex humeral arteries [1].

Knowledge of the normal anatomy and its variations has significant practical importance in vascular radiology and reparative surgery. An awareness of variations of the arterial supply to an area is essential for accurate diagnostic interpretation as well as the performance of interventional and surgical procedures. Variability in the origin, branching and course of certain branches of the axillary artery has been frequently reported [2-7].

Case report

Bilateral branches of the branches of the axillary artery were found on routine anatomical dissection in an 86 year old Caucasian male cadaver. In the right axillary region, the lateral thoracic artery was found to originate from the subscapular artery. And the subscapular artery arose from the second part of the axillary artery. Also, the lateral thoracic artery gave rise to the thoracodorsal artery in the right. In the left axillary region, the thoracodorsal artery arose from the lateral thoracic artery. The circumflex scapular and muscular branches to the subscapular muscle

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represented the terminal branches of the subscapular artery in the left. All the other branches of the axillary artery had a typical origin, course, distribution and termination (Figs 1,2).

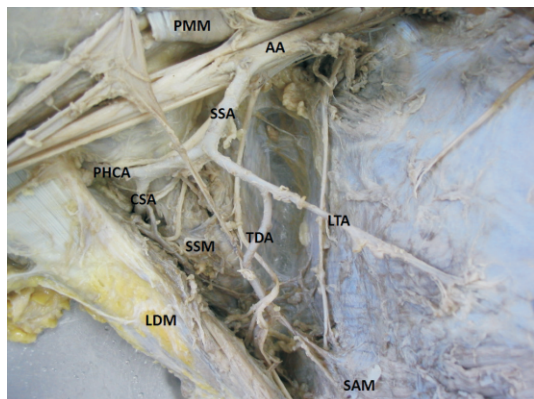


Figure 1. Right axillary region. AA: axillary artery, SSA: subscapular artery, LTA: lateral thoracic artery, TDA: thoracodorsal artery, PHCA: posterior humeral circumflex artery, CSA: circumflex scapular artery, LDM: latissimus dorsi muscle, SAM: serratus anterior muscle, PMM: pectoralis minor muscle, SSM: subscapular muscle.

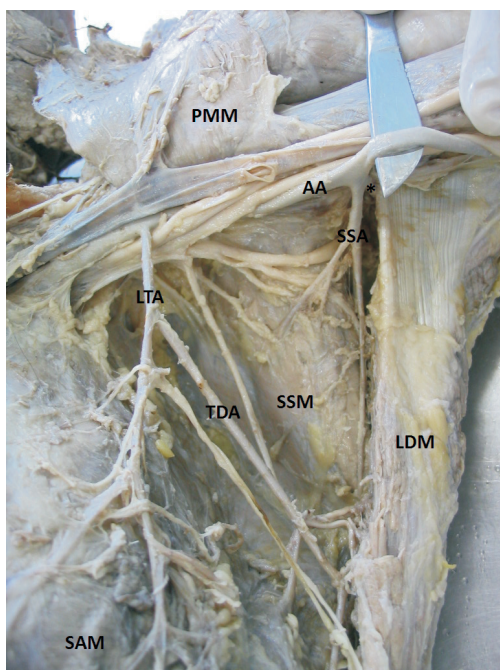


Figure 2. Left axillary region. *: circumflex scapular artery, AA: axillary artery, SSA: subscapular artery, LTA: lateral thoracic artery, TDA: thoracodorsal artery, LDM: latissimus dorsi muscle, SAM: serratus anterior muscle, PMM: pectoralis minor muscle, SSM: subscapular muscle.

Discussion

The vascular anatomy in the axillary region is quite variable and it is more variable in the living than in the

dead and also it varies among people living in different countries. Uglietta and Kadir reported variations in the major arteries of upper extremities to be present in 11-24% of people [8].

In the review study of Bergman et al. it is reported that the subscapular artery arose from the second part of the axillary artery in the ratio of 15%. Also they have reported that it might arise as a branch from the lateral thoracic artery. In the study by Poynter, *quoted* by Bergman et al. the lateral thoracic artery might be a branch of the subscapular in the ratio of 8% [7]. According to Huelke, the lateral thoracic artery arose from the subscapular artery in 14,6% of the cases [3]. Additionally, Lee and Kim reported variations in the subscapular arteries arising from the first parts of the axillary arteries. According to their case report, the subscapular arteries gave off lateral thoracic arteries bilaterally [5].

Again in the review study of Bergman et al. it is reported that the lateral thoracic artery might be replaced by or it might replace the thoracodorsal artery [7]. In a case report, Kumar et al. reported a common trunk which gave rise to the lateral thoracic, subscapular and thoracoacromial arteries [6]. Valnicek et al. had found the thoracodorsal artery as a branch of the lateral thoracic artery 1% in 30 cadavers [9].

This variation can be explained on the basis of deviation from the embryologic development of the vascular plexuses of the upper limb buds. As reported here, an arrest at any stage of development, showing regression, retention or reappearance may produce various variations [5, 10].

The subscapular arterial tree can be used as a source of microvascular grafts to replace damaged or diseased parts of arteries, particularly in the hand and forearm. The muscle patches, myocutaneous, osteomuscular and muscle fascia in reconstructive surgery of the head, neck and limbs is becoming increasingly frequent. Also the thoracodorsal artery can be used for coronary artery bypass grafts when other conduits are exhausted [6, 9, 11-15].

Variations in the origin and course of these arteries are of significant practical importance for the anatomist, vascular radiologist and surgeons of various disciplines. Both the normal and abnormal anatomy of the axillary artery and its branches should be well known for instructional procedures, accurate diagnostic interpretation and surgical intervention.

References

1. Corbett S, Woods D. Pectoral Girdle and Upper Limb: Pectoral girdle, shoulder region and axilla. In: Standring S, editor. *Gray's Anatomy The Anatomical Basis of Clinical Practice*, 39th ed. Philadelphia: Elsevier Ltd; 2005.
2. Botte MJ. Vascular systems. In: Botte MJ, Krames C, editors. *Surgical Anatomy of the Hand & Upper Extremity*. 1st ed. Philadelphia: Lippincott

- Williams & Wilkins; 2002. p.242-4.
3. Huelke DF. Variation in the origins of the branches of the axillary arteries. *Anat Rec.* 1959;135:33-41.
 4. Maral T, Celik H, Hayran M, Kecik A. An anatomical variation of the thoracodorsal artery with comments on flaps based on the axillary artery. *Eur J Plast Surg.* 1993;16:231-3.
 5. Lee JH, Kim DK. Bilateral variations in the origin and branches of the subscapular artery. *Clin Anat.* 2008;21:783-5.
 6. Kumar MRB, Siddaraju G, Bhagath KP, Muddanna SR. A unique branching pattern of the axillary artery in a south Indian male cadaver. *Bratisl Lek Listy.* 2008;109(12):587-9.
 7. Bergman RA, Afifi AK, Miyauchi R. *Illustrated Encyclopedia of Human Anatomic Variation: Opus II: Cardiovascular System: Arteries: Upper Limb* [cited 2009 May 20]. Available from: <http://www.anatomyatlases.org/AnatomicVariants/Cardiovascular/Directory/Alphabetical/S.shtml>
 8. Uglietta JP, Kadir S. Arteriographic study of variant arterial anatomy of the upper extremities. *Cardiovasc. Intervent Radiol.* 1989;12:145-8.
 9. Valnicek SM, Mosher M, Hopkins JK, Rockwell WB. The subscapular arterial tree as a source of microvascular arterial grafts. *Plast Reconstr Surg.* 2004;113:2001-5.
 10. Jurjus AR, Correa-De-Aruaujo R, Bohn RC. Bilateral double axillary artery: Embryological basis and clinical implications. *Clin Anat.* 1999;12:135-140.
 11. He GW, Mills NL. Rarely or possibly used arterial grafting: Use of the subscapular-thoracodorsal artery for coronary artery bypass grafting. In: He GW, editor. *Arterial grafting for coronary artery bypass surgery*, 2nd Ed, New York: Springer-Verlag; 2006. p.218-22.
 12. Jesus RC, Lopes MCH, Demarchi GTS, Ruiz CR, Wafae N, Wafae GC. The subscapular artery and the thoracodorsal branch: an anatomical study. *Folia Morphol.* 2007;67:58-62.
 13. Yaginuma G, Sakurai M, Meguro T, Ota K. Thoracodorsal artery as a free arterial graft for myocardial revascularization. *Ann Thorac Surg.* 2001;72:915-6.
 14. Takeishi M, Ishida K, Makino Y. The thoracodorsal vascular tree-based combined fascial flaps. *Microsurgery.* 2009;29:95-100.
 15. Malikov S, Casanova D, Magnan PE, Branchereau A, Champsaur P. Anatomical bases of the bypass-flap: study of the thoracodorsal axis. *Surg Radiol Anat.* 2005;27:86-93.