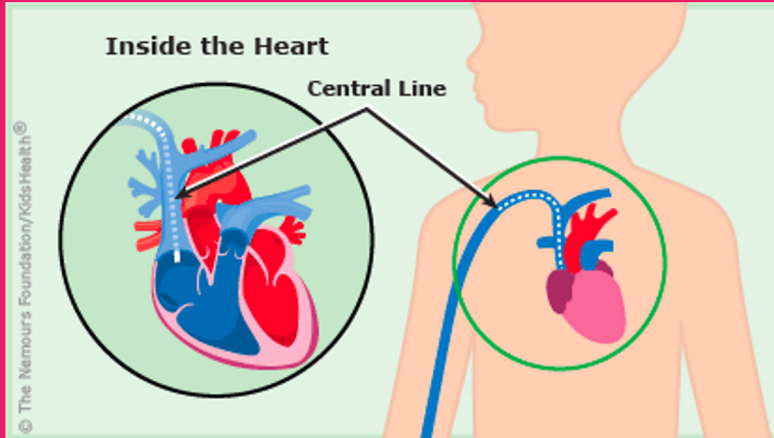


# How can ultrasound be used to place a central line or difficult IV?

**Khizra Shafiq**

# In which kinds of patients is Ultrasound Guided IV/Central Line Placement Useful?

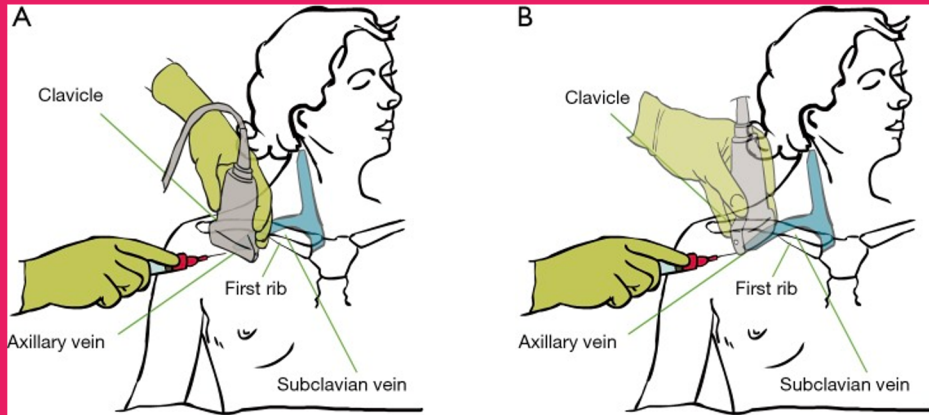
- Obese patients
- Hypovolemic patients
- Patients with vein-debilitating conditions (sickle cell disease or cancer)
- Patients who've undergone repeated venipuncture to administer prescription drugs/illegal substances



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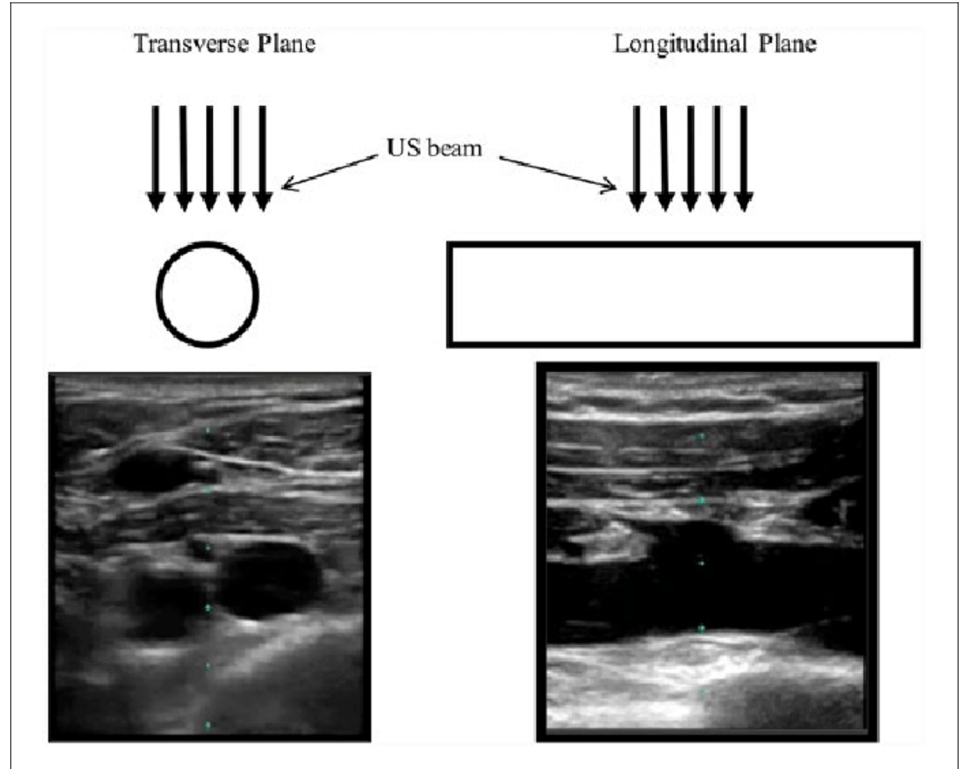
# Procedure for Using Ultrasound to place an IV/Central Line

1. **Explain** the procedure to the pt
2. Collect **equipment**
3. **Identify the best access site, mark** the point
4. **Prepare the site**
5. Apply **sterile probe cover**
6. **Verify the vein or artery. Align** the vessel with the middle of the probe and screen (in short or long view)
7. **Advance the needle** using guidance from the US. Maintain vision on the screen to **prevent losing sight** of the needle/vessel position
8. **Advance the catheter** into the vessel, then withdraw the needle.
9. Secure the site, remove the tourniquet, place the probe back to observe the target vessel.



# Short Axis vs Long Axis Views

- There is currently no standard method
  - some favor the longitudinal, others prefer the short axis
- Longitudinal view → better needle tip localization in ultrasound-guided central venous catheter placement via the IJV route, greater one attempt success
- Transverse approach → shorter operation time



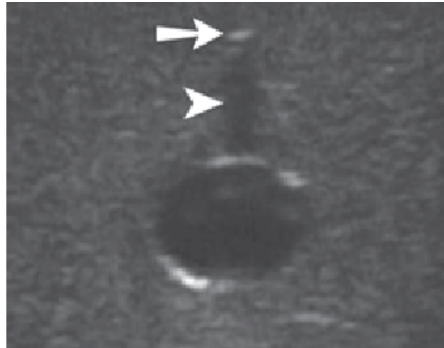
# Pros/Cons of Using the Transverse Approach



Transverse

## Advantages:

- Needle identification is done by visualizing the hyperechoic needle tip
  - Shows as a bright white dot (arrow)
- US probe must be moved along with the needle tip to track the tip as you attempt to reach the vessel



## Cons:

- visualization of the entire needle is not possible as in the longitudinal approach.
  - Losing sight of tip of needle → puncturing adjacent structures or through the back wall of intended vessel

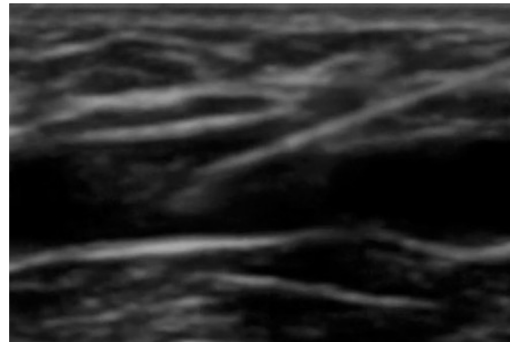
# Pros/Cons of Using the Longitudinal Approach



Longitudinal

## Advantages:

- Visualize the entire needle while attempting to cannulate the vessel
- The ultrasound probe, for the most part, remains still while the needle is guided into place



## Cons:

- Beam of the ultrasound, needle, and vessel must all remain in the same plane during this view
  - makes lateral movements of the needle difficult & the position of the needle relative to the vessel hard to identify
- Difficult on curving vessels

# Benefits Seen in Ultrasound Guided Procedures

- Lowered rates of PTX to 0%, (2.4% for landmark methods)
- 100% success rate with ultrasound guided CVC placement (94.4% in the landmark group)
- 0.6% rate of hematoma with ultrasound (8.4% without it)
- 1.1% rate of accidental carotid artery puncture with ultrasound (10.6% with landmark methods)
- Significantly reduced blood vessel access time
- Higher first-pass success
- 35% lower rate of central line-associated bloodstream infection



# References

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- Currie M, Zhu B, Vashisht R, et al. Ultrasound Intravascular Access. [Updated 2022 Sep 9]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2022 Jan-. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK448093/>
- Gottlieb M, Holladay D, Peksa GD. Comparison of Short- vs Long-axis Technique for Ultrasound-guided Peripheral Line Placement: A Systematic Review and Meta-analysis. *Cureus*. 2018 May 31;10(5):e2718. doi: 10.7759/cureus.2718. PMID: 30079284; PMCID: PMC6067833.
- Mahan AF, McEvoy MD, Gravenstein N. Long-axis view for ultrasound-guided central venous catheter placement via the internal jugular vein. *Rom J Anaesth Intensive Care*. 2016 Apr;23(1):27-31. doi: 10.21454/rjaic.7518.231.axs. PMID: 28913474; PMCID: PMC5505360.
- He YZ, Zhong M, Wu W, Song JQ, Zhu DM. A comparison of longitudinal and transverse approaches to ultrasound-guided axillary vein cannulation by experienced operators. *J Thorac Dis*. 2017 Apr;9(4):1133-1139. doi: 10.21037/jtd.2017.03.137. PMID: 28523170; PMCID: PMC5418287.