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Original Research Article

Identification of cephalic vein in the deltopectoral groove and its surgical relevance

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Abstract

Introduction: Identification and recognition of the cephalic vein (CV) in the deltopectoral triangle is of critical importance when considering emergency procedures. Therefore, the present cadaveric study was undertaken to identify the CV in the deltopectoral groove and its termination in the axillary vein with respect to the relevant anatomical landmarks.

Material and methods: The length of the CV was taken from the lowest limit of the deltopectoral groove to its draining point into the axillary vein. The coracoid process (CP), first costo-chondral junction (CCJ) and the midclavicular point (MCP) were used as the landmarks and their distances from the drainage point of CV into the axillary vein were measured.

Results: In all cadavers, the CV traversed the deltopectoral groove and terminated into the axillary vein. The mean length of the CV was 15.46 ± 1.57 cm. The distances of its drainage point from the sternoclavicular joint, midclavicular point, first costo-chondral junction and the coracoid process were 8.26 ± 0.99 cm, 3.51 ± 0.8 cm, 5.66 ± 0.71 cm and 5.16 ± 0.8 cm respectively.

Conclusion: The present anatomical study describes the location of cephalic vein in relation to the anatomical landmarks which would be commonly used in the intervention procedures in this region.

Key words

Cephalic vein, Sternoclavicular joint, Coracoid process, Deltopectoral groove, Midclavicular point.

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Introduction

The cephalic vein (CV) begins in the anatomical snuff box from the radial side of dorsal venous network. At the wrist, it crosses superficial to the anatomical snuff box. In the forearm, it travels upward along the anterior border of the brachioradialis muscle. It appears in front of elbow, where it is connected to the basilic vein by median cubital vein. Leaving the cubital fossa, it ascends in a groove along the lateral border of the biceps brachii until the proximal third of the arm, where it passes between the deltoid and pectoralis muscles (the deltopectoral triangle). In the deltopectoral triangle, it pierces the clavipectoral fascia, makes a right angled bend and drains into the axillary vein [1].

Central venous access can be achieved by cannulating various veins such as the subclavian, femoral, brachiocephalic and cephalic veins [2]. Central venous catheters in the upper limb and head and neck, are inserted blindly using various anatomic landmarks such as the clavicle, sternal notch, sternocleidomastoid and the carotid artery [3].

The CV is suitable for central venous access, pacemaker and defibrillator implantation [4, 5]. Furthermore, the cephalic vein cut-down method is associated with a lower incidence of complications than subclavian puncture with a success rate of approximately 80% [4, 6, 7]. The CV has been used as a carotid patch as an alternative to the great saphenous vein [8].

The CV has been used as a source of vein graft in microsurgery. It can be considered as a reliable source of venous drainage when there is a non-availability of veins during free-flap reconstruction in the head and neck region and breast. The use of vein graft increases the number of anastomosis thereby increasing the chances of occlusion. The anatomical course and location of the cephalic vein allow good patency and straightforward harvesting [9, 10].

Identification and recognition of the CV in the deltopectoral triangle is of critical importance when considering emergency procedures. However, reports indicate that the CV is commonly not found within the deltopectoral groove or that surgeons have difficulty in identifying its location despite the use of ultrasound devices [11].

Therefore, the present cadaveric study was undertaken to identify the CV in the deltopectoral groove and its termination in the axillary vein with respect to the relevant anatomical landmarks. A more complete knowledge of the relationships of the cephalic vein will allow surgeons to develop a safer, more complete surgical plan and help to prevent post operative complications.

Material and methods

The present observational study was carried out in the Department of Anatomy, Kasturba Medical College, Manipal. 10 formalin fixed adult cadavers were included in the study. Gender and age of the cadavers were not taken into consideration.

The skin was reflected and the CV was defined in the deltopectoral groove. Pectoralis major muscle was reflected from its sternocostal and clavicular attachments and the drainage point of CV into the axillary vein was noted. The landmarks such as the coracoid process and first costo-chondral junction were identified.

The arm was abducted to 90˚ for measuring the required parameters. Vernier calipers and dividers were used for the measurements. The length of the CV was taken from the lowest limit of the deltopectral groove to its draining point

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into the axillary vein. The coracoid process (CP), first costo-chondral junction (CCJ) and the mid clavicular point (MCP) were used as the landmarks and their distances from the drainage point of CV into the axillary vein were measured. The parameters measured are shown in **Photo - 1.** SPSS version 16 was used for the statistical analysis.

Photo – 1: Parameters measured.

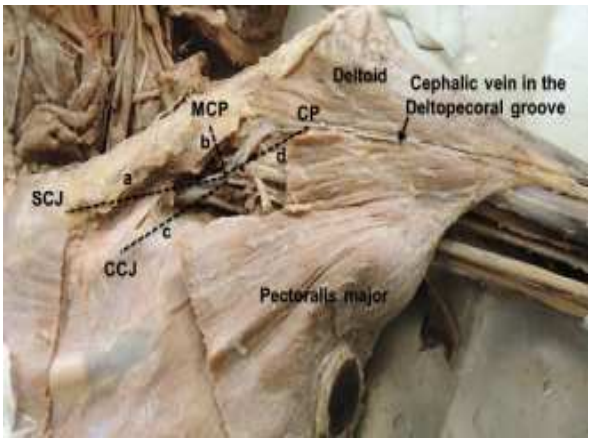

Table - 1: Mean and standard deviations (SD) of the distances measured.

Parameter measured	Mean and SD (cm)
CV - SCJ	8.26±0.99
CV - MCP	3.51±0.8
CV - CCJ	5.66±0.71
CV - CP	5.16±0.8

(CV - Cephalic vein, SCJ - Sternoclavicular joint, MCP - Midclavicular point, CCJ - First costo-chondral junction, CP - Coracoid process)

Results

In all cadavers, the CV traversed the deltopectoral groove and terminated into the axillary vein. The mean length of the CV was 15.46 ± 1.57 cm. The mean distances from the different landmarks to the drainage point of CV are shown in **Table - 1.** The sides were not considered as there was no statistical difference in the mean values between the right and left sides.

Discussion

A study by Martin, et al. showed the length of the CV within the deltopectoral triangle ranged from 3.5 cm to 8.2 cm with a mean of 4.8 ± 0.71 cm. The mean distances between the CV and the acromion process of the scapula and the clavicle were 10 ± 1.64 cm and 3 ± 1.13 cm respectively. There was no significant difference in the length or diameter of the CV in relation to the race, gender age or institution of origin of the cadavers [3].

Study done by Yeri, et al. on CV in the deltopectoral triangle showed CV is located at an average distance of 7.9 ± 6.0 mm with a range from 0 to 20 mm from the coracoid process [12].

In the present study, the mean length of the CV was 15.46 ± 1.57 cm. The distances of its drainage point from the sternoclavicular joint, midclavicular point, first costo-chondral junction and the coracoid process were 8.26 ± 0.99 cm, 3.51 ± 0.8 cm, 5.66 ± 0.71 cm and 5.16 ± 0.8 cm respectively.

However, this vein is not always present and using it requires practice [13]. Despite its clinical relevance, the current literature contains only a small quantity of data describing the morphology and morphometry of the CV. CV was found bilaterally in most specimens and was most often seen along the lateral portion of the deltopectoral triangle as described by Au, et al. This suggests that clinicians may consider identifying the cephalic vein along the lateral aspect of the deltopectoral groove. In addition, the deltopectoral groove is identified by a strip of fat in which the cephalic vein is embedded

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[11]. Studies have shown percutaneous venous punctures via the CV have less immediate preoperative complications than subclavian vein puncture [14].

According to Khan and Simms, using the CV for a carotid patch is superior to using the long saphenous vein, not only because it has the ideal size, wall thickness and handling characteristics and also it preserves the leg veins for future cardiovascular interventions [8].

Ultrasonographic guidance is becoming a popular technique for identifying the CV for the purpose of inserting different types of catheter [15]. Surgeon's ability to recognize and identify the anatomical variations of the cephalic vein will reduce the occurrence of iatrogenic complications when surgery is performed in and around the deltopectoral triangle.

Similarly, in breast reconstruction the CV with its appropriate lie, easy harvest and good caliber, can be used to drain the superficial or the deep venous system of the DIEP flap depending upon the requirement. Hence, the CV can be considered a reliable and constant venous outflow channel in cases of head and neck reconstructions with free tissue transfer especially in previously operated and post‑radiotherapy patients [16].

Loukas, et al. reported that in 5% of cases CV was absent [3] while Le Saout, et al. reported absence of CV in 19.7% of cases [17]. De Rosa, et al. reported absence of CV in 5.3% [18]. In the present study, CV was present in all the cases. Knowledge of the above mentioned details may help diminish the inconveniences when using the CV, as it is a good alternative in accessing veins.

The parameters measured in the abducted arm in the present study may vary little when the arm is kept in anatomical position. The values may also differ a little from that of in living as they were taken in formalin fixed specimens.

Conclusion

The present anatomical study describes the location of cephalic vein in relation to the anatomical landmarks which would be commonly used in the intervention procedures in this region.

References

1. Standring S. Gray's anatomy, The anatomical basis of clinical practice. In: Veins of the upper limb. 38th edition. Churchil Livingstone Elsevier, Spain, 1995, p. 1589.
2. Le Donne. Percutaneous cephalic vein cannulation (in the deltopectoral groove), with ultrasound guidance. J Am Coll Surg, 2005; 200: 810–811.
3. Loukas M, Myers CS, Wartmann T, Tubbs RS, Judge T, Curry R, et al. The clinical anatomy of the cephalic vein in the deltopectoral triangle. Folia Morphol., 2008; 67(1): 72–77.
4. Chen JY, Chang KC, Lin YC, Chou HT, Hung JS. Feasibility and accuracy of pre-procedure imaging of the proximal cephalic vein by duplex ultrasonography in pacemaker and defibrillator implantation. J Interv Card Electrophysiol, 2004; 10: 31–35.
5. Neri R, Cesario AS, Baragli D, Monti F, Danisi N, Glaciale G, et al. Permanent pacing lead insertion through the cephalic vein using an hydrophilic guidewire. Pacing Clin Electrophysiol, 2003; 26: 2313–2314.
6. Povoski SP. A prospective analysis of the cephalic vein cut down approach for

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ISSN: 2394-0034 (O)

chronic indwelling central venous access in 100 consecutive cancer patients. Ann Surg Oncol, 2000; 7: 496–502.

7. Povoski SP. Cephalic vein cut down approach for long term indwelling central venous access. Arch Surg, 2002; 137: 746–747.
8. Khan RSA, Simms M. Cephalic vein for carotid patching. EJVES Extra, 2005; 9: 35–36.
9. Nakayama Y, Soeda S, Iino T. A radial forearm flap based on an extended dissection of the cephalic vein. The longest venous pedicle? Case report. Br J Plast Surg, 1986; 39: 454‑7.
10. Bhathena HM, Bipaddled KNM. Retrograde radial extended forearm flap with microarterial anastomosis for reconstruction in oral cancer. Br J Plast Surg, 1988; 41: 354‑7.
11. Au FC. The anatomy of the cephalic vein. Am Surg., 1989; 55: 638–639.
12. Yeri I, Houghton EJ, Palmieri B, Flores M, Gergely M, Gomez JE. Cephalic vein. Detail of its anatomy in the deltopectoral triangle. Int J Morphol, 2009; 27(4): 1037-42.
13. Camous JP, Raybaud F, Lest I, Benoit PH. Introduction of permanent cardiac stimulations/defibrillation leads via the retro-pectoral veins. Pacing Clin Electrophysiol, 2005; 28: 324–325.
14. Mathes SJ, Nahai F. Reconstructive surgery, principles, anatomy and technique. Vol. 1. Section 8F Radial Forearm, Churchill Livingstone, Philadelphia, 1997, p. 775–802.
15. Sofocleous CT, Schur I, Cooper SG, Quintas JC, Brody L, Shelin R. Sonographically guided placement of peripherally inserted central venous catheters: review of 355 procedures. Am J Roentgenol, 1999; 170: 1613–1616.
16. Shankhdhar VK, Yadav PS, Dushyant J, SeethaRaman SS, Chinmay W. Cephalic vein: Saviour in the microsurgical reconstruction of breast and head and neck cancers. Indian J Plast Surg, 2012; 45: 485-93.
17. Le Saout J, Vallee B, Person H, Doutriaux M, Blanc J, Nguyen H. Anatomical basis for the surgical use of the cephalic vein 74 anatomical dissections. 189 surgical dissections. J. Chir. (Paris), 1983; 120(2): 131-4.
18. De Rosa F, Talarico A, Mancuso P, Plastina F. New introducer technique for implanting pacemakers and defibrillator leads: Percutaneous in cannulation of the cephalic vein. G. Ital. Cardiol., 1998; 28(10): 1094-8.

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