CASE REPORT

Congenital arteriovenous communication in the arm: a cadaveric study

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Abstract

An abnormal communication between an artery and a vein is known as arteriovenous malformation (AVM) or arteriovenous fistula (AVF). The AVM or the AVF might be congenital in origin or even acquired. The arteriovenous communications are usually surgically made in patients undergoing repeated hemodialysis, while suffering from any chronic renal disease. The abnormal arteriovenous communications may be asymptomatic in nature. The arteriovenous communications might be an incidental finding during any anatomical dissections or medico-legal autopsies. The present study reports the presence of BBC on both sides of a 54-year-old male cadaver who died of road traffic accident. There was a communication between the brachial artery and the brachial vein, 11.5 cm above the medial epicondyle. The oblique communicating channel measured 1.5 cm in length and connected the brachial artery to the brachial vein. A detailed histological study of the communication showed the presence of thick tunica media. Knowledge of arteriovenous communications may be beneficial for any academic studies and equally important for vascular surgeons and radiologists performing angiographic studies.

***Keywords*:** arm, anatomy, brachial, artery, vein, arteriovenous malformation, arteriovenous fistula.

Introduction

In early 1758, the AVF was described for the first time by William Hunter. It was thought that the AVM resembled the snakes covering the Greek God Gordon's head [1]. Numerous names like arteriovenous aneurysm, arteriovenous fistulas, arteriovenous communication, plexiform angiomas, have been coined to describe such a communication between an artery and a vein [2]. These communications are congenital or acquired in origin and often remain asymptomatic. They are incidental findings during routine anatomical dissections and autopsies. Often, in patients requiring repeated hemodialysis, such a communication might be made surgically [3].

Brachial vein is found in close relation to the brachial artery with tributaries similar to the anterior branches near the lower margins of the subscapularis [4]. Standard anatomy textbooks do not report any communication between a brachial artery or any vein in the arm [4, 5]. Usually, the venae comitantes accompany the brachial artery and all its branches. The basilic and the cephalic vein ascend through subcutaneous tissue, with the brachial vein perforating the deep fascia in the middle of the arm and the cephalic vein lying in the groove between the deltoid and the pectoralis major muscle to drain into the axillary vein [5]. It is unusual to find a communication between the brachial artery and any of the veins of the arm. Unless created surgically for hemodialysis patients', such communications may be congenital in origin. According to past studies, AVM is more commonly found in the scalp [6]. In the present case, the arteriovenous communication was only observed in the arm.

The main aim of the present study was to highlight the abnormal communication between the brachial artery and the brachial vein with regard to its histological features. The anatomical knowledge of such abnormal vascular communication may be academically and clinically important

Material and methods

During routine dissection of cadavers for undergraduate medical teaching, we observed the presence of communication between the brachial artery and the brachial vein on both sides of a 54-year-old male cadaver. The brachial artery and the brachial vein were dissected and all the surrounding area was cleaned to observe any abnormal communications. Appropriate measurements were taken and the specimen was photographed (Figure 1). The communicating vascular channel and the brachial vein was also processed histologically with Hematoxylin–Eosin staining (Figure 2, a and b). We did not take any tissue from the brachial artery for histology processing.

Results

The communication between the brachial vein and the brachial artery was noted at a distance of 11.5 cm above the medial epicondyle on both upper limbs. The length of the communicating channel measured 1.5 cm.

Histological staining with H & E stain showed that the abnormal communicating channel had a prominent tunica media. It could be compared to the brachial vein (less prominent tunica media as seen in Figure 2a) to which it was connected. A prominent tunica media meant that the channel exhibited features of an artery.

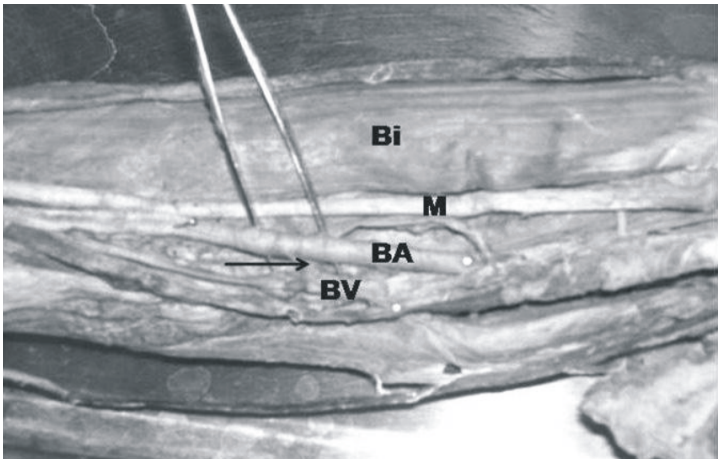
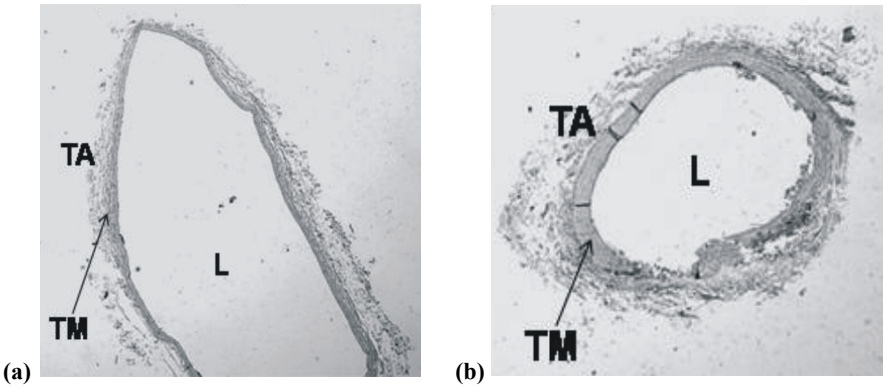


Figure 1 – *Dissected specimen (right upper limb) showing: BV– brachial vein, BA – brachial artery, M – median nerve, Bi – biceps*

Figure 2 – *(a) Micrograph of brachial vein (H & E stain, 2.5× magnification) showing: TA – tunica adventitia, TM – tunica media, L – lumen; (b) Micrograph of the anomalous arteriovenous communicating channel (H & E stain, 2.5× magnification) showing: TA – tunica adventitia, TM – tunica media (thick and prominent), L– lumen*



Discussion

There is a paucity of literature on the presence of congenital AVM or AVF supplemented with appropriate histological findings. Standard textbook of anatomy defines the communication as arteriovenous anastomoses, which are usually found in nasal, labial skin, mucous membrane of nose and alimentary system, tongue, thyroid gland and sympathetic ganglia [4].

A past cadaveric study had described a communication between the facial artery and the vein, just before the facial artery divided into inferior and superior labial arteries [7] but the same study did not elaborate on the histological aspect of such a communication.

In the present case, we observed the communicating channel to be made up of prominent tunica media (Figure 2b) which refutes any views that the individual might have had any surgical grafting because arterial grafts are seldom made surgically in patients requiring such during repeated hemodialysis.

The present arteriovenous communication is a rare variety as it was connecting a large artery and vein and it exhibited a prominent and thick tunica media. We speculate that the presence of prominent tunica media may have had an important role in contraction of the vessel thereby regulating the blood flow. We presume that the communicating vascular channel was congenital in nature. Admittedly, we did not have any significant clinical history to corroborate the fact.

Standard textbook of anatomy mentions a communication between an artery and a vein as a vascular shunt [4]. These vascular shunts may be either thoroughfare channels (in ultrastructure resembling capillaries), or arteriovenous channels (direct communications between smaller arteries and veins, possessing thick muscular tunic) or specialized arteriovenous anastomoses known as glomus (found in hands and feet).

There are research reports that an abnormal communication may also exist between an artery and a vein following trauma [8]. In the present case, it was difficult to have the history of the patient.

Often, the AVM remains as an asymptomatic lesion like a birthmark or a swelling and the symptoms may only arise if the adjacent structures are compressed [9]. An important step in classifying the vascular anomalies and differentiating haemangiomas from the AVM was done by Mulliken JB and Glowacki J (1982) [10].

Haemangiomas usually regress in late childhood whereas the AVM may grow with an increase in age. Often, surgical intervention may result in profuse bleeding. The vascular malformations if present may also result in venous hypertension, subsequent hypoperfusion or calcification [11]. Considering the ill effects of such abnormal vascular communications, its presence cannot be simply ignored.

Conclusions

Anatomical knowledge of AVM, AVF or any communication between an artery and a vein in the arm may be important for vascular surgeons, perfusionists and interventional radiologists in day-to-day clinical

practice and the present study is a sincere attempt to highlight such.

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