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THE VANISHING VEIN: A STUDY ON MEDIAN CUBITAL VEIN ABSENCE AND ITS PROCEDURAL IMPACT

Dr. Kiran Kumar T. M.[1]*, Dr. Rashmi N. R.[2], Dr. Kochuthresia Jose[3]

[1]Second Year Post Graduate Scholar. Department of Rachana Sharira. Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital and Research Centre, Kuthpady, Udupi, Karnataka, India.
[2]Assistant Professor, Department of PG Studies in Rachana Sharira, Sri Dharmasthala Manjunatheshwara College of Ayurveda, Hospital and Research Centre Kuthpady, Udupi, Karnataka, India.
[3]Assistant Professor, Department of PG Studies in Rachana Sharira, Sri Dharmasthala Manjunatheshwara College of Ayurveda, Hospital and Research Centre Kuthpady, Udupi, Karnataka, India.

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***Corresponding Author**
Dr. Kiran Kumar T. M.
Second Year Post Graduate Scholar. Department of Rachana Sharira. Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital and Research Centre, Kuthpady, Udupi, Karnataka, India.

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ABSTRACT

The median cubital vein is a prominent superficial vein in the antecubital fossa, commonly utilized for venipuncture due to its accessibility and size. However, anatomical variations, including its complete absence, can pose significant clinical challenges. This article investigates the incidence, embryological basis, and the clinical implications of the absence of the median cubital vein. Through a review of cadaveric study, we highlight the compensatory venous patterns such as prominent cephalic or basilic veins and the presence of alternative anastomotic veins. Clinically, an absent of median cubital vein may increase the risk of failed venipuncture, complications during intravenous cannulation, and challenges in creating arteriovenous fistulas for hemodialysis. Awareness of this anatomical variation is essential for clinicians, especially in emergency, surgical, and phlebotomy settings, to prevent procedural complications and to improve patient outcomes.

KEYWORDS: However, anatomical variations, including its complete absence, can pose significant clinical challenges.

INTRODUCTION

The median cubital vein is one of the most clinically significant superficial veins of the upper limb, commonly located in the anterior aspect of the elbow within the cubital fossa. It begins from the cephalic vein 2.5cm below the bend of the elbow, runs obliquely upward and medially, and ends in the basilic vein 2.5 cm above the medial epicondyle.[1]

It receive tributaries from the anterior aspect of the forearm (median vein of the forearm) and is connected to the deep veins through a perforator vein, which pierces the bicipital aponeurosis.[2] The perforator vein fixes the median cubital vein and thus makes it ideal for intravenous injections.[3]

It usually serves as a prominent communicating vein between the cephalic vein on the lateral side and the basilic vein on the medial side. Owing to its relatively fixed position, superficial location, and size.[4] It is frequently chosen for venipuncture, intravenous catheterization, blood sampling, and other diagnostic and therapeutic interventions. As such, a clear understanding of its anatomy is fundamental for medical professionals, particularly those working in emergency medicine, anesthesiology, and phlebotomy.[5]

The absence of the median cubital vein is typically compensated by other superficial venous arrangements, such as a prominent cephalic or basilic vein, or an atypical pattern involving accessory veins. These anatomical differences are believed to arise from variable patterns of venous development during embryogenesis.[6] A thorough understanding of the developmental basis and the range of anatomical configurations is therefore essential for accurate clinical assessment and procedural success.

Embryologically, development of blood and blood vessels starts as early as 15-16 days in the mesoderm of the yolk sac, chorion, and body stalk. Blood vessels develop from isolated masses and cords of mesenchyme in the mesoderm called blood islands.[7] Growth and fusion of blood islands form an extensive network of blood vessels throughout the embryo.[8]

This article aims to provide an in-depth review of the absence of the median cubital vein, examining its embryological origins, reported prevalence in various populations, potential clinical consequences, and implications for medical practice. By highlighting this anatomical variation, we seek to emphasize the importance of adaptability and anatomical knowledge in clinical settings, particularly when managing vascular access in the upper limb.

METHODS

The variation was observed during routine dissection in the Sri Dharmasthala Manjunatheshwara ayurvedic medical college, hospital and research center Udupi, on the right upper limb of a male cadaver. After careful removal of the skin and superficial fascia of the cubital fossa, the structures were identified.

Figure 1: Cephalic Vein.

Figure 2: Basilic Vein.

DISCUSSION

Anatomical variations in the superficial veins of the upper limb are common and well-documented, yet they often go underappreciated in clinical practice. The median cubital vein, due to its usual prominence and accessibility, is traditionally favored for various procedures such as venipuncture and cannulation. However, its absence, although not exceedingly frequent, poses notable clinical challenges. Understanding such variations is essential not only for routine procedures but also for surgical planning, imaging interpretation, and emergency interventions.

The absence of the median cubital vein can be attributed to variations in embryological development. During early fetal life, the superficial venous system of the upper limb

undergoes a complex transformation, wherein the primary venous plexuses differentiate into the adult pattern. Disruptions or deviations during this process may result in the absence of the median cubital vein or the formation of alternative anastomotic pathways between the cephalic and basilic veins. In such cases, veins such as the median antebrachial vein, accessory cephalic vein, or even deep veins may take on a more prominent role.

Clinically, the absence of the median cubital vein may lead to multiple failed venipuncture attempts, particularly by inexperienced practitioners, and may necessitate the use of ultrasound-guided vascular access techniques. This is especially relevant in pediatric patients, obese individuals, or those with chronic illnesses where peripheral veins may already be compromised. Furthermore, knowledge of this variation is critical during the creation of arteriovenous fistulas for hemodialysis, where vein availability and caliber are crucial for successful outcomes.

Studies on the prevalence of this variation suggest that while it is not the most common pattern, it is significant enough to warrant inclusion in both anatomical education and clinical training. Some reports indicate population-based differences in venous anatomy, highlighting the role of genetic and possibly environmental factors in vascular development. As such, greater emphasis on individualized anatomical assessment, especially using pre-procedural imaging, may improve success rates and patient comfort.

CONCLUSION

We found absence of medial cubital vein, and the poor development of cephalic vein, which runs parallelly in cubital fossa. In most of the population, the cephalic vein drains into the basilic vein through median cubital vein (70-80%).[9] But in this case we noted absence of median cubital vein.

The absence of the median cubital vein, while not universally prevalent, represents an important anatomical variation with meaningful clinical implications. Its recognition is vital for effective vascular access, minimizing procedural complications, and improving patient outcomes. Medical professionals should be aware of such variations and consider them during clinical decision-making, especially when standard venous access proves difficult. Incorporating anatomical variations into medical training, along with wider adoption of imaging-guided techniques, can enhance both the safety and efficacy of routine and

emergency vascular procedures. Continued anatomical research and awareness can contribute to better preparedness and more individualized patient care.

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