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Unusual variability of the superficial venous system of the upper limb and its consequences for deep one: case report

Venous system of upper limb

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Abstract

In our report we would like to present a variation of the two main superficial veins of the upper limb. In all of 21 (88%) explored of upper limbs, the venous system shown a pattern similar to the anatomical textbook. But in four others (12%) venous patterns differed from those already described. Especially in one of them the variant of the veins of the upper limb distinctly contrasted with the others. In that case, the basilic and cephalic vein instead of the normal course to the arm, where they should bypass the elbow pit, unexpectedly merged in it and formed one of the two brachial veins. Towards the axillary cavity it ran laterally over the entire arm regardless of the second brachial vein. In the armpit cavity, instead of connecting with the second one, it gave rise to an independent the second vein - the accessory axillary vein. This uniqueness was based on that an independently from deep venous system, the superficial one formed their own net. The accessory axillary vein and the second brachial vein were completely formed by two main superficial veins: the basilic and cephalic one. By describing this case we wanted to draw attention, that in any surgical procedure on the upper limbs, especially on the venous system there is a certain probability of encountering them. The another conclusion is that the catalog of patterns of them seems to be endless.

Key words: venus system, upper limb, anatomical variation, surgery
INTRODUCTION

The nature of the human body inspires from the dawn of mankind to the present day. Despite new alternative methods the anatomical dissection still remains the golden standard in the study of structure of human body (3). Searching of new patterns or variations of structures of the human body are the most important challenge for every anatomist (6, 8). Former postulates of clinicians addressed to anatomists encouraging them to continue exploration of human body have not lost their relevance (2, 4, 8).

Variations in the venous pattern of the upper limb are very common. Conventional textbooks describe the anatomy of them as two layouts (7). Ones are called superficial or superfascial and the second deep or subfascial. These are not independent systems, but the existing anastomoses between them provide blood flow from the superficial to the deep system, which ultimately delivers it to the heart. The superficial system is represented by two main veins: the basilic vein and cephalic one. At the level of the forearm and arm these both veins run along the inner and lateral side of upper limb. Finally, in the middle of the arm, the basilic vein connects to one of the brachial veins and the cephalic vein joins to the axillary vein in the deltopectoral triangle. The deep system consists of veins accompanying the arteries, whose names come from the accompanying arteries. Usually, in this system, there are two veins which run along one artery, except of the axillary and subclavian vein (3, 5). The number of anatomical variants of the veins of the upper limb seems countless. There are constantly reports of new discovered variants of the veins of the upper limb. Continuous update increases the number of anatomical variants of the veins of the upper limb. Updating these patterns is especially important in vascular procedures (2, 3).

CASE REPORT

During preparation one of the upper limbs for the educational purposes an unusual pattern of superficial and deep veins system was noticed.

As can be seen on the photography of the left upper limb was observed the unusual pattern of the basilic and cephalic vein Fig. 1. Basically, the cephalic and basilic vein runs up along both side of forearm. Then, both veins enter the arm, avoiding the area of the cubital fossa but in our case they ran directly to the elbow pit where unexpected they both fused to form one of
two main brachial veins. For this publication it was called superficial brachial vein. As can be seen on Photo 1 the second brachial vein has been formed fully separately by the veins of the deep system.

According to classical textbooks both brachial vein, near the armpit should join together to create alone one axillary vein. As can be seen, each of brachial veins ran separately over of whole arm up to the axillary cavity. There both became axillary veins and ran still separately upwards. The axillary vein, which was formed by the superficial brachial vein, was named the accessory axillary one.

One has an irresistible impression when looking at the photograph that the blood flowing from the upper limb rolls along two independent vessel systems. One system runs superficially, independently of the arteries up to the axillary cavity, the other one is located deeper and accompanies the arteries of the upper limb. This pattern of blood circulation in the upper limbs seems to be unique and has not been published so far.

The work was approved by the Local Ethical Committee of Pomeranian Medical University in Szczecin.

**DISCUSSION**

The traditional anatomy texts offer a lot of description of the upper arm veins and are particularly huge in regards to their variations (2, 4, 8).

Bardeleben was one of the first authors to provide a systematic nomenclature of the veins of the upper limbs and their topography. He also described about 36 varieties. However, in none of them was a description similar to the presented case (9). Also the detailed classification of the superficial and deep upper limb veins is given by Vazquez et al., however, in these 11 variants there is also no description similar to the presented case (10).

Although the literature describes some types of anatomical variants of the veins of the upper limb, we have established that this pattern has not yet been published (1, 2, 4, 5, 6). It has been found a report which describes slightly similar to our case an anatomical variant of the basilic and cephalic vein. But in their case the deep system was joined with the superficial in the cubital fossa (7). The occurrence of accessory axillary vein is estimated quite high, over 50%. Charpy was the first to describe these variability, but there were no similar descriptions to the presented case (11). Similarly, Gusmao et al. in their observations noted that the basic
branches forming the accessory axillary vein originated from the deep vessels system, which sometimes received the branches from the superficial system. The authors did not encounter the accessory axillary vein formed exclusively the veins from superficial system (12). Unlike to the basilic vein, which is characterized by some topographic instability, many reports indicate a fairly stable course of the cephalic vein (6, 8). However, several variants of the cephalic vein have been already described. De Soul et al. (13) and Ukoha et al. (14) in their research indicated on six pattern varieties of the vein course in the area of the ulnar fossa, however, in none of the given variants we find a similar to our. It may be another proof that variability of the cephalic vein is not a rare phenomenon, as it is supposed to be (1, 6, 8).

Some authors have emphasized the importance of identifying some variants of cephalic vein for surgical procedures, especially vascular or orthopedic (4, 6).

Especially they point out in some procedures such as creation of arteriovenous fistulas where transposition of veins in some variants could have increased a risk of some complications (1, 4). Some authors suggest vein mapping before surgery to minimize the risk of some complications resulting from unexpected variants (1).

The presence of two large veins in the axillary cavity was demonstrated by ultrasound examination at vascular patients. The authors regarded one of theses veins as the accessory axillary vein. At this point, should be emphasized the the importance of radiologic tools in anatomical exploration on the living. However, the authors concluded that anatomical dissection should be the basis for transferring the new anatomical pattern to other descriptions, e.g. radiological.

The above conclusion can be seen when editing radiological or surgical atlases. Therefore, cross-sectional studies should be still continued.

**CONCLUSIONS**

The catalog of patterns of the upper limb venous system seems to be unlimited and should therefore be constantly updated. During of each vascular surgery should be taken into account the probability of anatomical and topographic variability of the venous system of the upper limb.

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Phot. 1. Photography presents the unique pattern of veins of left upper limb – the veins are blue
(1 – basilic vein, 2 – cephalic vein, 3 – „superficial” brachial vein - pulled up by probe,
4 – „deep” brachial vein - pulled up by probe, 5 – radial artery - pulled up by a garter,
6 – ulnar artery - pulled up by a garter, 7 – „superficial” axillary vein, 8 – „deep” axillary vein,
9 – brachial artery - pulled up, 10 - axillary artery, 11 –singular radial vein, 12 – singular ulnar vein.
For the clarity of Foto – the nervous system was missed.