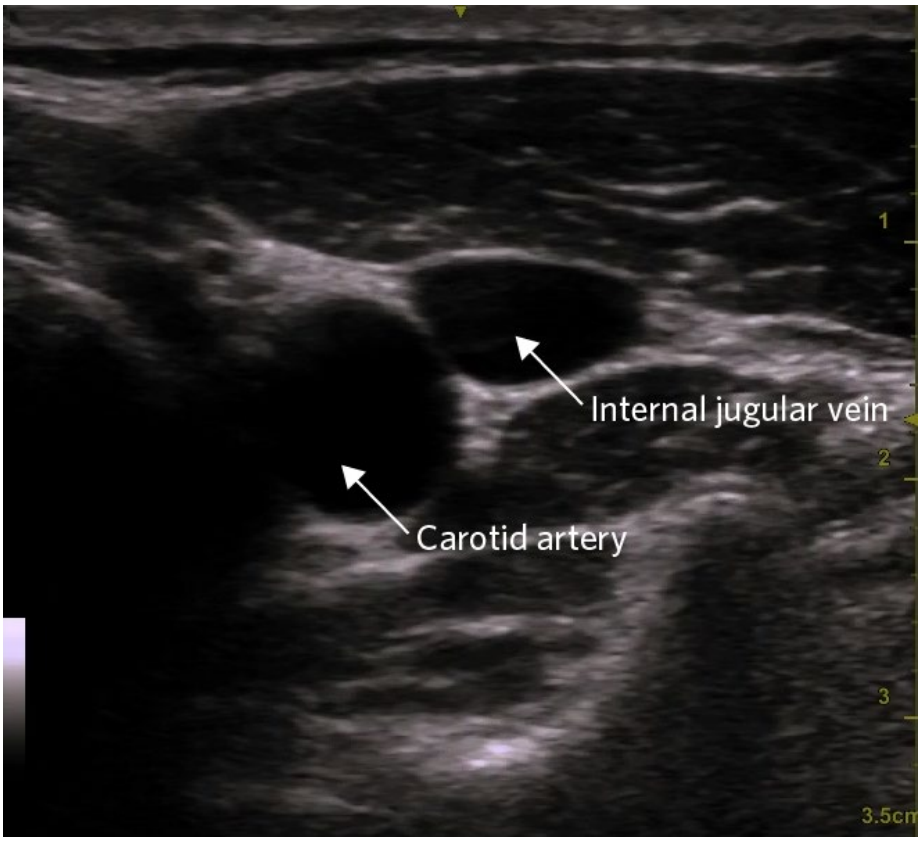
HOUSE
HANDS-ON ULTRASOUND EDUCATION

THE UNIVERSITY OF BRITISH COLUMBIA
Continuing Professional Development
Faculty of Medicine

How-To Guide

Ultrasound for Vascular Access



How to do it:

1. Position the patient, the machine and yourself. For an internal jugular central line, stand at the head of the bed with the machine to the side of the bed with the screen facing you. You want to be able to see the area you are scanning and the screen without having to turn your head. Imagine your needle aiming towards the screen. You want the machine to be in reach of your dominant hand for knob adjustment.
2. Hold the linear probe (high-frequency probe) in transverse orientation to scan the vessels, identifying the artery and the vein. Arteries are generally smaller, circular and less compressible. Veins are generally larger, oval, more easily compressible, and can vary with respiration. Scan along the vein to find the optimal site for insertion and mark the skin.

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The Hands-On Ultrasound Education (HOUSE) Program is offered in close collaboration with the Rural Coordination Centre of BC (RCCBc)

3. Set up yourself and all supplies for insertion using sterile technique.
4. Have your assistant place gel on the probe, and then help you place the probe inside the sterile cover. Remove any air bubbles caught under the cover. Apply sterile gel to the outside of the probe cover.
5. Reconfirm the anatomy on the screen.
6. Hold the probe in your non-dominant hand and use two fingers to grip the probe in a transverse orientation.
7. Look at the skin as you insert the needle through the skin; thereafter look at the screen.
8. Start with the needle at a 45 degree angle to enter the skin, and then change to a more shallow angle.
9. Once you have identified the needle tip with your US probe, advance the needle slowly and incrementally. Then advance the probe until you once again visualize your needle tip.
10. Never move the probe and the needle at the same time, as you will lose the image of the needle on the screen.
11. As you become proficient with this, incorporate the longitudinal view as well. When you are satisfied that the needle is directly over the vein, stop. Rotate the probe into longitudinal to watch the needle enter the vein. This view will tell you the depth you need to be at to do this. In this view you can see the needle in its entire length, however it is more difficult to find the needle with this view. If you lose the image, stop all needle movement, and find the needle again with the US probe prior to proceeding (this will be easier if you rotate back to transverse).
12. Once you are tenting the vein, watch your needle, not the screen. Confirm entry by noting the flashback of blood into your needle. Once flashback is seen, put your probe down and use both hands to insert the catheter. Cannulate the vessel as you normally would.
13. When using the Seldinger technique, confirm wire placement within the vein with the US probe prior to dilating the vessel. Use your regular clinical exam to confirm vein rather than artery cannulation (pulsating flashback, etc.).

How to do it better:

- Patient position can vastly change the anatomy under the skin. Optimize position prior to attempting the procedure. Trendelenburg, though it may be uncomfortable for the patient, can make a huge difference, and only needs to occur for the 30-60 seconds when you are cannulating the vein. Humming, breath holding and valsalva can all be helpful as well.
- Some US machines have needle-enhancement software, which highlights the needle, making it easier to follow your needle on the screen.
- Practice makes perfect; the more you use it, the better you get. Start by using POCUS in the transverse plane (short axis), and as you get better, start using the longitudinal plane as well (long axis).
- Don’t apply too much pressure on the skin, as this will occlude the vein, making it impossible to see.
- Consider using an arterial line set-up (because the needle and catheter are longer) when trying to cannulate a deep peripheral vein in an obese patient.
- Consider using local anaesthetic when inserting any catheter. Since you aren’t using palpation for the anatomy, you needn’t worry about distorting it with a small amount of lidocaine.

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- Create a large sterile field on the patient, so you can lay the sterile probe down and use both hands to start your line, or alternatively, have the patient hold the probe through the drape if they are able.

How to do it safely:

- Always anchor your hand on the patient by placing a finger (usually your 5th digit) on the patient to give yourself tactile feedback that you are not moving the needle in relation to the patient.
- Never move the needle without first finding the needle tip on the US screen. When you do advance the needle, advance it only in small increments, so that you can continue to follow the needle tip with your US.
- If the needle is not easily visualized, bounce the needle a bit, as this movement will be easily seen on the US screen.
- Since this is a very visual technique, please review videos on how to perform this technique. There are countless examples on the Internet.
- If this is totally new to you, and you feel uncomfortable using the probe and having a needle in your hand at the same time, start by using the US machine to landmark the vessel.

How to use this in practice:

It should be your standard of care to use POCUS for central venous line placement. Numerous studies in the last 10 years have shown increased success and safety of insertion of central lines, arterial lines and peripheral lines (by both nurses and physicians) when using US guidance. Many hospitals now have a policy that central lines cannot be inserted without US guidance when a machine is available. There has been a successful lawsuit in Canada in an incident when this policy was not followed.

Teach your nurses how to use the US machine for obtaining difficult peripheral lines, and use it yourself for this too.