Pattern of Superficial Venous Arrangement in The Cubital Fossa of Adult Jordanians

*Faraj AlBustami,[1] Islam Altarawneh,[2] Eman Rababah,[3]**

Abstract

Objective: The cubital fossa is a common site for the withdrawal of venous blood for analysis, fluid and blood transfusion, and intravenous therapy. The superficial venous return from the upper limb follows a number of superficial veins which are extremely variable; these include the cephalic, basilic, median cubital and antebrachial veins and their tributaries.

To determine the patterns of superficial venous arrangement in the cubital fossa of adult Jordanians.

Methods: 264 males and females were randomly selected from the students of the University of Jordan. All subjects were Jordanian, aged between 18 and 25 years. The students consent was taken, the superficial veins of the cubital fossa were made prominent by applying a tourniquet about 10 cm proximal to the crease of the elbow and by active movements of the hand. The veins were marked on the skin and the pattern of veins in each case was accurately diagrammed on a sheet of paper.

Results: Six venous patterns were observed. There were no significant differences between the venous patterns on the right and left sides in males or females. The commonest pattern was that the median cubital vein arose from the cephalic vein a few centimeters below the elbow, joined the basilic vein a few centimeters above the level of the elbow joint and received tributaries from the front of the forearm. This pattern was more common in males (51.5%) than in females (45.4%). The less commonly observed patterns was the absence of communication between basilic and cephalic veins (in 13.6% males and 12.8%females); an arched median cubital vein (in 9.8% males and 12.8 %females); absence of the cephalic vein (in 5.3%males and 13.6% females) and two median cubital veins (in 2 males only, 1.5%).

Conclusions: Awareness of these cubital venous patterns and their approximate incidence would be very useful for those performing venepuncture or venesection in Jordanians, especially under emergency conditions.

Keywords: Cubital fossa, Superficial veins, Patterns, Jordanians.

(J Med J 2014; Vol. 48 (4):269- 274)

Received	***Accepted***
Jan. 26, 2014	*Oct. 23, 2014*

Introduction

Superficial veins of the cubital fossa are commonly used for blood sampling and transfusion and for intravenous injections often under conditions of emergency[1]. Cubital veins are also used for the introduction of cardiac catheter to obtain blood samples from cardiac

1,2. Department of Anatomy and Histology, Faculty of Medicine, The University of Jordan.
3. Department of Medical Laboratory Science, Faculty of Allied Health Science, Hashemite University.
**** Correspondence should be addressed to:***
E-mail: Eman Rbabah (emo_friendly2007@yahoo.com

chambers and for cardioangiography. The arrangement of the superficial veins in the cubital fossa, however, is subject to considerable variation[2,3,4,5,6,7,8]. Different patterns of superficial cubital veins and their percentages of occurrence have been reported in various races[9,10,11,12,13]. In the present work we were did not find any report in the literature, describing superficial cubital venous patterns in Jordanians. The objective of this study is to determine the patterns of superficial veins of the cubital fossa among adult Jordanians.

Materials and Methods

This study is an observational study, which is purely descriptive. The subjects used in this study were 132 male and 132 female students from the University of Jordan. The subjects were aged between 18 and 25 years. All the subjects with prominent superficial veins were included in the study. The Excluded ones were those who have thick subcutaneous tissue or having cut wounds within the cubital fossa. Three to five minutes after application of tourniquet at the midarm level, the occluded superficial veins now were conspicuous and were diagrammatized and some were photographed. Each subject had two drawings, one for the right side and the other for the left side. The sex and age were recorded.

Statistical Analysis

All the data were organized and analyzed using **SPSS version** 17 (IBM corporation USA). The variables were compared using the paired t test. P- Values < 0.05 were considered statistically significant.

Results

The cubital veins are classified into six main groups (A-F) based on the classification of Del Sol et al (fig .1).

In pattern (A) the median cubital vein arose from the cephalic vein a few centimeters below the elbow, joined the basilic vein a few centimeters above the level of the elbow joint and received tributaries from the front of the forearm. This pattern was more common in males (51.5%) than in females (45.4%) (Fig.1-A, table 1). Pattern (B) consisted of one median antebrachial vein branching into two in the cubital fossa with one branch ending in the basilic vein and the other branch in the cephalic vein. This pattern was also more frequent in males (18.2%) than in females (16.6%) (fig.1-B, table 1). In pattern (C) seen in 12.8% females and 13.6% males, there was no communication between the cephalic and the basilic veins (fig.1-C, table 1). In 11.4% females and 9.8% males, the cephalic vein and the basilic vein were connected by an arching vein with the concavity of the arch facing proximally into which drained two or more veins from the forearm (fig.1-D, table 1). This was pattern (D). Pattern (E) was found in 13.6% females and 5.3% males and showed only the presence of basilic vein, the cephalic vein was absent (fig.1-E, table 1). Pattern (F) was seen only in 2 male subjects (1.5 %) and no female subjects showed this pattern. Two median cubital veins were seen joining the cephalic and basilic veins. The distal of these two veins corresponded with the usual description of the median cubital vein (fig.1-F, table 1).

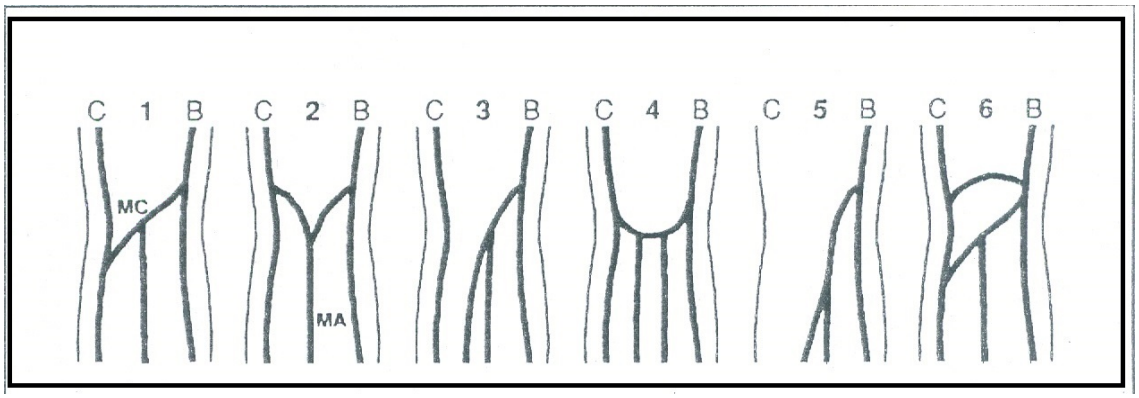

Figure 1: Diagrams showing pattern of superficial veins of the cubital fossa in 290 Jordanians (132 males and 132 females). B= basilic vein, C=cephalic vein, MC= median cubital vein, MA=median antebrachial vein. The diagrams from (1-6) correspond to the photographs (A-F)

Table 1. Distribution of the superficial cubital veins per pattern for both sexes

Pattern	A	B	C	D	E	F
Males no. and percentage	68 51.5*	24 *18.2	18 13.6*	13 9.8	07 5.3	02 1.5
Females no. and Percentage	60 45.4	22 16.6	17 12.8	15 11.4**	18 13.6**	0 0

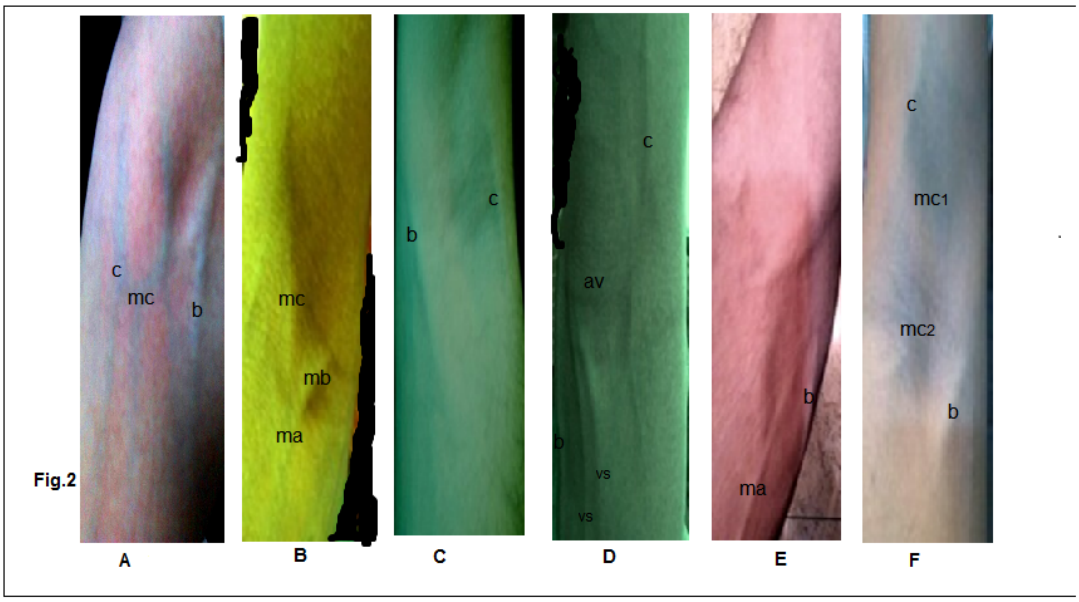

Fig. 2: Photograph showing pattern A in which the median cubital vein (mc) runs between cephalic (c) and basilic (b) veins.

F.g.2. Photograph showing pattern B in

which the median antebrachial vein (ma) divides into median cephalic (mc) and median basilic vein (mb).

Fig. 2. Photograph showing pattern C in which there is no communication between cephalic (c) and basilic vein (b).

Fig. 2. Photograph showing pattern D in which the cephalic (c) and basilic (b) veins are connected by an arching vein (av) which receive two or more veins (vs).

Fig. 2. Photograph showing pattern E in which cephalic vein is absent and the basilic (b) and median antebrachial vein (ma) can be seen.

Fig. 2. Photograph showing pattern F in which two median cubital veins (mc_1 and mc_2) are present running between cephalic (c) and basilic (b) vein.

Discussion

Most of standard textbooks of anatomy describe two patterns of the venous arrangement in the adult cubital fossa. In the first pattern[2,3,4] the cephalic vein gives off the median cubital vein which pass upward and medially to join the basilic vein.

This was the most common arrangement seen in our study, being present in 51.5% of males and 45.4% in females. The second pattern described in anatomy books[5,6,7,8] is formed of a single median antebrachial vein which ascends in the forearm and divides into median cephalic and median basilic veins which join the cephalic and basilic veins respectively. We found this pattern in 18.2% of males and in 16.6% of females. Most clinicians are aware of these two patterns. In our study we found four other arrangements of superficial cubital veins, with which many clinicians may not be familiar. In 13.6% males and 12.8% females the median cubital vein was absent and there was no communication between the cephalic and basilic veins. This pattern (C in fig. 1) has also been seen to have a low incidence in Americans [10] and in Indians[11] (8% and 10% respectively), with a particularly low incidence (0.7%) in British[12]. The next pattern (D in fig 1) found in our study is rare and was observed in 9.8% males and 11.4% females. It has been reported in Iraqis[13], in Nigerians[14], and in Malays[15] with a similar low incidence. In this pattern the cephalic and basilic veins were joined by an arched vein, with the concavity of the arch facing proximally into which drained two or more veins from the forearm. A similar pattern (F in fig 1) consisted of the cephalic and basilic veins being joined by two median cubital veins, the upper vein was arched while the lower one corresponded to the usual description of the median cubital vein. This pattern, however, was observed in two males subjects only (1.5%) but none in females. This pattern was described only in Nigerians[14] and Malays[15].

Finally, in 13.6% of females and in 5.3% of males in our study (E in fig. 1) we were unable to see the cephalic vein and presumable it was absent. This fact is important to bear in mind when repeated attempts fail to display the cephalic vein in a patient. The high incidence of this pattern in females could be due to the excess subcutaneous fat which may obscure some of the superficial veins.

Some of the previous authors reported a difference in the venous pattern on the right and left sides[14, 17, 18]. In the present work there were no similar difference in both males and females.

Injury to lateral cutaneous nerve of forearm as well as other nerves have been reported after venous cannulation in the cubital fossa[16].

In conclusion, the results of present study showed that in addition to racial differences,

gender had an influence on the distribution of superficial venous patterns. Most of the described patterns of the present work (patterns A-F) have higher incidence in males than females. This could be attributed to the fact that the superficial cubital veins in the males were much more prominent than those of females[13].

on the other hand, the excess subcutaneous fat in females may obscure some of the superficial veins in the cubital fossa.

When locating a vein for venipuncture in Jordanians particularly during emergencies, it is important to be aware of the uncommon arrangement of superficial cubital veins and their percentage, this applies to subjects who have absent median cubital and cephalic veins and the presence of an arched median cubital vein. It is also important to observe and remember that either the median cubital or median basilic veins whichever pattern is present crosses superficial to brachial artery from which it is separated by bicipital aponeurosis. Intravenous injection of irritating drug using any of these two veins may inadvertently enters the brachial artery or an abnormal superficial ulnar artery. The latter is commonly seen in case of high brachial artery bifurcation[7].

References

1. Kyle J: Pyes Surgical Handcraft. 20th edn. Bristol : John Wright and Sons, 1977.
2. Willams PL, Bannister LH, Berry MM, Collins P, Dyson M, Dussek JE. et al. Gray's Anatomy.38th ed. Edinburgh UK: Churchill Livingstone; 1995.
3. Moore KL, Dalley AF. Clinically Oriented Anatomy. 5th ed. Baltimore , MD: Lippincott Williams; 2006.
4. Snell RS.Clinical Anatomy for Medical Students. 6th ed. Baltimore ,Maryland USA: Lippincott Williams and Wilkins; 2000 p.449.
5. O'rahilly R: Gardner -Gray- O'rahilly's Anatomy. 5th ed. Philadelphia : W.B. Saunders Company, 1986.
6. Basmajian JV, Shomecker CE; Grants Method of Anatomy. 8th ed. Baltimore : Williams and Wilkins, 1989.
7. Ellis H: Clinical Anatomy. Tenth edn. Blackwell Publishing, 2002.
8. Last's Anatomy. 9th ed. Churchill Livingstone; 1994.
9. Del Sol M, Mardones LM, Bustos JE. Venous formations in the cubital fossa of Mapuche. Bioscopic Study. Int J Morph 2007; 23 :885-94.
10. Charles CM: on the arrangement of superficial veins of the cubital fossa in American white and American negro males. Anat Rec 54: 4-9, 1932.
11. Tewary SP, Singh SP and Shamer S: The arrangement of superficial veins in the cubital fossa in Indian subjects. J Anat Soc India 20:99-102,1971.
12. Berry RJ, Newton HAS: A study of the superficial veins of the superior extremity in 300 young subjects. Anat Anz 335: 591-601, 1908.
13. Wasfi FA, Dabbagh AW, Alathari FM, salman SS: Biostatistical study on the arrangement of superficial veins of the cubital fossa in Iraqis. Acta Anat 126 (3): 183-6, 1986.
14. Ukoha UU, Oranusi CK, Okafor JI, Obiaduo AO: Patterns of superficial venous arrangement in the cubital fossa of adult Nigerians. Nigerians journal of clinical practice 16: 104-109, 2013.
15. Dharap AS , Shaharuddin MY: Patterns of superficial veins of the cubital fossa in Malays. Med J Malaysia, 49 (3): 239-41,1994.
16. Stevens RJ , Mahadevan V, Moss AL: injury to the lateral cutanous nerve of forearm after venous cannulation: a case report and literature review. Clin Anat. 25(5): 659-62, 2012.
17. Singh SP, Ekandem R,Bose O. On the arrangement of superficial veins of the capital fossa in Nigerians. Anat rec 25:17-22;1982
18. Singh JD: Patterns of superficial veins of the cubital fossa in Nigerian subjects. Acta Anat 112 : 217-219.

الوصف التشريحي للأوردة السطحية في الحفرة المرفقية في البالغين الأردنيين

فرج البسطامي،[1] إسلام الطراونة،[1] إيمان الربابعة[2]

1– قسم التشريح والأنسجة، كلية الطب، الجامعة الأردنية، عمان، الأردن؛ 2– قسم العلوم الطبية المخبرية، كلية العلوم الطبية المساندة، الجامعة الهاشمية، الزرقاء، الأردن

الملخص

الهدف: تستخدم الأوردة السطحية الموجودة في الحفرة المرفقية للحصول على الدم لأغراض الفحوص المخبرية وكذلك لنقل الدم ولإعطاء العلاج بالوريد. ويجري الدم الوريدي في الطرف العلوي من خلال وريدين أو ثلاثة أوردة سطحية وهي: الوريد الرأسي، والوريد الباسليقي والوريد المرفقي الأوسط، وكذلك الوريد الساعدي وروافد هذه الأوردة والعلاقة التشريحية بينها.

وصف للنماذج المختلفة من توزيع الأوردة السطحية في الحفرة المرفقية في البالغين الأردنيين.

الطرق: استخدم في هذه الدراسة 264 طالباً وطالبة تم اختيارهم بطريقة عشوائية من طلبة الجامعة الأردنية وتراوحت أعمارهم بين 18-25سنة، وبعد أخذ موافقة من الطالب على المشاركة في الدراسة وضعت لفافة مطاطية حول العضد للضغط على الأوردة لمدة 2-5 دقائق، حيث ينتج عن ذلك امتلاء أوردة الحفرة المرفقية بالدم وبروزها، حيث نقوم برسم لتوزيع هذه الأوردة على ورقة.

النتائج: لوحظ وجود ستة نماذج من توزيع الأوردة السطحية في الحفرة المرفقية، ولم يكن هناك فرق في هذه النماذج في الطرفين الأيمن والأيسر سواء في الذكور أو الإناث، وكان أكثر النماذج وجوداً تفرع الوريد المرفقي الأوسط من الوريد الرأسي بضع سنتمترات أسفل مفصل المرفق واتصاله بالوريد الباسليقي بضع سنتمترات فوق مفصل المرفق، حيث يستقبل روافد من منطقة الساعد وكان هذا النموذج أكثر وجوداً في الذكور 51.5%، من الإناث 45.4%. أما النماذج الأقل وجوداً فتشمل عدم وجود اتصال بين الوريد الرأسي والوريد الباسليقي (12.8% في الإناث و13.6% في الذكور)، كذلك وجود الوريد المرفقي الأوسط على شكل قوس مقعر إلى الأعلى (11.4% في الإناث و9.8% في الذكور)، وعدم وجود الوريد الرأسي (13.6% في الإناث 5.3% في الذكور) ، كذلك وجود وريدين مرفقيين (فقط اثنين من الذكور وما يشكل 1.5%).

الاستنتاجات: الانتباه لوجود عدة نماذج من توزيع الأوردة السطحية في الحفرة المرفقية يشكل أهمية بالغة للفريق الطبي الذي يتعامل مع هذه الأوردة سواء لأخذ عينات من الدم أو لنقل الدم أو إعطاء أدوية في الوريد.

الكلمات الدالة: الحفرة المرفقية، أوردة سطحية، نماذج، أردنيين.