

Abnormal Vascular Pattern in the Upper Limb: Original Image

ÜST EKSTREMİTEDE ANORMAL DAMAR YAPILANMASI

Ragıba ZAĞYAPAN, MD,^a Can PELİN, MD,^a Nüket MAS, MD^a

^aDepartment of Anatomy, Başkent University Faculty of Medicine, ANKARA

Abstract

Variations in the arterial pattern of the upper limb are not only important for anatomists and surgeons, but for radiologists and cardiologists as well. In the present case, during dissection of a male cadaver, only a single common trunk was observed arising from the third part of the axillary artery on the right side. The common trunk was later divided into 2 branches, 1 giving rise to the anterior and posterior circumflex humeral and deep brachial arteries, and the other to the circumflex scapular and thoracodorsal arteries. The anatomic relationships of the branches with the adjacent structures also were different from the usual configuration. An unusual occurrence of the median nerve and its relation with the brachial artery also was observed, in addition to the variations in the branching pattern of the axillary artery. Such variations are important not only for invasive procedures, such as ligation of injured arteries or angiographic studies of brachial vessels, but also to avoid brachial plexus lesions during surgery.

Key Words: Upper extremity; axillary artery

Türkiye Klinikleri J Med Sci 2007, 27:807-809

Özet

Üst ekstremitede gözlenen vasküler varyasyonlar yalnızca anatomist ve cerrahlar açısından değil, radyolog ve kardiyologlar açısından da önem taşımaktadır. Olguda, rutin disseksiyon uygulaması sırasında bir erkek kadavrada sağ üst ekstremitede A. axillaris'in 3. kısmından tek bir arter kütüğünün ayrıldığı gözlemlendi ve bu varyasyon değerlendirildi. Arter kütüğünün daha sonra lateral ve medial olmak üzere 2 ana dala ayrıldığı saptandı. Lateral daldan, A. profunda brachii, A. circumflexa humeri anterior ve A. circumflexa humeri posterior'un, medial daldan ise A. thoracodorsalis ve A. circumflexa scapula'nın ayrıldığı görüldü. Öte yandan bu dalların çevre yapılarla komşuluklarının normal anatomik tanımlara uymadığı da saptandı. A. axillaris'in dallanmasında gözlenen bu varyasyonun yanı sıra N. medianus'un normalin dışında bir seyir gösterdiği tespit edildi ve bu sinirin A. brachialis'le olan komşuluğu değerlendirildi. Bu varyasyonların ayrıntılı olarak bilinmesi yalnızca arter ligasyonu ya da anjiyografi gibi girişimsel çalışmalar için değil, herhangi bir cerrahi girişim sırasında plexus brachialis'in zarar görmemesi açısından da önem taşımaktadır.

Anahtar Kelimeler: Üst ekstremité; Aksiller arter

Variations in the arterial pattern of the upper limb have long received the attention of anatomists, orthopedic and reconstructive surgeons, radiologists and cardiologists, and especially, vascular specialists. Detailed information about the vascular structure of the upper extremity is important not only for diagnostic interventions and surgical approaches, but it has profound medico-legal implications as well.^{1,2}

In anatomy textbooks, the axillary artery is identified as continuing from the subclavian artery after the upper margin of the first rib, ends at the

level of the inferior margin of the teres major muscle. The axillary artery is classically divided into three parts, according to the pectoralis minor muscle. Six major branches are given off from these parts of the axillary artery. The first part of axillary artery is located between the first rib and the superior border of the pectoralis minor muscle. The first branch of the first part is the superior thoracic artery. The second part of the axillary artery lies beneath the pectoralis minor muscle and has two branches, the thoracoacromial artery proximally, and the lateral thoracic artery distally. The third part of the axillary artery has three branches, which are named the subscapular, anterior circumflex humeral and posterior circumflex humeral arteries. The subscapular artery is the largest branch of the axillary artery, which terminates as the circumflex scapular and thoracodorsal arteries. However, there were no fixed patterns for branches of the axillary artery.²

Geliş Tarihi/Received: 18.08.2006 **Kabul Tarihi/Accepted:** 01.11.2006

Yazışma Adresi/Correspondence: Can PELİN, MD
Başkent University Faculty of Medicine
Department of Anatomy, ANKARA
Can-pelin@yahoo.co.uk

Copyright © 2007 by Türkiye Klinikleri

Türkiye Klinikleri J Med Sci 2007, 27

In the present case, the abnormal branching pattern of the axillary artery and the unusual course of the brachial artery were observed on the right side of a 58-year-old Turkish man, and evaluated according to their location and relation with adjacent structures. On the right side, only a single trunk was found to arise from the third part of the axillary artery, just at the level of the lower border of the pectoralis minor muscle. The length of this common trunk was 8.4 mm, and the width (at the arising points) was 4.0 mm. Further on, it divided into two branches: One on the lateral side of the radial nerve and the other on the medial side of the median nerve (Figure 1). The lateral branch of the common trunk terminated into three branches: The anterior and posterior circumflex humeral arteries, and a deep brachial artery (Figure 2). The medial branch could be determined as a subscapular artery that gave rise to the circumflex scapular and thoracodorsal arteries as usual. Contrary to the normal anatomic structure, the subscapular artery lay beneath the radial nerve (Figure 3). An abnormal formation of the median nerve and an unusual relation between the brachial artery and the median nerve accompanying the vascular variation also were observed. Apart from its normal course, the brachial artery passed over the radices of the median nerve (Figure 4). The doubled lateral radices of the median nerve crossed over the above-mentioned common trunk (Figure 2).

The most frequent anatomic variations of the axillary artery are the persistent superficial brachial artery, high division of the brachial artery, and the high division of the ulnar and the radial arteries.¹ It is known that the incidence of the variations is higher on the right axilla when compared with the left side.³ On the other hand such variations are mostly seen in female subject (40.63%) when compared with males (12.33%). Besides the variation at the termination of the axillary artery, variable origin of circumflex humeral, subscapular and deep brachial arteries are also observed.³ The subscapular artery is the largest and most variable branch of the axillary artery. Although the subscapular artery has been determined as a common trunk of the thoracodorsal artery and the circumflex scapular artery, these two arteries do not always arise from a common trunk. The incidence of variations in the

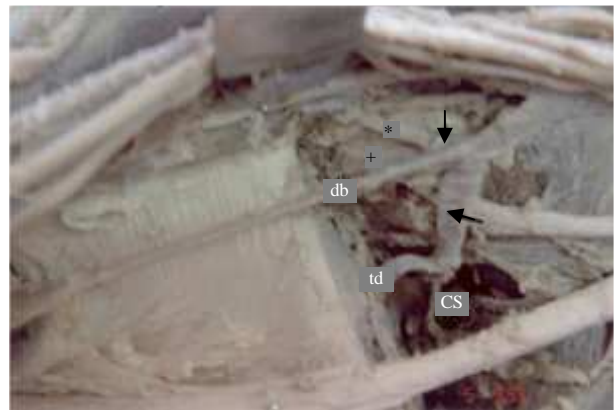


Figure 1. Common trunk arising from the third part of the axillary artery. *: Anterior circumflex humeral artery, +: Posterior circumflex humeral artery, →: Lateral branch, →: Medial branch, db: Deep brachial artery, td: Thoracodorsal artery, cs: Circumflex scapular artery.

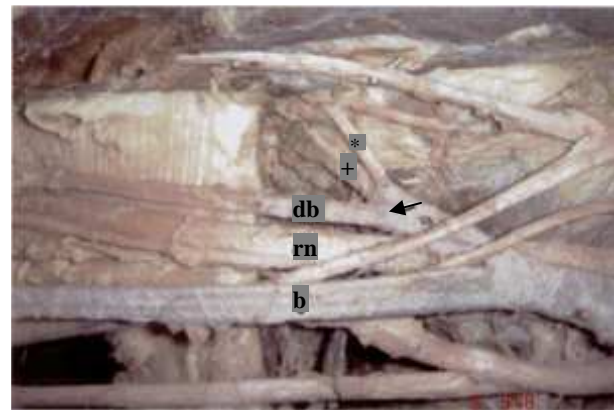


Figure 2. Lateral branch of the common trunk, crossing over the radial nerve. *: Anterior circumflex humeral artery, +: Posterior circumflex humeral artery, →: Lateral branch, db: Deep brachial artery, rn: Radial nerve, b: Brachial artery.

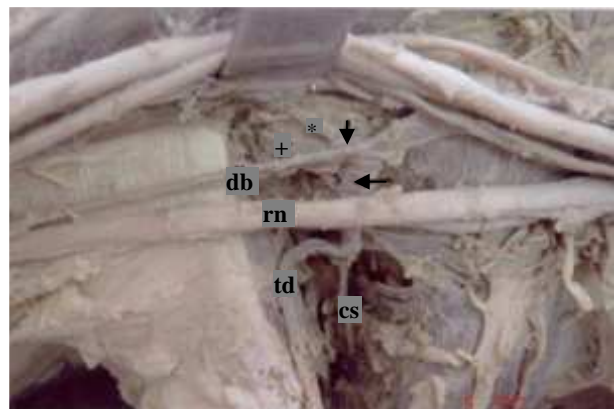


Figure 3. Medial branch of the common trunk passing beneath the radial nerve. *: Anterior circumflex humeral artery, +: Posterior circumflex humeral artery, →: Lateral branch, db: Deep brachial artery, →: Medial branch, rn: Radial nerve, td: Thoracodorsal artery, cs: Circumflex scapular artery.

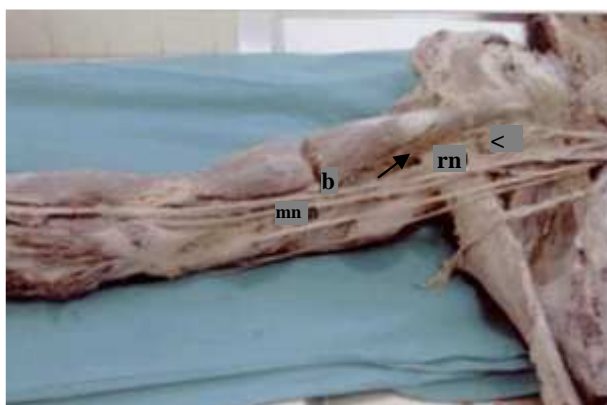


Figure 4. Brachial artery lying over the median nerve in the arm. b: Brachial artery, rn: Radial nerve, mn: Median nerve, →: Lateral radices of the median nerve, <: Medial radix of the median nerve.

branching pattern of the axillary artery is higher on the right side.³ Vascular variation in this case also was observed on the right side.

In the present case, a single common trunk arose from the axillary artery at the level of the lateral border of the pectoralis minor muscle just before the joining point of the lateral and medial radices of the median nerve. Although the incidence of axillary artery variations is higher in women, the present case was in a man.³ The frequency of such a variation has been reported to be 0.45%. Venieratos and Lolis also have reported a similar variation and named it *common subscapular trunk*.⁴ The common subscapular trunk has a diameter equal to 6.5 mm and is larger than the continuation of the axillary artery. In the present case, the width of the common trunk was 4.0 mm—nearly equal to the rest of the artery. Contrary to anatomy textbooks, the brachial artery crossed over between the radices of the median nerve and lay over the nerve along its course in the arm. Owing to the variation of the vascular tree accompanied by the unusual relation with the components of the brachial plexus, a complex structure was seen. The lateral branch of the common trunk, giving rise to the anterior and posterior circumflex humeral arteries and deep brachial artery, overlapped the radial nerve, but crossed over by the two segments of the lateral radix of the median nerve as well, was thus compressed between these two nervous structures.

In addition to this, the medial branch of the common trunk that terminates into the thoracodorsal and circumflex scapular arteries passes beneath the radial nerve and is compressed by it. Another variation of the third part of the axillary artery was discovered by Çavdar and colleagues.⁵ In their study, the third part of the axillary artery divided into two main buds: As a deep brachial artery on the lateral and as a superficial brachial artery on the medial side. The anterior and posterior circumflex humeral arteries and the subscapular artery arose from the lateral side, separately, which is different in our study.

Normally the medial radix of the median nerve crosses over the axillary artery joins with the radix from the lateral cord and forms the median nerve. Median nerve then passes downward on the lateral side of the brachial artery, later crosses over it and lay on the medial side of the artery.² In the present case contrary to the normal structure the brachial artery overlapped the two radices of the median nerve those arise from the lateral cord and the joining point of the radices from the lateral and medial cords of the brachial plexus. Later the artery passed downward on the median nerve for a while as brachial artery. Since the lateral radices and the proximal portion of the median nerve were covered by the artery for a distance in the arm, in the present case the artery could compress the nervous structures. Such a variation might be clinically significant, since the symptoms of median nerve compression are confused with more common causes such as radiculopathy and carpal tunnel syndrome.

Variations such as those reported in the present case are important, not only for invasive procedures (eg; ligation of the injured arteries or angiographic studies of the brachial vessels) but also, to avoid brachial plexus lesions during surgery.

REFERENCES

1. Jurjus A, Sfeir R, Bezirdjian R. Unusual variation of the arterial pattern of the human upper limb. *Anat Rec* 1986;215:82-3.
2. Williams PL, Warwick R, Dyson M, Bannister LH. Cardiovascular system. In: Gabella G, ed. *Gray's Anatomy*. 38th ed. London England: Churchill-Livingstone; 1989. p. 1537-8.
3. Pandey SK, Gangopadhyay AN, Tripathi SK, Shukla VK. Anatomical variations in termination of the axillary artery and its clinical implications. *Med Sci Law* 2004;44:61-6.
4. Venieratos D, Lolis ED. Abnormal ramification of the axillary artery: Sub-scapular common trunk. *Morphologie* 2001;85:23-4.
5. Cavdar S, Zeybek A, Bayramiçli M. Rare variation of the axillary artery. *Clin Anat* 2000;13:66-8.