

NURSE-PERFORMED ULTRASOUND-GUIDED UPPER ARM VENOUS CANNULATION IN EMERGENCY DEPARTMENT PATIENTS WITH DIFFICULT VENOUS ACCESS

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OBJECTIVES

- To determine the proficiency of nurses in placing peripheral lines using ultrasound (US) guidance in patients who had failed IV attempts
- To assess which veins were sonographically visible
- To assess success rates of cannulation based on the vein chosen
- To determine if there was a difference in success rate in 1-person vs. 2-person technique

METHODS

DESIGN: Prospective, observational

SETTING: Urban teaching hospital with an emergency medicine residency program

PATIENTS: Patients with at least 2 failed peripheral IV attempts AND no other peripheral vein suitable for cannulation

TRAINING: Nurses were given a 1.5 hour training course in dynamic US-guided cannulation in the transverse plane

PROCEDURE: The nurses used a compact US machine designed for vascular access to survey the upper arm for the presence of the following veins:

- Basilic, brachial, median antecubital, cephalic (see Illustrations 1 and 2)

Nurse made independent determination of

- Which vein to cannulate
- Whether to use 1- or 2-person technique
- Whether to use 1.88 in. or standard 1.25 in. cath

STATISTICS: Compared success rates using Chi-squared tests

RESULTS

- Patient characteristics
 - Number of patients enrolled: 74
 - Average age: 48-years-old
- Percentage requiring central venous access in past: 67%
- Vein visible but not adequate for cannulation
 - 6/74 patients
 - Considered as treatment failure
 - Always the brachial

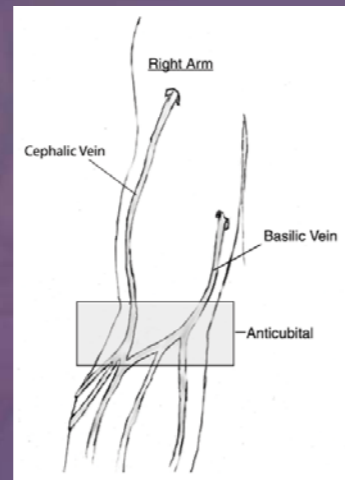


Illustration 1: Upper-arm external venous anatomy

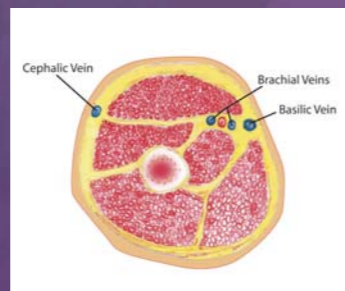
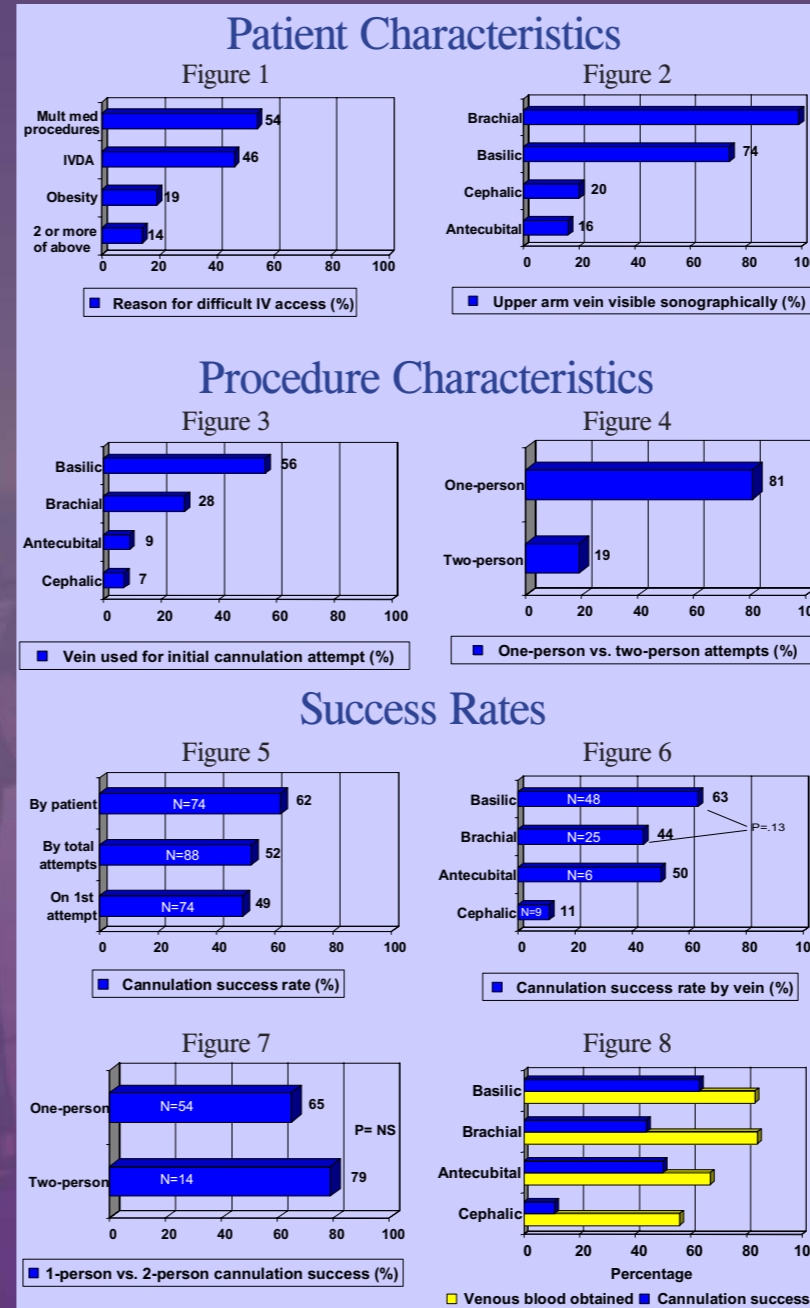


Illustration 2: Cross section of upper arm



Complications

- Arterial puncture: 3/68
 - All stopped with local pressure only
- Arm numbness: 2/68
 - Both resolved after needle removal or repositioning of arm
- Severe pain: 7/68
 - All immediately resolved after needle removal or cannulation completion

CONCLUSIONS

- Nurse-performed US-guided upper arm cannulation was successful in most patients with difficult venous access
- The basilic vein was sonographically visible in the majority of patients and had the highest rate of successful cannulation, although this did not reach statistical significance
- The median antecubital and cephalic veins were rarely visible sonographically, and were rarely used even when visible
- The 1-person technique was chosen 4 times more than the 2-person technique and did not have a statistically significant difference in success

LIMITATIONS

- Observational design. Randomized study necessary to determine true difference in
 - Cannulation success rates between different veins
 - 1-person vs. 2-person cann. success rates
- Possible selection bias
 - Only patients with most difficult access may have consented to study
- Technique was taught in the transverse plane only
 - Addition of longitudinal technique may increase success rate