

## CASE REPORT

# Double axillary vein variation diagnosed with ultrasound guidance during infraclavicular nerve block intervention

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## SUMMARY

The use of ultrasound guidance increases the safety of peripheral block interventions by allowing anaesthesiologists to simultaneously see the position of block needle, the targeted nerves and surrounding vessels. In this report, we represented three patients diagnosed with double axillary vein variation with ultrasound guidance during infraclavicular nerve block intervention. The patients were scheduled for different types of upper limb surgeries. All patients received infraclavicular nerve block for anaesthetic management. A double axillary vein variation was diagnosed with ultrasound during block interventions. Hydro-location technique was used in all cases and the procedures were completed uneventfully. In the current literature, there is limited number of reports concerning double axillary vein variation. Detailed knowledge of the axillary anatomy is important to avoid complications such as intravascular injection during peripheral nerve block interventions. The use of ultrasound guidance and hydro-location technique should be considered for nerve blocks, especially in the axillary area.

## BACKGROUND

The use of ultrasound guidance during peripheral block interventions has gained popularity in the recent years. As it allows anaesthesiologists to simultaneously see the position of block needle, the targeted nerves and surrounding vessels, the use of ultrasound increases the success rate and safety of block interventions.<sup>1 2</sup>

The infraclavicular nerve block is a frequently preferred anaesthetic technique for elbow and upper limb surgery. It has several advantages such as lower likelihood of tourniquet pain, a reliable blockade of the musculocutaneous nerve and a simpler and safer approach when compared with multi-injection axillary nerve block and mid-humeral blocks.<sup>3</sup> However, the risk of complications increases in the presence of anatomical variations. In this report, we aimed to represent the management of three patients diagnosed with double axillary vein variation during infraclavicular nerve block intervention under ultrasound guidance.

## CASE PRESENTATION

Written informed consents for block procedures and sharing of the data were obtained from each patient. The first patient was a 27-year-old man with

American Society of Anaesthesiologists status I. He was scheduled for an elbow surgery due to distal radius fracture. The patient was planned to receive infraclavicular nerve block for anaesthetic management. The arm of the patient was adducted to the side of the operation and the coracoid process was palpated. Under aseptic conditions, the ultrasound probe was located to the intersection point between the coracoid process and the clavicle. Two axillary veins, a single axillary artery and cords were identified (figure 1). The skin was infiltrated with 3–4 mL of lidocaine under ultrasound guidance. Then 8 cm, 22-gauge Stimuplex needle was inserted along the same path to the axillary vein medial to the axillary artery with inplane technique. The targeted vein was moved away from the axillary artery by using hydro-location technique with 2–3 mL of saline solution. We aspirated the syringe before each local anaesthetic application in order to avoid intravascular injection. A total of 30 mL 0.25% bupivacaine was then infiltrated around the artery until each cord was surrounded by a ring of local anaesthetic solution (figure 2). The second patient was a 46-year-old man with American Society of Anaesthesiologists status II and he was scheduled for an elective hand surgery. Using the same technique, we identified two axillary veins and a single axillary artery. The nerve block was performed uneventfully with the same technique. And the third patient was a 19-year-old man with American Society of Anaesthesiologists status I. He was planned to have an operation for distal humerus fracture. We again identified two axillary veins and a single axillary artery during infraclavicular nerve block with ultrasound guidance. As the vessels were very close to each other, we confirmed the positions of veins and artery by using Doppler ultrasonography. Then again, we used hydro-location technique with 3–4 mL of saline solution to avoid intravascular injection and approach near the artery. In all cases, an adequate anaesthesia was provided without any complications.

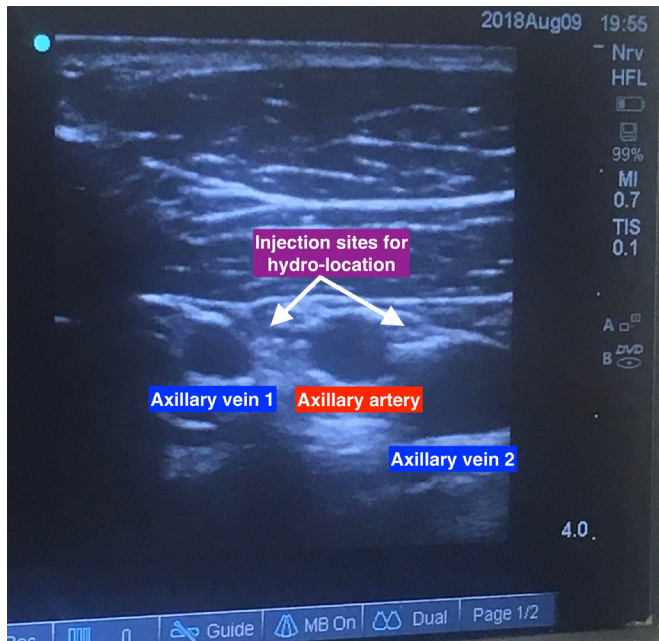
## OUTCOME AND FOLLOW-UP

None of the patients had any complications related to infraclavicular nerve block intervention. The operations were completed uneventfully. The patients were informed about their axillary vein variation.



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**Figure 1** Double axillary veins and single axillary artery diagnosed with ultrasonography.

**DISCUSSION**

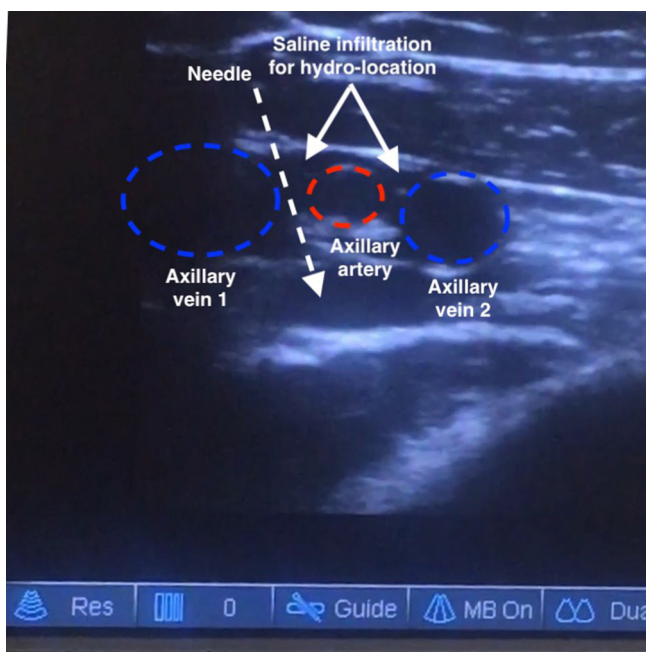
The connection of the basilic and the brachial veins forms the axillary vein which is located between the lateral edge of the teres major muscle and the lateral edge of the first rib. The axillary artery runs slightly above and posterior to the axillary vein.<sup>4</sup> In the literature, there is limited information about the variations of axillary vessels. Kutiyawala *et al* studied on 100 patients and reported the incidence of double axillary veins as 10%.<sup>5</sup> Khan *et al* documented the variants of axillary region in 73 patients. They reported the incidence of double axillary veins as 14%.<sup>6</sup> Both studies were performed during axillary dissection as part of the breast cancer surgery. Berthier *et al* conducted a study to show the correlations

between the anatomical structures seen in the cadaveric dissection and ultrasound images during axillary nerve block.<sup>7</sup> They reported to detect several cases with multiple axillary veins during ultrasound guided axillary nerve block procedure. However, the number of patients or the cases with double axillary veins were not mentioned in this study. Other than these, the current literature contains a single case report to represent detection of double axillary veins during peripheral nerve block intervention under ultrasound guidance, and another report describing a double axillary vein variation preoperatively diagnosed by CT.<sup>8,9</sup> In these reports, the authors highlighted the importance of detailed knowledge of the axillary anatomy to avoid complications such as intravascular injection of local anaesthetics during peripheral nerve block interventions or injury to the vessels and nerves during surgical axillary dissection.<sup>5-8</sup> Uysal *et al* reported that the use of hydro-location technique provided a safer area during infraclavicular nerve block intervention of a patient with double axillary vein.<sup>8</sup> Hydro-location technique is a principle to locate needle-tip by using ultrasound liquid detection. The technique is performed with the injection of 0.5–1 mL liquid under ultrasound beam to identify the anatomical position of needle tip.<sup>10</sup> We used hydro-location technique in all patients with double axillary vein variation and the interventions were completed without any complications. Particularly, an anatomical variation of the axillary vessels have an increased risk of vascular puncture during peripheral nerve block interventions performed blinded or guided only by electrical nerve stimulation.<sup>7</sup> In the light of these information, the use of ultrasound guidance should be considered during nerve blocks, especially in the axillary area.

As a conclusion; variations in the anatomy of axillary area are common but descriptions remain rare in the literature. In the presence of multiple vascular structures, the anaesthesiologists should perform real time observation of anatomical structures under ultrasound guidance. Using hydro-location technique and intermittent aspiration of the syringe during local anaesthetic injection may provide a safer condition for peripheral block interventions.

**Learning points**

- ▶ The use of ultrasound guidance increases the safety of peripheral block interventions by allowing anaesthesiologists to simultaneously see the position of block needle.
- ▶ Hydro-location technique is a principle to locate needle-tip by using ultrasound liquid detection.
- ▶ Double axillary vein is a common but poorly described variation of the axillary area.
- ▶ An anatomical variation of the axillary vessels have an increased risk of vascular puncture during peripheral nerve block interventions performed blinded or guided only by electrical nerve stimulation.



**Figure 2** The local anaesthetic infiltration around axillary artery.

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