

A PROSPECTIVE STUDY ON ANATOMICAL VARIATIONS AND VASCULAR PATTERNS OF SUPERFICIAL VEINS IN THE CUBITAL FOSSA AND ITS CLINICAL IMPLICATIONS AMONG PRECLINICAL MEDICAL STUDENTS

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Abstract

Background: Superficial veins of the cubital fossa are the most frequent site for the venous accesses to get blood samples and for administering, blood transfusions and intravenous injections. Venipuncture usually meets with high failure rate of 30% thus requiring recurrent tries. The low understanding, lack of skill, problem in finding out the superficial venous patterns in cubital fossa may be ascribed for this much high failure rate. The health workers faces problem in performing their procedures due to anatomical variation in the distribution of these veins. **Materials and Methods:** This study was conducted in Department of Anatomy in a tertiary care teaching hospital in Rajsamand. The duration of study was over a period of two years. **Result:** The result of this study revealed that among 200 participants, type 1 is the common pattern for the superficial vein of cubital fossa. **Conclusion:** It can be suggested that the proper and adequate knowledge of the variations of basilic and cephalic veins minimize the frequency of associated complications.

INTRODUCTION

The deoxygenated blood from the arm, forearm, and hand is drained by superficial and the deep venous system of the upper limb. The superficial venous system is situated within the subcutaneous tissue of the upper limb near to the surface of the body.^[1] Cephalic, basilic, median antebraclial, and median cubital veins are the main superficial veins of the cubital fossa. Out of these, the cephalic is the longest vein of the upper limb. It originates from the lateral end of the dorsal venous network of the hand.^[2] This vein coils around the lateral border of the distal part of the forearm while running proximally through the roof of the anatomical snuffbox passing in front of the elbow. It runs along the lateral border of the arm muscle biceps brachii and pierces the deep fascia at the lower border of the pectoralis major. Furthermore, it traverses through the delto-pectoral triangle piercing the clavipectoral fascia and finally draining in the axillary vein.^[3] On the other hand, the basilic vein starts from the medial end of the dorsal venous arch running proximally along the back of the medial border of the forearm. It then encircles the medial border near the elbow going proximally in front of the elbow. In the arm, the basilic vein is commonly used to form arteriovenous fistulas for hemodialysis. The superficial segment of the basilic vein is exploited to

pass a catheter above the cubitus in general, vascular and endovascular procedures.^[4] The median cubital vein, another superficial vein, is a large communicating vein joining the cephalic with basilic veins. It originates from the cephalic vein 3 cm below the bend of the elbow. It then continues proximally running obliquely and medially while joining the basilic vein around 3 cm above the medial epicondyle.^[5] The median antebraclial vein collects the blood from the superficial venous network of the palm continuing proximally on the anterior aspect of the forearm ending in the median cubital or basilic veins.^[6]

Superficial veins of the cubital fossa are the most frequent site for the venous accesses,^[7] to get blood samples and for administering, blood transfusions and intravenous injections. Venipuncture usually meets with high failure rate of 30% thus requiring recurrent tries. The low understanding, lack of skill, problem in finding out the superficial venous patterns in cubital fossa may be ascribed for this much high failure rate. The health workers faces problem in performing their procedures due to anatomical variation in the distribution of these veins. These veins are normally visible through the skin while in the conditions, like shock that affects blood flow, these veins collapse and these become poorly visible.^[8,9] The nearby neurovascular structures may get injured while accessing the veins

due to its poor visibility leading to local inflammation, hematoma, thrombus, infection, bruising and sensory changes.^[10,11]

A diverse range of patterns (20%) of anastomosis of the superficial veins of the cubital fossa have been reported.^[12] The most frequently reported pattern of the cubital venous arrangement is involving the median antebrachial vein. It runs with two terminal branches of the median cephalic and median basilic vein joining the cephalic with the basilic vein.^[13] The clear understanding of different venous pattern in the cubital fossa is extremely important for diagnostic, surgical and therapeutic practices.

MATERIALS AND METHODS

Study Area: This study was conducted in Department of Anatomy in a tertiary care teaching hospital in Rajsamand.

Study Duration: The duration of study was over a period of two years.

Study Population: In this study we included total 200 case.

Inclusion & Exclusion Criteria: All fit subjects with prominent superficial veins included. The subjects with thick subcutaneous tissue layer or having any cut or wound within the cubital region were excluded.

We were explained the procedure and purpose of study to the all subjects. Informed consent were taken from each subjects. After obtaining informed consent all participants were requested to show their upper limb. No active intervention was done. Tourniquet was applied about 10 cm above the elbow for about 2 to 3 minutes in a supine position. After applying tourniquet, subjects were asked for active exercises, when veins became visible. The visibility was properly ensured. Pattern of veins was studied & recorded in a detailed.

Types of Superficial Venous

Venous arrangement around cubital fossa is highly variable. It was seen that the cubital veins are classified into four main groups on the bases of previous study with following criteria:

Type 1: In this pattern Median cubital vein arise from cephalic vein a few centimeters below elbow joint and passes obliquely upward to medial side to join basilic vein a few centimeters above elbow joint and receives tributaries from the front of the forearm.

Type 2: In this pattern Median antebrachial vein joins basilic vein without establishment of communication between cephalic and basilic vein.

Type 3: In this pattern Cephalic vein runs from lateral to medial where it joins basilic vein and receives tributaries from the front of the forearm; no proximal cephalic vein.

Type 4: In this pattern Median antebrachial vein divides into median cephalic and median basilic veins in cubital fossa which joins cephalic and basilic veins, respectively.

Data Analysis: Data were analysed by using Microsoft excel.

RESULTS

Total 200 healthy subjects were included in this study. After examine the superficial vein of cubital fossa in each subjects, observations were recorded. We had seen four types of pattern. Type 1 was the most common pattern which was seen in 114 subjects. After that we were seen Type 3 pattern followed by Type 2 and type 4 which were 44,22 & 20 respectively.

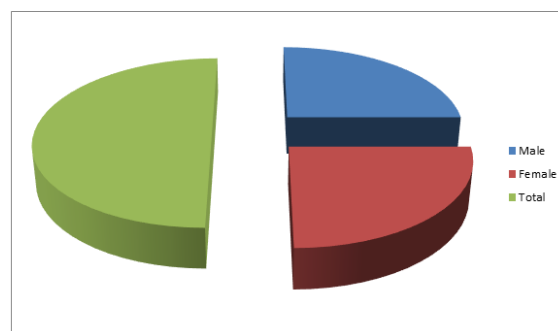


Figure 1: Subject Distribution according to gender

Table 1: Distribution of cases according to variation in superficial vein.

Types of vein	No.
Type 1	114
Type 2	20
Type 3	44
Type 4	22
Total	200

Table 2: Distribution of cases according to variation in superficial vein in relation to Gender

Gender	Type 1	Type 2	Type 3	Type 4
Male	60	8	18	14
Female	54	12	26	8

DISCUSSION

The superficial veins have been reported to be present in between the two layers of superficial

fascia. These veins run along with cutaneous nerves and superficial lymphatics. A clear understanding of distribution, relations and patterns around cubital fossa is extremely important for various diagnostic

and therapeutic procedures such as drawing blood samples and for giving intravenous injections. Various anatomical variations in lengths, anastomosis and patterns have been observed affecting the procedures in cubital fossa. In the present study, four different patterns in the superficial veins in the cubital fossa have been observed.

In type 1 pattern, the cephalic vein passes from the medial to lateral side and joins the basilic vein. On the other hand in type 4 pattern the median antebrachial vein in the cubital fossa break ups into median cephalic and median basilic vein to link the cephalic and basilic vein respectively. Type 1 venous pattern was the most commonly found pattern in both the genders. While, the type 4 pattern was the least frequent one among all. The studies by Hamzah AA et al,^[14] Faraj and Eman,^[15] among Jordanians (48.5%), Dharap et al,^[16] among Malaysians (68%) and Hyunsu et al,^[17] among Koreans (50.1%) reported type 1 pattern to be the most common one supporting the findings of the present study. Similarly, the biostatistical study of Wasfi FA et al,^[18] observed type 1 pattern being the most common one, followed by type 3 and type 2; while, the type 4 being the least common variation.

No gender variation was observed in the present study. These findings of the present study were similar to various studies.^[14,19] Conversely, Melaku T. et al,^[20] observed gender variation in the superficial venous patterns in cubital fossa. Type 2 and 3 patterns have been found to have male preponderance. As well as, a significant gender variation was reported by some of the studies.^[21,22]

The variations in cephalic vein have been found to be lesser than the variations in basilic vein.^[23] Varicosities have been observed to affect the pattern and anastomosis of these veins.^[24] These varicosities can be removed if needed for cosmetic reasons. The genetic and hydrodynamic factors have been found to play a key role in the different patterns of these veins.^[19] It is extremely important to have a clear knowledge about the normal anatomy of variations. The significant variations in origins, insertions and patterns of veins have been found in human anatomy as it is not static. Therefore, to avoid complications, surgeons, radiologists, anatomists and medical students should know about these variations while performing procedures such as blood sampling, coronary artery bypass grafting, cardiac catheterization, transfusion procedures, fistulae creation and infusion.

CONCLUSION

Thus, it can be concluded that the awareness of the arrangement of superficial veins in the cubital fossa is extremely essential for health professionals especially vascular surgeons to avoid any single

chance of affecting the underlying structures. It can be suggested that the proper and adequate knowledge of the variations of basilic and cephalic veins minimize the frequency of associated complications.

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