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Case Report

Neurovascular variations in the limbs of a single cadaver

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Abstract

While doing the routine dissection for undergraduate students in the department of Anatomy, NRS Medical College, Kolkata, India, few neurovascular variations were detected in the superior and inferior extremities of a male cadaver, aged about sixty-five years. In the left upper limb, the cephalic vein was connected with one of the venae comitantes of the brachial artery through the median cubital vein. The basilic vein was not prominent and replaced with few thin veins.

In the left lower limb, the deep peroneal (deep fibular) nerve crossed the anterior tibial artery from lateral to medial side and again from medial to lateral side in the lower third of the leg.

This case report will contribute in the fields of gross anatomy, clinical anatomy and may also help clinicians for any invasive procedure or surgical approach in the limbs.

Key words [cephalic vein] [basilic vein] [median cubital vein] [anterior tibial artery] [deep peroneal nerve]

Introduction

The cephalic vein begins at the radial end of the dorsal venous arch at the back of the hand, winds around the radial border of the forearm, and ascends in the arm on the lateral side of the biceps brachii muscle. The vein lies within the superficial fascia, and pierces the deep fascia to drain into axillary vein in the shoulder region [1, 2]. The origin of the basilic vein is the ulnar side of the dorsal venous arch, then it ascends along the medial aspect of the forearm, pierces the deep fascia at the elbow and joins the venae comitantes of the brachial artery to form the axillary vein at the lower border of the teres major muscle [2,3].In front of the elbow, the prominent median cubital vein links the cephalic vein and the basilic vein. It lies in the cubital fossa superficial to the bicipital aponeurosis. This vein receives a number of tributaries from the front of the forearm and gives off the deep median vein which pierces the fascial root of the antebrachial fossa to join the venae comitantes of the brachial artery [2, 4].

The deep fibular nerve (deep peroneal nerve) is one of the terminal branches of the common fibular (peroneal) nerve. It arises in the substance of the peroneus longus muscle on the lateral side of the neck of the fibula. The nerve enters the anterior compartment of leg by piercing the anterior fascial septum. It then descends deep to the extensor digitorum longus muscle, first lying lateral to the anterior tibial artery (in the proximal third of leg), then anterior (in the middle third), and finally lateral again (in the distal third) [2,3]. The anterior tibial artery is the smaller branch of the popliteal artery at the distal border of the popliteus muscle. It passes above the proximal part of the interosseous membrane, enters the anterior compartment of leg, runs distally as far as the ankle joint along with the venae comitantes and deep fibular nerve [3,5]. Distal to the ankle, on the dorsum of foot, the artery is renamed as the dorsalis pedis artery lateral to which run the deep peroneal nerve and its medial branch [1, 6].

The aim of the case report was to know about the variations of these structures concerned to prevent serious complications.

Case Report

Few neurovascular variations were found in the superior and inferior extremities of a male cadaver in the Department of Anatomy, NRS Medical College, Kolkata, India, while doing the routine dissection for the MBBS students in February, 2013. The subject was about sixty-five years old. Dissection was done properly in both the lower and upper limbs of that cadaver. Relevant structures were observed carefully and photographs were taken.

In the left upper limb, the basilic vein was replaced with few very thin veins which drained the medial side of forearm and

arm, instead of a large and prominent basilic vein. The cephalic vein was present as usual on the lateral aspect of that upper limb in the superficial fascia. In the cubital fossa, the median cubital vein connected the cephalic vein with one of the venae comitantes accompanying the brachial artery (brachial vein), instead of the basilic vein. The cephalic vein was connected with the median cubital vein at an acute angle.In the right upper limb no such variation was found (Figures 1, 2).

In the left lower limb, the deep peroneal nerve crossed the anterior tibial artery from lateral to medial side proximally and again from medial to lateral side in the distal one-third of the leg. On the right side this relation was according to normal anatomy (Figure 3).

Discussion

A large number of invasive procedures are carried out by using the veins of upper limb, particularly in and distal to the axillary region [7].

According to a previous study, the basilic is the main venous outlet in 53% cases [1]. The brachial veins are venae comitantes accompanying the brachial artery [8]. Vollala et al. described a case in 2008, where a perforating vein connected a vein accompanying radial artery (this vein ascended as a brachial vein) and median cubital vein [8].

There exists a fair amount of variation of the median cubital (median basilic) vein. This vein is often used for venipuncture (for taking blood or intravenous injection), so also the basilic vein [4]. Superficial segment of the latter can be used in general, vascular and endovascular surgery to introduce a catheter [9].

Vascular surgeons also utilize the basilic vein to create an AV (arteriovenous) fistula or AV graft for hemodialysis access in patients with renal failure [4]. Knowledge about variations of the upper extremity veins is limited despite its importance for a successful AV fistula creation [10].Vascular access for chronic hemodialysis has classically been initiated by the creation of a primary radial artery–to–cephalic vein arteriovenous fistula (RCAVF) [11].

Kaiser et al. reported about a complication of a basilic vein transposition resulting from failure to recognize aberrant anatomy as the brachial–basilic junction was located near the antecubital fossa [10]. This case highlights the prevalence of variations of upper extremity veins and the need for thorough

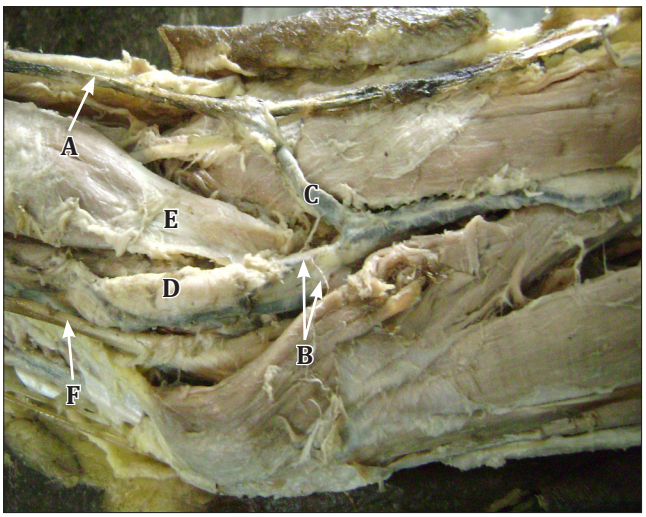

Figure 1. The median cubital vein connected the cephalic vein with one of the venae comitantes accompanying the brachial artery in the left upper limb. *(**A**: cephalic vein; **B**: venae comitantes accompanying the brachial artery–brachial veins; **C**: median cubital vein; **D**: brachial artery; **E**: biceps brachii tendon; **F**: median nerve)*

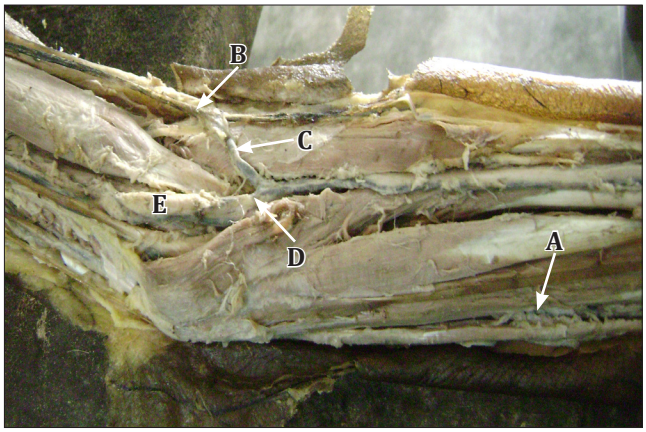

Figure 2. One of the thin veins to replace the basilic vein. *(**A**: one thin vein on the medial side of the forearm; **B**: cephalic vein; **C**: median cubital vein; **D**: brachial veins; **E**: brachial artery)*

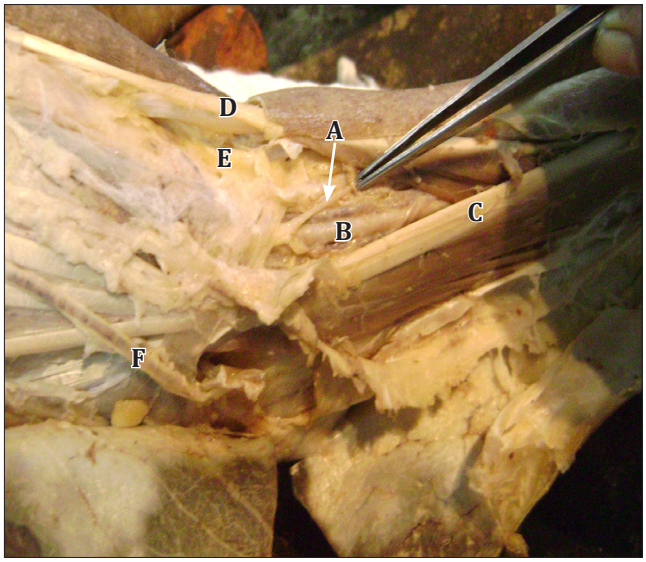

Figure 3. Deep peroneal nerve crossed the anterior tibial artery from medial to lateral side in the distal third of left leg. *(**A**: deep peroneal nerve; **B**: anterior tibial artery; **C**: tendon of extensor digitorum longus; **D**: tendon of tibialis anterior; **E**: tendon of extensor hallucis longus; **F**: dorsal venous arch of foot)*

duplex vein mapping before surgery for the preservation and planning of future access [10].

Increased use of chronic venous access catheters such as PICS (Peripherally Inserted Central venous catheters) and various tunneled catheters has been associated with an increased incidence of upper extremity deep vein thrombosis [12].

Majumdar et al. found a case having similarity with the present case regarding the crossing of anterior tibial artery by deep peroneal nerve[13]. An ankle block involves the block of deep and superficial peroneal nerves; so the course of the deep peroneal nerve has importance in regional anaesthesia [14].

The deep fibular nerve and the arteria dorsalis pedis (continuation of the anterior tibial artery) crossed over each other at multiple levels in 26.7% of the lower limbs, as was observed in a previous study [6]. When the artery crosses over the nerve, there is a risk of entrapment of the deep fibular nerve by the dorsalis pedis artery aneurysms; anatomical knowledge will be of help for surgical release of the nerve at that time [15]. In plastic surgery, detailed knowledge of nerve and vascular supply of foot and ankle is necessary for the design of a neurovascular free dorsalis pedis flap [6].

Conclusion

Description of these variations will enhance our knowledge in gross anatomy and clinical anatomy. The case will provide information to the clinicians regarding any invasive procedure, regional nerve block and surgical approach to arm, forearm, the foot and ankle.

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