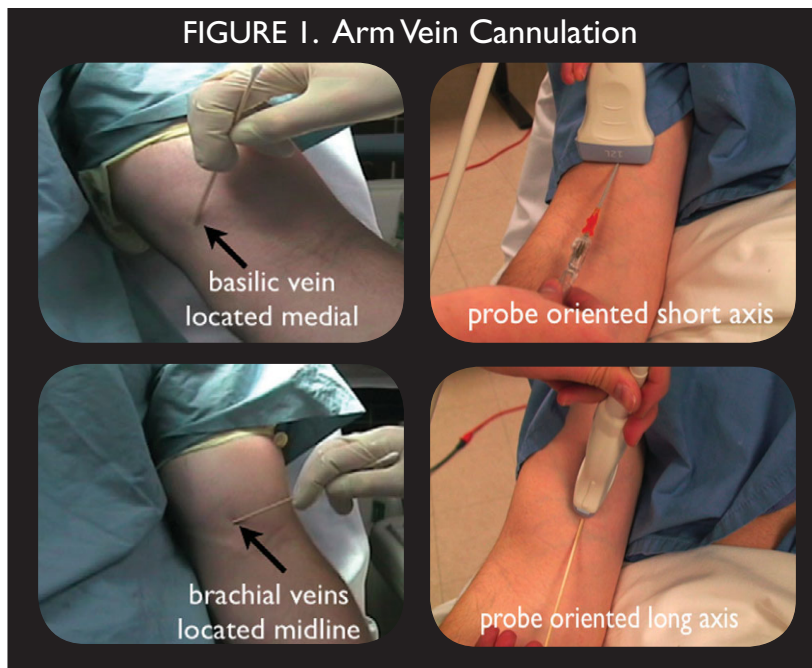


PRESENTATION

FIGURE 1. Arm Vein Cannulation



>> A 46-year-old man presents to your emergency department for evaluation of a painful, swollen area that appeared on his right arm two days ago. He has a history of intravenous drug use and admits injecting heroin into the arm the day before. His drug use has caused abscesses in the past and he is worried that he may have developed another.

The patient does not seem to be in acute distress during his physical examination, but he is tachycardic (110 bpm) and febrile (101°F). His blood pressure is normal at 120/80 mm Hg. When you begin to palpate the fluctuant, erythematous area on his arm, he quickly stops you, obviously in great pain. Based on your examination findings and

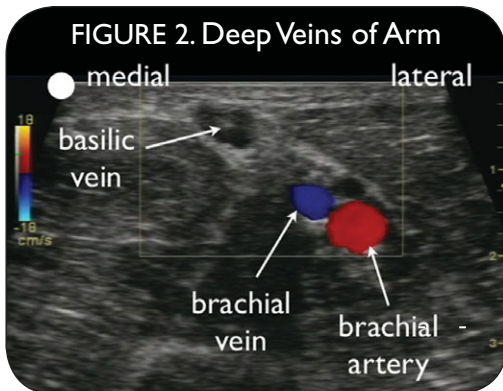
his fever, you agree that he may have developed another abscess, with surrounding cellulitis.

In order to confirm your suspicion, you place a covered, high-frequency ultrasound probe over the fluctuant area and quickly locate a fluid collection. You decide the best course of action in this case is an incision and drainage procedure followed by administration of intravenous antibiotics and hospital admission for further antibiotic treatment.

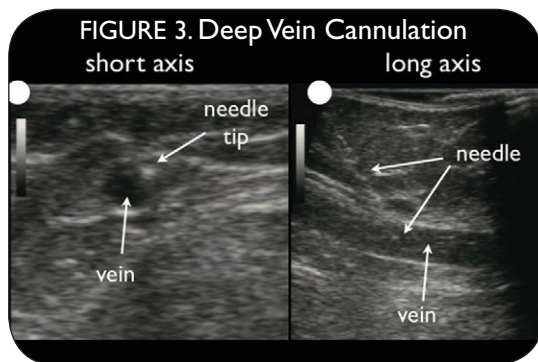
Unfortunately, prior drug use has caused scarring of most of the patient's arm veins. When two of your most experienced nurses both fail to gain access, you search his neck and feet for a viable vein. Unable to locate one, you consider the alternatives. A central line will solve your vascular access problems, but you question whether this patient really requires central access with its risk of complications. Instead, you decide to use ultrasound to look for veins in his arm that are too deep to palpate, but might still be accessible for an intravenous line. Figure 1 shows the correct probe placement for imaging these structures.

Turn page for conclusion >>

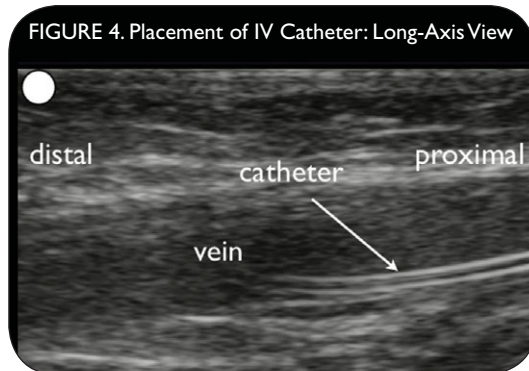
DIAGNOSIS AND DISCUSSION



>> The first step in using ultrasound to assist a deep-arm intravenous catheterization is to place a high-frequency linear-array transducer on the upper arm in the short-axis orientation (probe perpendicular to the course of the vein), which will show both the basilic and brachial veins. Most clinicians will opt to catheterize the basilic vein due to its more superficial and medial location in the patient's arm. The brachial vein is also a viable choice, but depth and close proximity to the brachial artery and median nerve make it a more advanced target in some patients. One technique for avoiding the brachial artery during insertion is to use the probe to compress both vascular structures. The artery will prove much harder to compress than the vein. Doppler flow can also help differentiate the two (Figure 2).



Once a target vein is selected, the clinician can use one of two methods to map out the course of the vessel through the arm. The first is to hold the probe in a short-axis orientation and draw a mark on the distal location of the vein. The probe is then moved proximally up the arm and a second mark is made over the vein. In order to place the intravenous line, the needle is inserted at the distal mark and then follows the trajectory of the vein by aiming toward the proximal mark. The second option is to align the probe in the long-axis orientation along the top of the vessel. The needle can then enter at the distal aspect of the probe and follow the axis up the arm.



Whichever method is chosen, it is important to take the depth of the target vein (usually between 1 and 2 cm) into account and prevent extravasation of fluid by maintaining the necessary length of catheter inside the lumen of the vein. Many clinicians choose to use a 1.88-inch angiocatheter rather than the 1.18-inch catheter typically used for superficial veins.

In this patient the basilic vein was easily visualized on ultrasound. After the vein's course had been mapped out, the needle was inserted using the short-axis probe orientation to determine the correct puncture point. The probe was then swiveled to the long-axis orientation to better determine the position of the needle tip in relation to the vein (Figure 3). Once luminal placement of the needle tip was verified, the catheter was successfully threaded into the vein (Figure 4) and analgesia was administered. The patient's abscess was successfully incised and drained, intravenous antibiotics were given, and the patient was admitted to the hospital.

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