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Ultrasound-Guided Peripheral IV Placement

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Ultrasound Guided Peripheral IV Placement

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1

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2

Learning Objectives

- Describe indications for ultrasound guided peripheral IV placement
- Review supplies for ultrasound guided peripheral IV placement
- Describe venous anatomy, characteristics, and ultrasound artifacts
- Identify appropriate veins and catheters for IV placement
- Perform ultrasound guided peripheral IV placement using in-plane and out-of-plane techniques

Indications

Peripheral IV Placement	Ultrasound Guided Placement
Emergency care	Multiple failed landmark attempts
Blood product transfusion	Non-palpable veins
Intravenous drug administration	History of difficult IV access
Intravenous hydration	

- Use of ultrasound in patients predicted to have difficult IV access can increase first attempt success by ~50%*

*Tada M et al. Cochrane Database Syst Rev, 2019

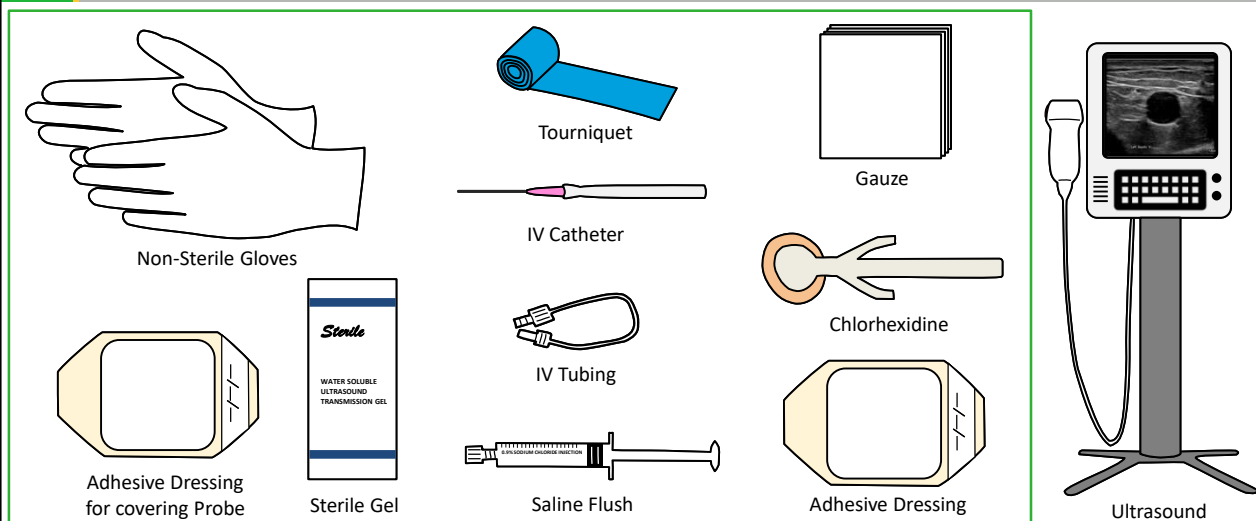
Contraindications

Peripheral IV Placement	When Ultrasound is Not Indicated
Infection, burns, phlebitis	Easy access is predicted
Infiltration	Clearly visible or palpable veins
AV fistula in the extremity	
Anticipated IV duration > 6 days	

- In patients with predicted easy IV access, ultrasound guidance may reduce first attempt success by ~11%*

*Tada M et al. Cochrane Database Syst Rev, 2019

Supplies for Ultrasound Guided PIV Placement



Supplies for Ultrasound Guided PIV Placement

Non-Sterile Gloves

Tourniquet

IV Catheter

IV Tubing

Saline Flush

Gauze

Chlorhexidine

Adhesive Dressing

Ultrasound

Sterile
PROBE COVER KIT
QTY: 1

Sterile Probe Cover w. Sterile Gel



7

Supplies for Ultrasound Guided PIV Placement

Sterile
NON-LATEX Gloves
Size 8.0
QTY 1

Sterile Gloves

Tourniquet

IV Catheter

IV Tubing

Saline Flush

Gauze

Chlorhexidine

Adhesive Dressing

Ultrasound

Sterile
PROBE COVER KIT
QTY: 1

Sterile Probe Cover w. Sterile Gel



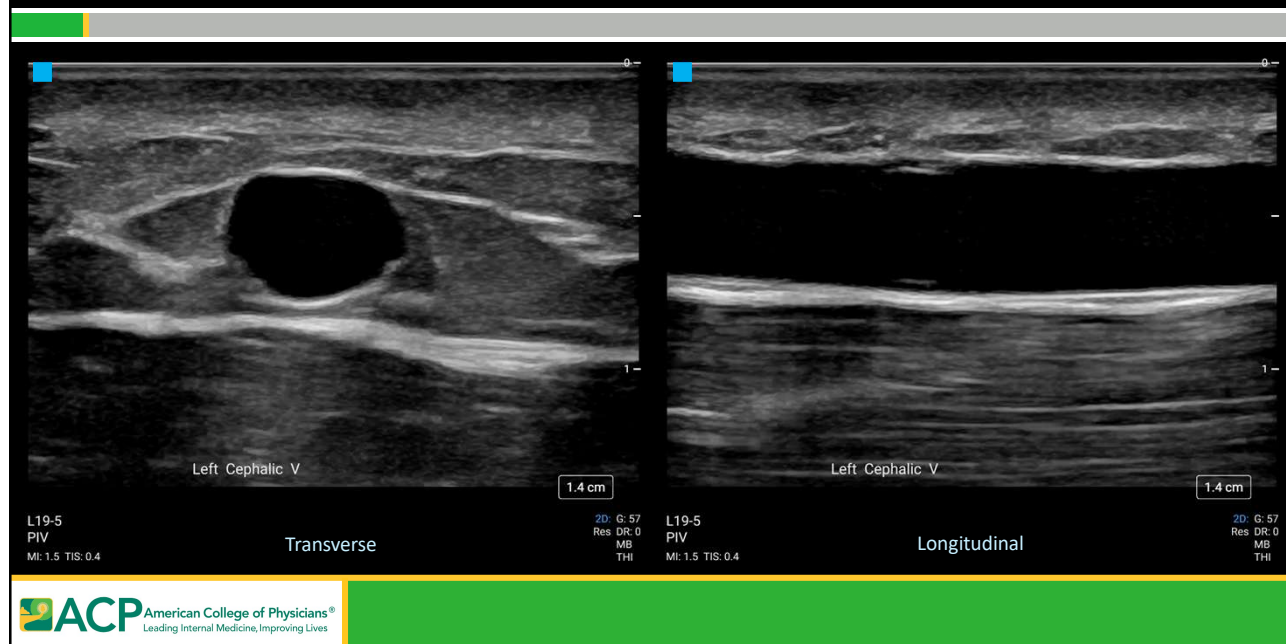
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Supplies for Ultrasound Guided PIV Placement

- No single standard exists
- Sterility practices range from clean to sterile technique
- Follow your institutional guidelines

Peripheral Vein Ultrasound Characteristics

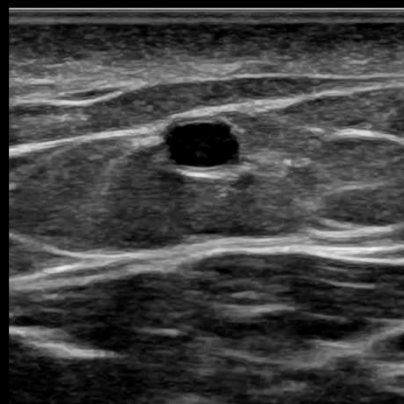
Venous Anatomy and Ultrasound Characteristics



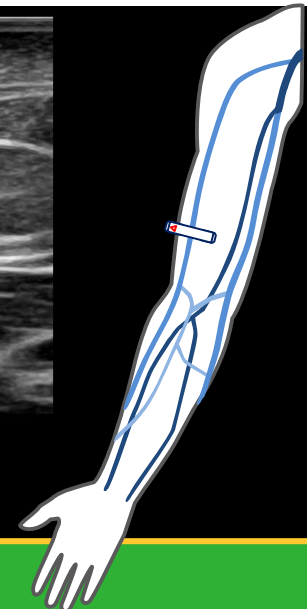
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Venous Anatomy and Ultrasound Characteristics

- Slide the probe to map out the vein
- Assess for adequate vein length



Right Cephalic V



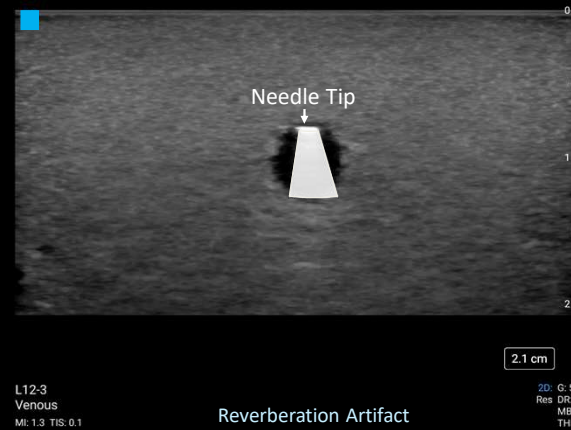
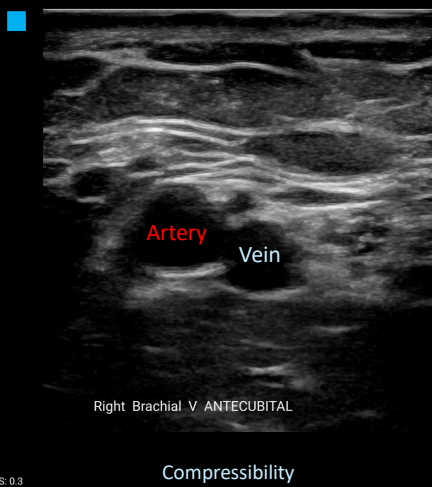
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Venous Anatomy and Ultrasound Characteristics

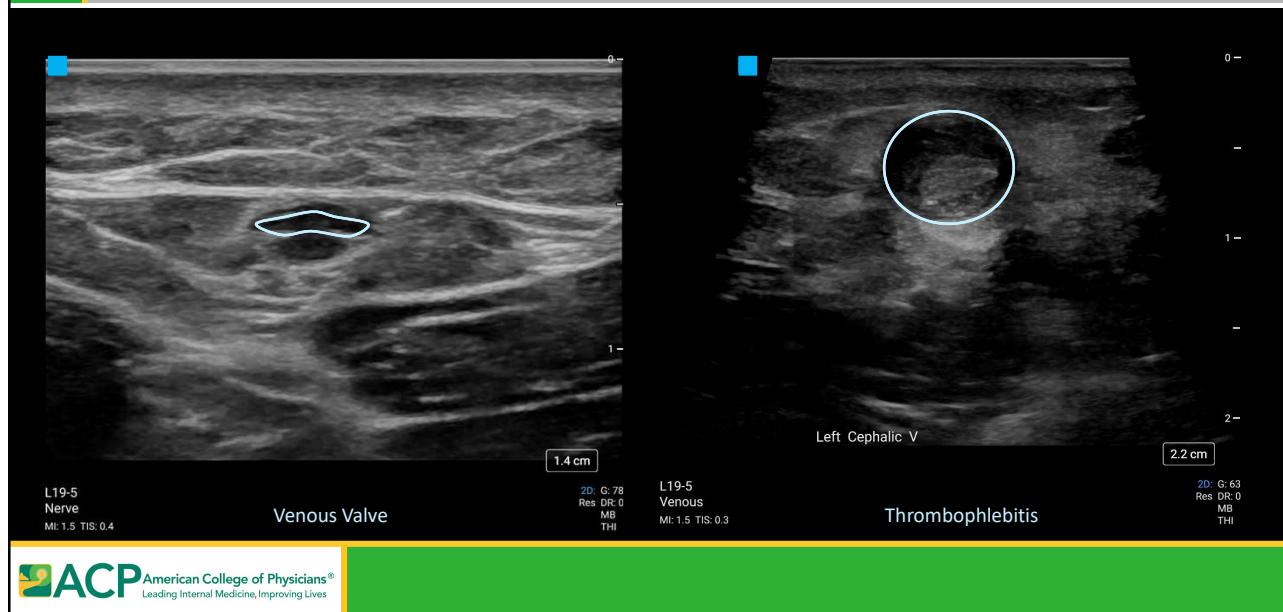
- Slide the probe to map out the vein
- Assess for adequate vein length
- Avoid branching vessels



Venous Anatomy and Ultrasound Characteristics



Venous Anatomy and Ultrasound Characteristics



15

Insertion Site and Catheter Selection

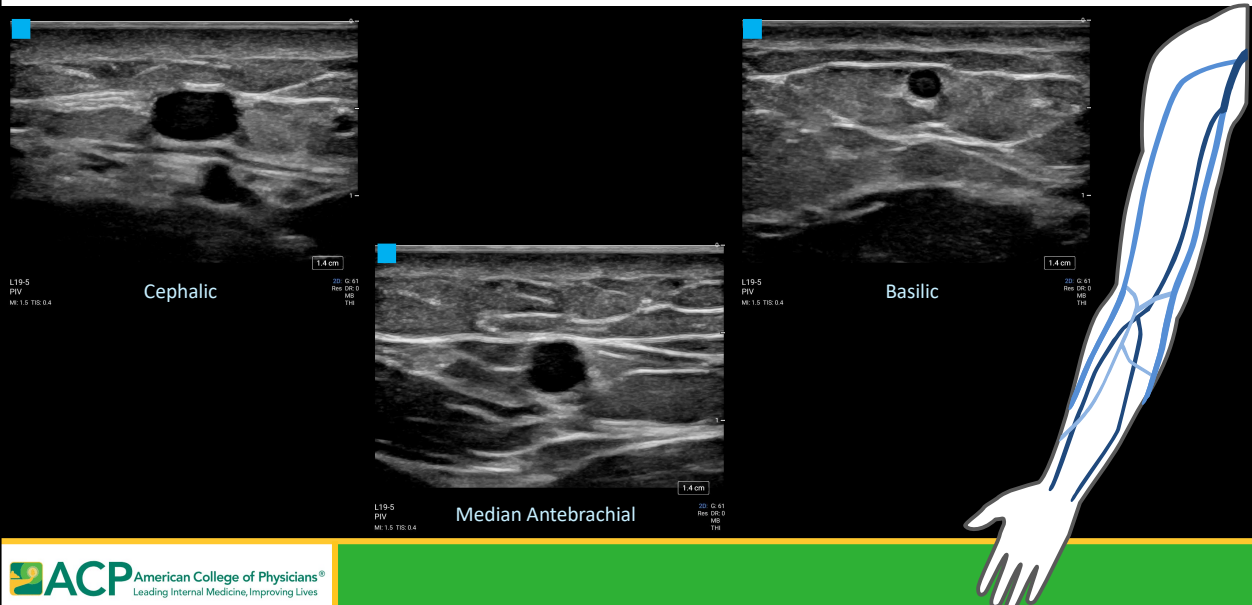


16

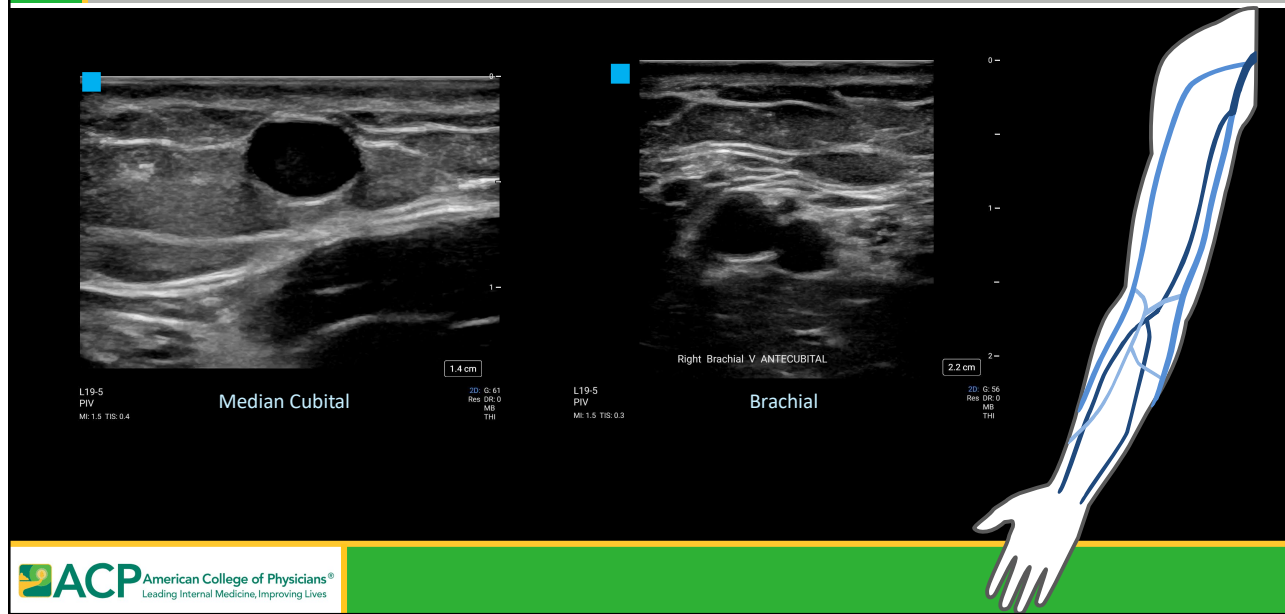
Site and Catheter Selection

- *Moderate depth*
 - **0.3-1.5 cm** from skin surface
 - Shallower = difficult with US
 - Deeper = high failure rate, less sustainable
- *Big enough*
 - **Diameter ≥ 0.3 cm**
 - Smaller = high failure rate
 - Ideal catheter to vein ratio < 0.4
- *Practical/Useable*
 - Basilic, median cubital, cephalic, deep brachial*

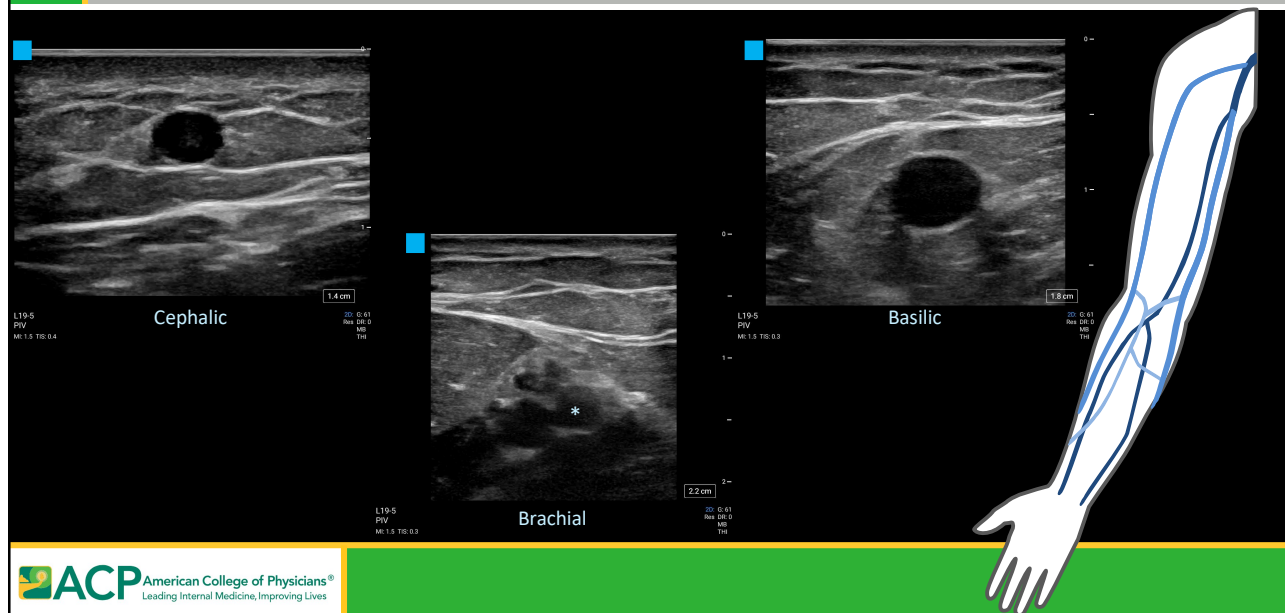
Site Selection: Forearm



Site Selection: Antecubital Fossa



Site Selection: Arm



Site and Catheter Selection

- Identify by color (18G or 20G long catheters preferred)
- Use longest catheter available (with >50% length to keep in lumen)



Solve for
hypotenuse ▾

$$c \approx 1.41$$

a Leg

b Leg

Solution

$$c = \sqrt{a^2 + b^2} = \sqrt{1^2 + 1^2} \approx 1.41421$$

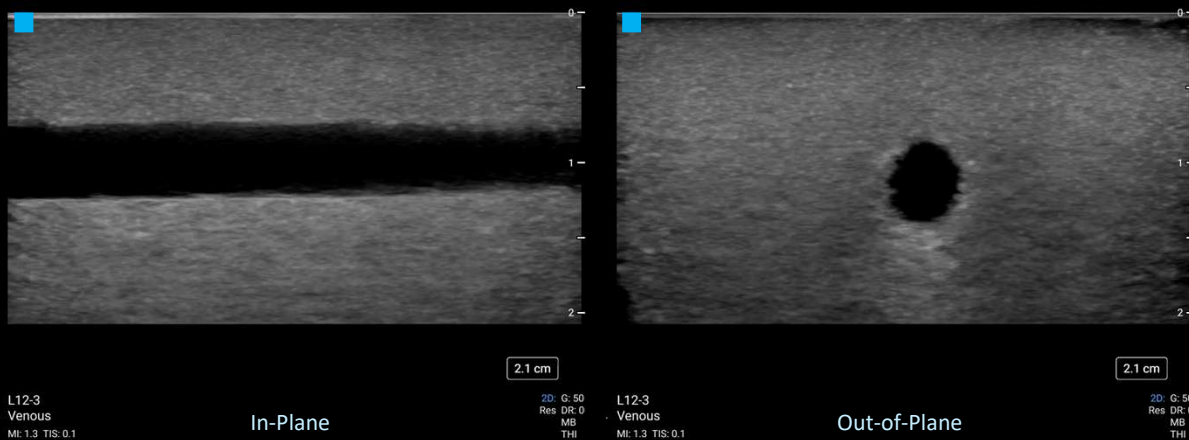
Ultrasound Guided Peripheral IV Placement Technique

Ultrasound Guided Peripheral IV Placement Steps

1. Review contraindications
2. Gather supplies
3. Apply tourniquet
4. Prepare skin with chlorhexidine or other antiseptic
5. Utilize probe cover and sterile gel per institutional practice
6. Place peripheral IV under ultrasound guidance
7. Apply sterile dressing and secure the peripheral IV

23

Technique



24

Take Home Points

- Scan to identify an appropriate IV placement site
- Use compression or color flow to differentiate veins from arteries
- Target veins ≥ 0.3 cm in diameter and 0.3 cm - 1.5 cm from the skin
- Longer length IV catheters are preferred (≥ 1.75 in)
- After entering the vein, lower the angle and advance the needle another 1– 2 mm before inserting the catheter

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Please break into groups of 3 for the practical session