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The Absence of Cephalic Vein in the Proximal Right Upper Limb: A Case Report

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ABSTRACT

Introduction: the cephalic vein of the upper limb has a superficial course in forearm, arm and deltopectoral groove which makes it easily accessible for clinical procedures.

Case description: in a 76 year old male cadaver, the right cephalic vein drained into basilic vein in the cubital region and there was absence of cephalic vein in the arm and deltopectoral groove. The venae comitantes of brachial artery were large and drained into axillary vein.

Conclusion: the knowledge of the variation in the course and termination of cephalic vein is important to avoid complications during interventional, diagnostic, and therapeutic procedures performed with the vein.

Keywords: Cephalic vein; Deltopectoral groove; Superficial veins; Upper limb; Pacemaker; Venipuncture.

Introduction

The cephalic vein is the preaxial vein of the upper limb which begins from the lateral end of dorsal venous arch of the hand and drains into axillary vein near the apex of the axilla[1,2].

Amongst the superficial veins of upper limb which include cephalic vein, basilic vein, median cubital vein, median ante-brachial vein, the cephalic vein has the longest superficial course as it pierces the deep fascia just distal to the clavicle to drain into axillary vein[1].

The superficial course of cephalic vein makes it easily accessible for venipuncture and cardiac catheterization along with other superficial veins[3,4]. It is a vein of choice to insert pacemaker, implantable defibrillator and create arteriovenous fistula for hemodialysis[5,6]. It can also be used to harvest venous graft[7].

Developmentally cephalic vein is derived from the preaxial vein of upper limb which arises from the terminal plexus of upper limb bud and drains into deep vein near the proximal joint[1].

There are several studies which have described the pattern of superficial veins in the cubital region[8-10]. However description of comprehensive anatomy of cephalic vein from the formation to the termination is lacking.

The knowledge of variation in the course and termination of cephalic vein is important because of its utility in diagnostic, interventional and therapeutic procedures and hence we are reporting this case.

Case Description

During routine dissection in the Department of Anatomy at JSS Medical College Mysuru, we observed a variation in the course and termination of cephalic vein on the right side of male cadaver aged 76 years.

The cephalic vein on the right side originated as the continuation of lateral end of the dorsal venous arch joined by lateral marginal vein. The vein crossed the roof of anatomical snuff box and followed the lateral border of forearm lying in superficial fascia. In the cubital region the cephalic vein drained completely into the basilic vein (figure 1). There was no continuation of cephalic vein in the arm. On the deeper dissection, the venae comitantes of brachial artery appeared unusually larger, the medial venae comitans (medial brachial vein) passed deep to median nerve and lateral venae comitans (lateral brachial vein) passed superficial to median nerve and drained into axillary vein. Both the venae comitantes were enclosing the median nerve (figure 2). The acromial vein, pectoral vein, clavicular, superior thoracic veins drained into the axillary vein. The cephalic vein was absent in the proximal part of the upper limb and deltopectoral groove. There was a slender deltoid vein in the deltopectoral groove which drained into axillary vein. There was no variation seen in the course and termination of the left cephalic vein.

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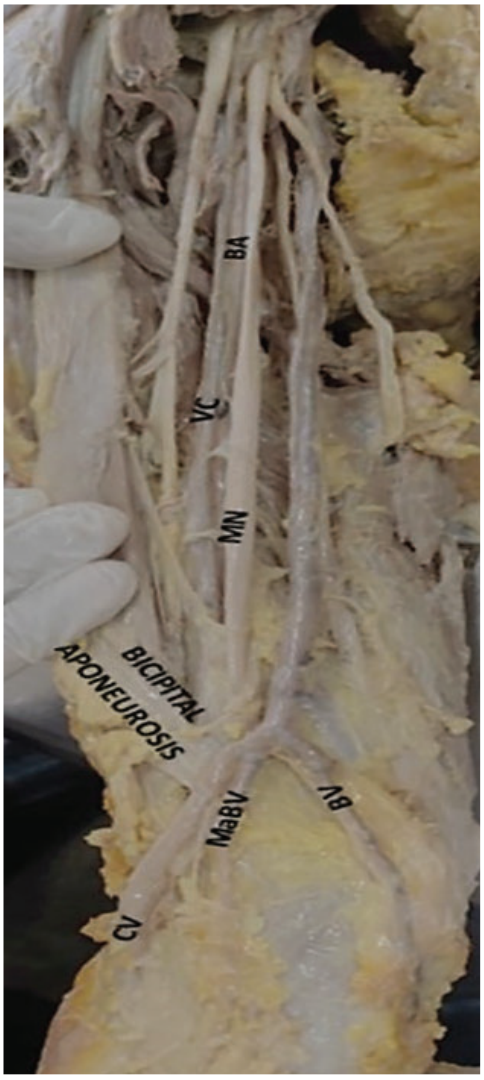

Figure 1. Termination of cephalic vein in cubital region. CV- Cephalic vein, BV- Basilic vein, MaBV- Median antebrachial vein, MN- Median nerve, BA- Brachial artery, VC- Venae Comitantes

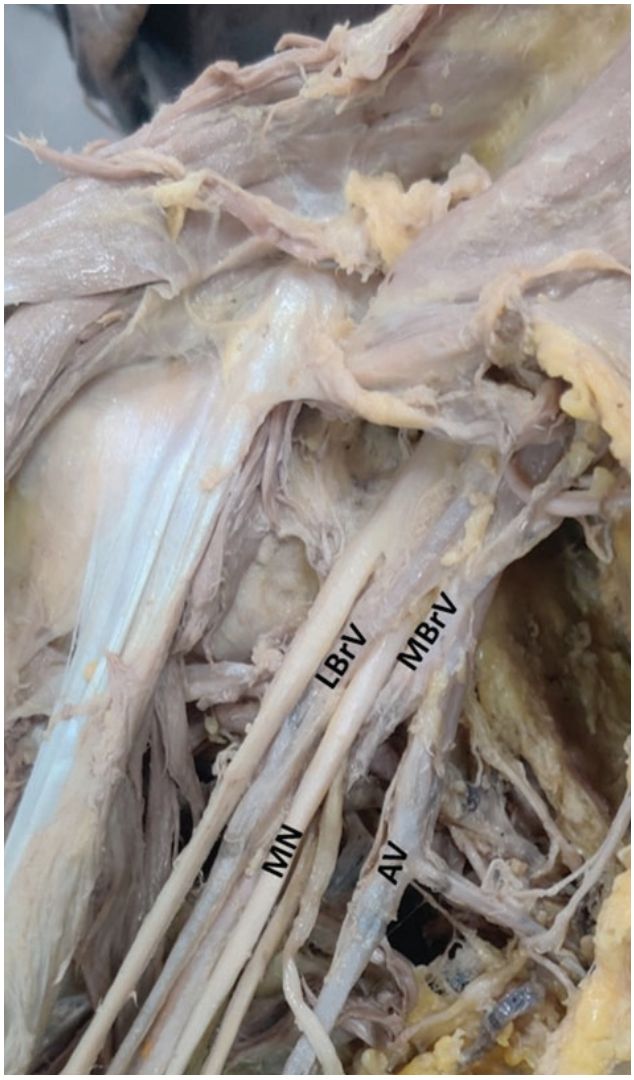

Figure 2. Termination of medial and lateral brachial veins (venae comitantes) into axillary vein. MN- Median nerve, AV- Axillary vein, LBrV- Lateral Brachial Vein, MBrV- Medial Brachial Vein.

Discussion

The typical course of cephalic vein is described as originating from the radial end of dorsal venous arch, then it winds around lateral border of forearm and ascends along the anterolateral surface of forearm in the superficial fascia[1,2]. In the cubital region the cephalic vein is connected to the basilic vein anteriorly by median cubital vein which transfers most of the blood from cephalic vein to basilic vein[2]. Then the cephalic vein runs in the arm in the groove between biceps brachii and brachioradialis, ascends along lateral border of biceps brachii, lies in the deltopectoral groove, pierces clavipectoral fascia and drains into axillary vein[1,2].

The important relations of cephalic vein are with superficial branch of radial nerve on anatomical snuff box, lateral cutaneous nerve of forearm as it passes from cubital region to arm and deltoid artery in the deltopectoral groove[1].

During development of vascular system, initially diffuse plexus are formed throughout the embryonic mesoderm followed by formation of separate plexus in relation to the differentiating tissues and organs which is followed by formation of larger channels by enlargement of individual capillaries and fusion of adjacent capillaries, the regions where the flow is diverted undergoes retrogression and atrophy[11].

In the early stage of development the limb bud has terminal plexus at the tip, which is fed by the axis artery of the limb and drained by the marginal veins which develop along the pre-axial and post axial borders of the limb[1,12]. The marginal veins which form the pre axial and post axial veins give rise to the superficial veins of the limb, where the preaxial vein drains into the deep veins close to the proximal joint whereas the postaxial vein drains into the deep vein near the distal joint and in upper limb preaxial vein forms the cephalic vein and the post axial vein forms the basilic vein[1].

The cephalic vein initially drains into external jugular vein after passing superficial to clavicle by jugulo-cephalic trunk which atrophies as the cephalic vein gets a new connection with axillary vein[13].

Persistent jugular-cephalic trunk has been reported where the cephalic vein terminates in external jugular vein[14].

The establishment of final vascular pattern of depends on genetic factors and hemodynamic factors like the pressure of blood, rate and direction of flow. [11, 12] These factors could have led to the termination right cephalic vein in the cubital region in the above reported case.

The premature termination cephalic vein as seen in the above reported case presents variation in the pattern of superficial veins of the cubital region. This has been classified using different terminologies in various studies. Kaissar Yammine *et al.* conducted meta-analysis using 27 studies which included 9924 arms in total, described this pattern as Type-4 with a prevalence percentage of 1.6 to 32%[8].

Hyunsu Lee *et al.* studied the pattern using intravenous illuminator on 174 right and 176 left side on Korean subjects and classified this pattern as Type III with 2% occurrence[9]. A S Dharap *et al.* in their study on 170 males and 96 females termed this variation as pattern 5 which was noted 1% females and 2.9% males[10].

Although median cubital vein is the preffered vein for venipuncture, the cephalic vein can be used for long term intravenous access or indwelling catheter[1,4].

The cephalic vein cutdown in deltopectoral groove had lesser risk of pneumothorax and lead failure when compared to subclavian puncture hence was suggested to be the venous access of choice to insert cardiac implantable electronic devices like the pacemaker, implantable cardioverter -defibrillator by AP Benz *et al.*[5] M. Loukas *et al.* reported the absence of cephalic vein in deltopectoral groove in 5% cases[15].

The radiocephalic fistula in the forearm followed by the brachiocephalic fistula in the arm are the most commonly preferred for hemodialysis[6]. Cephalic vein graft has been tried in femoro-popliteal (infrainguinal) bypass and has advantages over synthetic grafts[7].

Conclusion

The cephalic vein is approached by the cardiologists, radiologists, surgeons and phlebotomists in the arm and deltopectoral groove for interventional, diagnostic and therapeutic procedures. The recognition of the absence of the cephalic vein in the arm and deltopectoral groove is important to avoid complications during the procedure and to find other safer alternatives during emergencies.

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