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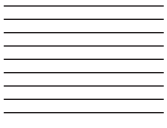

# Ultrasound in Emergency Medicine

## A RANDOMIZED CONTROLLED TRIAL COMPARING ONE-OPERATOR VERSUS TWO-OPERATOR TECHNIQUE IN ULTRASOUND-GUIDED BASILIC VEIN CANNULATION

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□ **Abstract—The basilic vein offers an alternative site for peripheral intravenous access for emergency access. The use of a two-operator ultrasound-guided basilic vein cannulation technique has been shown to be a safe and effective technique for use on Emergency Department patients. However, the one-operator technique is more customary by other services. We sought to compare the more customary one-person technique to the two-person technique in basilic vein cannulation in novice operators. This was a prospective, randomized controlled trial of two techniques of ultrasound-guided basilic vein cannulation (one-operator vs. two-operators) in healthy adult volunteers. Each volunteer underwent each technique, one technique on each arm. We selected the initial arm and technique using computer-generated block randomization. In the one-operator technique, a single operator held the transducer in transverse short-axis plane while attempting cannulation using a 20-gauge, 1.88-inch catheter. In the two-operator technique, a second operator held the transducer in place while the first operator attempted cannulation. The primary outcome variable was first-attempt cannulation success. Secondary outcome variables were overall success, number of attempts, time-to-cannulation, complications, and ease-of-technique rated by the operators. There were 32 subjects enrolled. One-operator first-attempt success was 18/32 (56%); two-operator was 21/32 (65%), with a mean difference in proportion of −9% (95% confidence interval [CI] −33–14%). Overall success for one operator was 23/32 (72%) and two-operator was 24/32 (75%), with mean difference in proportion of −3% (95% CI −24–18). The median number of attempts for one-operator was 1.6 (interquartile range [IQR] 1–5) and two-operator was 1.4 (IQR 1–5) ($p = 0.8$). Time to cannulation for one-operator was 57 s (± 62) and two-operator was 44 s (± 37) ($p = 0.33$). The median score for ease-of-technique for one-operator was 4.3 (IQR 1–6) and for two-operator was 3.6 (IQR 1–6) ($p = 0.26$). There were no complications with either technique (95% CI 0–10%). Novice operators can reliably perform a basilic vein cannulation using ultrasound guidance. However, we were unable to demonstrate any advantage for any particular technique in cannulating the basilic vein. © 2008 Elsevier Inc.**

□ **Keywords—ultrasound; basilic vein; randomized trial; intravenous access**

### INTRODUCTION

Establishing reliable vascular access in an emergency situation may be difficult due to many factors, such as body habitus, volume depletion, shock, intravenous drug use, congenital deformity, and cardiac arrest. As a result, central venous access is commonly required in the emergency department (ED).

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The use of bedside ultrasound to facilitate venous access has been described in numerous specialties, including emergency medicine (1–5). Ultrasound-guided central venous access has been found to reduce complications and reduce time-to-cannulation (6,7). However, the role of ultrasound in facilitating peripheral intravenous access in the ED is unclear.

The basilic vein offers an alternative site for peripheral intravenous (i.v.) access (5,8,9). The basilic vein runs superficial on the medial aspect of the upper arm, just proximal to the antecubital fossa, and lies superficial to the brachial veins and artery (Figure 1). This vein is commonly used for peripherally inserted central catheters (PICC). Specialized personnel under controlled conditions perform these techniques, usually with one operator (5,9). This technique can, however, be useful for placement of a peripheral i.v. in ED patients.

Keyes et al. demonstrated that an ultrasound-guided brachial and basilic vein cannulation technique used in ED patients provided a safe, easy alternative site for peripheral i.v. access (10). However, the participants in Keyes' study were experienced ultrasound operators with significant ultrasound-guided intravenous access experience. Additionally, they used a two-operator technique: one operator to perform the cannulation and a second operator to hold the transducer in position (Figure 2A). A requirement of two operators for this procedure may detract from the usefulness of basilic vein cannulation in general ED practice.

A one-operator ultrasound-assisted technique is more practical and useful to most emergency physicians. This approach is more commonly used by other specialties using ultrasound for basilic vein cannulation (5,9,11). In a one-operator technique, the transducer is held in one hand while the catheter is manipulated with the other (Figure 2B). No studies have been published comparing the two techniques, especially in novice operators. The best technique for basilic vein cannulation by emergency physicians, especially during training, remains unclear.

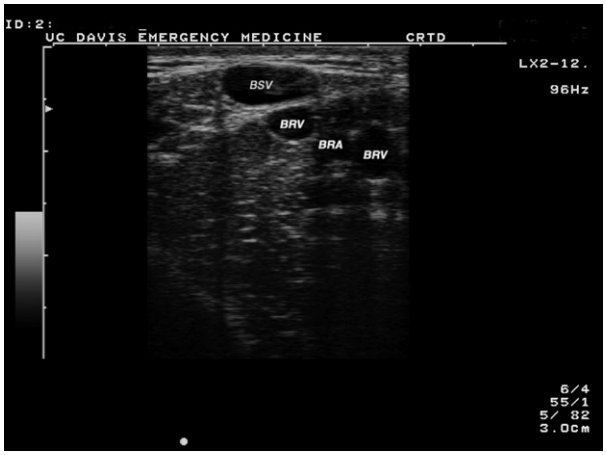


**Figure 1. Ultrasound image demonstrates the basilic vein in the transverse short axis plane. Note its superficial location. BSV = basilic vein; BRV = brachial vein; BRA = brachial artery.**


**Figure 2. (A) and (B) dramatize one- and two-operator ultrasound-guided peripheral vein cannulation–short axis approach. Note: sterile coupling media is used.**

The purpose of this study was to compare one- and two-operator techniques for ultrasound-guided basilic vein cannulation in a randomized, controlled trial. Our primary hypothesis was that a one-operator technique would be superior in time, success, and perceived ease of performance compared to a two-operator technique in ultrasound-guided basilic vein cannulation in novice operators. Our secondary objective was to determine the overall success of ultrasound-guided basilic vein cannulation in novice operators.

## METHODS

This was a prospective, randomized controlled trial comparing two techniques of ultrasound-guided basilic vein cannulation: a one-operator vs. a two-operator method.