

## Case Report

### Variations in the right upper limb veins of a single cadaver

<sup>1</sup>Prof. (Dr.) Partha Pratim Pradhan , <sup>2</sup>Dr. Biswapriya Sinha , <sup>3</sup>Dr. Biplab Goswami , <sup>4</sup>Dr. Shubhrangsu Samanta , <sup>5</sup>Dr. Pinki Kundu , <sup>6</sup>Dr. Moumita Hota , <sup>7</sup> Prof. (Dr.) Bhaskar Pal, <sup>8</sup>Prof. (Dr.) Sudeshna Majumdar

<sup>1</sup>Principal, Bankura Sammilani Medical College, Bankura - 722102. West Bengal, India.

<sup>2</sup>Junior Resident, Department of Anatomy , Nilratan Sircar Medical College, Kolkata – 700014, West Bengal, India

<sup>3</sup>Demonstrator, Department of Anatomy , Nilratan Sircar Medical College, Kolkata – 700014, West Bengal, India.

<sup>4</sup>Junior Resident, Department of Anatomy , KPC Medical College, Kolkata – 700032, West Bengal, India.

<sup>5</sup>Junior Resident, Department of Anatomy , Nilratan Sircar Medical College, Kolkata – 700014, West Bengal, India.

<sup>6</sup>Junior Resident, Department of Anatomy, Nilratan Sircar Medical College, Kolkata – 700014, West Bengal, India.

<sup>7</sup>Professor, Department of Anatomy , RG KAR Medical College, Kolkata - 700004, West Bengal, India.

<sup>8</sup>Professor, Department of Anatomy, Nilratan Sircar Medical College, Kolkata -700014, West Bengal, India.

Corresponding author: Prof. (Dr.) Sudeshna Majumdar

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#### Abstract

While doing the routine dissection for the undergraduate students in NRS Medical College, Kolkata, India, few vascular variations were found in the right upper limb of one seventy year old male cadaver. The dissection was done in September, in the year 2013 and variations were detected in the superficial and deep veins of the right superior extremity of the cadaver concerned. The right basilic vein joined the two brachial veins (venae comitantes of the brachial artery) separately in the right axilla, close to the shoulder joint, instead of at the lower margin of teres major or subscapularis muscle and formed the right axillary vein. On the left sided superior extremity no such venous variation was detected.

This case report will contribute to the fields of Gross and Clinical Anatomy, at the same time may be of help to the surgeons and other clinicians for any invasive procedure or surgical approach in the upper limb like introduction of cardiac catheters and formation of arteriovenous fistula. So the case report has importance in surgery, cardiology and nephrology in addition to Anatomy.

**Key Words:** Basilic vein, cephalic vein, axillary vein, brachial veins

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#### INTRODUCTION

The **cephalic vein** originating at the radial end of the irregular dorsal venous arch at the back of the hand, winds around the radial border of the forearm, ascends in arm on the lateral side of the biceps

brachii muscle and pierces the deep fascia in the shoulder region to drain into axillary vein [1,2].

The origin of the **basilic vein** is the ulnar side of the dorsal venous arch, and this vein is the main venous outlet in 53% of cases [1]. This vein ascends along the medial aspect of the forearm, pierces the deep

fascia at the elbow or at about the middle of the arm. Then it joins the venae comitantes of the brachial artery at the lower margin of teres major or near the lower margin of subscapularis muscle to continue upwards as the axillary vein [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 [2, 3].

**The Brachial veins** flank the brachial artery, as venae comitantes with the tributaries similar to the arterial branches and near the lower margin of the subscapularis they join the axillary vein. These deep veins have numerous anastomoses with each other and with the superficial veins [2,4].

**The axillary vein** is the continuation of the basilic vein. It begins at the lower border of the teres major and ascends to the outer border of the first rib, where it becomes the subclavian vein. It is joined by the brachial veins below the lower margin of the subscapularis and by the cephalic vein near its costal end. Other tributaries follow the axillary artery branches. The vein runs medial to the axillary artery and is partially overlapped by the artery [2, 3].

The aim of this study was to know about the variations of these veins concerned to some extent, as the knowledge of these variations can prevent serious

complications during an invasive procedure or a vascular surgery in upper limb.

#### **METHODS**

While doing the routine dissection for the undergraduate students in the Department of Anatomy, NRS Medical College, Kolkata, India, in September, 2013, few variations were found in the right superior extremity of a male cadaver. The subject was about seventy year old and the variations were present in superficial and deep veins of the right upper limb. Dissection was done properly in both the upper limbs of the cadaver concerned. All the structures were observed carefully and relevant photographs were taken.

#### **RESULTS**

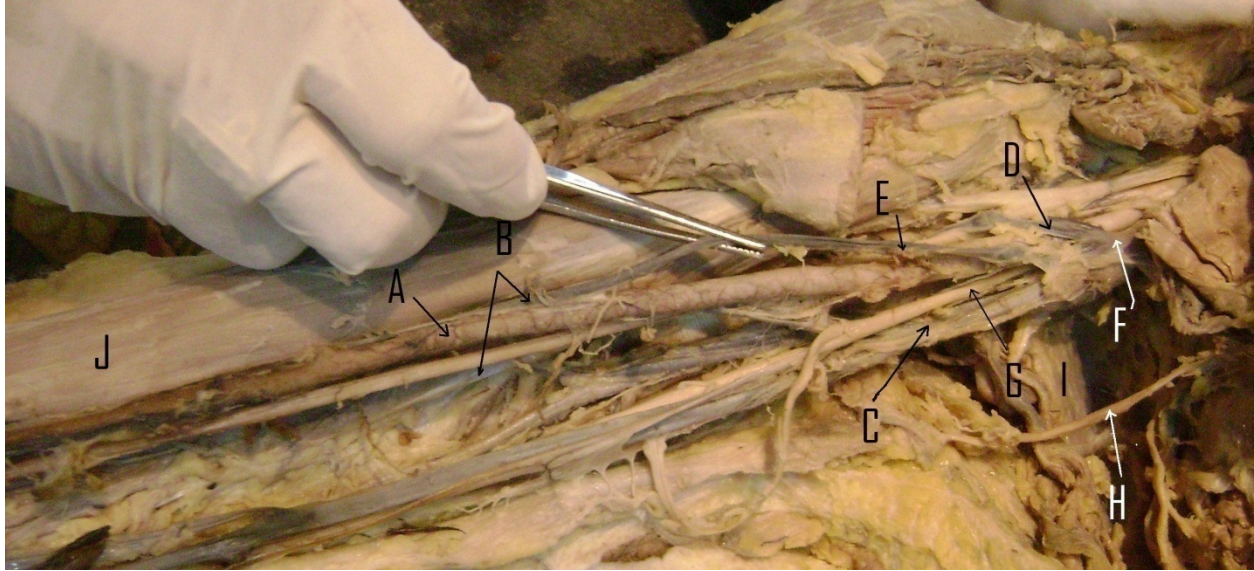
In the right superior extremity of the cadaver concerned, the basilic vein arose from the medial side of the dorsal venous arch, ascended along the medial aspect of the forearm and arm, pierced the deep fascia above the elbow, at about the middle of the arm. But this vein received the venae comitantes along with brachial artery or the brachial veins at a higher level in axilla, in the shoulder region. The two brachial veins joined the basilic vein separately at two different levels in the axilla to form the right axillary vein.

On the left sided superior extremity no such variation was found among the veins in the cadaver concerned.

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**One Figure** showing the two right brachial veins [D & E] joined with the basilic vein [C] separately at two different levels in the axilla to form the right axillary vein [F]. One such brachial vein is held with forceps.

**Index:** A –Brachial artery, B- Two venae comitantes, one on each side of the brachial artery, C - Right basilic vein, D – one brachial vein (one of the two venae comitantes along with the brachial artery) joining the basilic vein, E – Another brachial vein joining the basilic vein, F - Axillary vein, G - Medial cutaneous nerve of forearm, H - Medial cutaneous nerve of arm, I – Teres major muscle, J – Biceps brachii muscle.

## DISCUSSION

The formation of the venous drainage system of the human body is a complex process involving structures forming and regressing in a pre-defined order. Interruption of any one of these steps results in congenital variations [5].

At the tip of the early limb bud in the intrauterine life, blood in the terminal capillary plexus returns to the body via a marginal vein that develops along the pre and post-axial borders of the limb. As the limb enlarges, the marginal vein can be divided into and pre and post-axial veins, which run along their respective borders and are the precursors of the superficial veins of the limbs. Generally, the preaxial (superficial) veins join the deep veins at the proximal joint, and the postaxial (superficial) veins at the distal joint of the limb. Deep veins develop in situ alongside the arteries. In upper limb, the preaxial

superficial vein becomes the cephalic vein and drains into the axillary vein at the shoulder. The postaxial superficial vein becomes the basilic vein which passes deep in the arm [2]. In the present case the latter has joined the deep brachial veins near the proximal joint, i.e., the shoulder joint.

In 2012, Bhattacharya et al described a case where on both sides the axillary vein was formed by the basilic vein and venae comitantes along with brachial artery at a higher level (behind the pectoralis minor muscle) [6]. 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]. The median cubital vein is commonly used for venipuncture (for blood sampling and transfusion or intravenous injection), so also the basilic vein, often under conditions of emergency [8, 9]. Superficial segment of the latter can be used in general, vascular

and endovascular surgery to introduce a catheter [10]. According to Dharap and Shaharuddin, veins in the cubital fossa are used for the introduction of cardiac catheters for obtaining blood samples from cardiac chambers and for cardioangiography [9].

Vascular surgeons utilize the basilic vein to create an AV (arteriovenous) fistula or AV graft for hemodialysis access in patients with renal failure [8]. Vascular access for chronic hemodialysis has classically been initiated by the creation of a primary radial artery-to-cephalic vein arteriovenous fistula (RCAVF) [10, 11]. Increased use of chronic venous access catheters such as PICS (Peripherally Inserted Central venous catheters) and various tunnelled catheters has been associated with an increased incidence of upper extremity deep vein thrombosis [12].

Knowledge about variations of the upper extremity veins is important for a successful

arteriovenous fistula creation [13]. Kaiser et al (in 2010) described a complication of a Basilic Vein Transposition (BVT) resulting from failure to recognize aberrant anatomy as the brachial-basilic junction was located near the cubital fossa. This case highlights the prevalence of variations of upper extremity veins and the need for thorough Duplex Vein Mapping before surgery for the preservation and planning of future access [13].

### CONCLUSION

In this context, it is evident that the present case describing a venous variation in upper limb, has significance in vascular surgery, cardiology or nephrology in addition to Anatomy.

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