ULTRASOUND CANNULATION

A useful tool when you are faced with another challenging IV access!

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Objectives:

For clinical staff to have a practical understanding of:

1. The benefits and limitations of u/sound guidance.
2. The ultrasound system e.g. probes and controls.
3. The suitable vessels in the upper arm.
4. How to visualise vessels in the transverse plane.
5. Setting up for the cannulation and inserting the cannula successfully under u/sound.

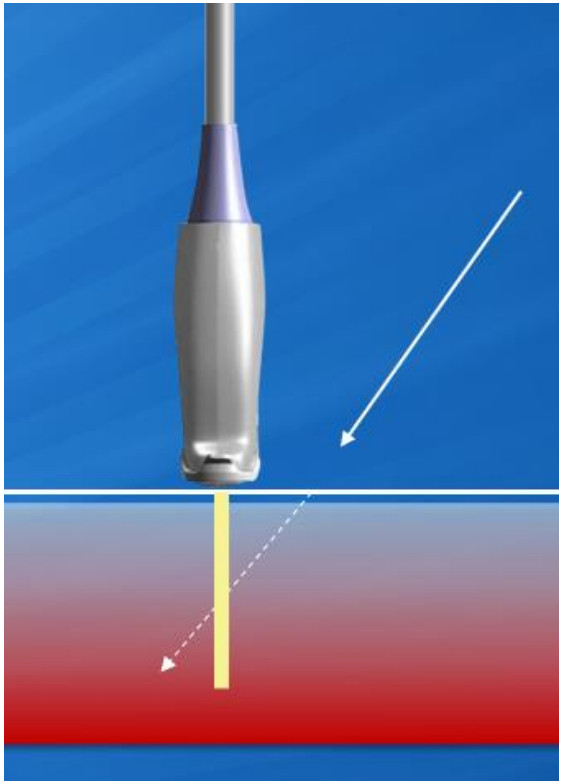
"A huge thank you to Sonosite for the loan of the u/sound machine and use of their online resources"

Introduction:

- Ultrasound history
- My personal experience with it
- Why the increasing interest in this modality?
  - IV access increasingly challenging
  - Technology improving and less expensive
  - Over utilisation of central access especially PICCs
  - Recognised benefits
    - Deeper, disguised veins
    - Reduced attempts
    - Longer dwell

Cautions:

- You do not want to de-skill yourself on standard palpation techniques
- Need longer cannulae (48mm 20g is commonly used) or risk extravasation (Elia et al, 2012)
  - Particular caution with patients receiving vesicants
- Also avoid accessing basilic vessels that might be used for a PICC later
- Takes expertise & time/resources/space in a busy ED unit!
- Not cheap devices!



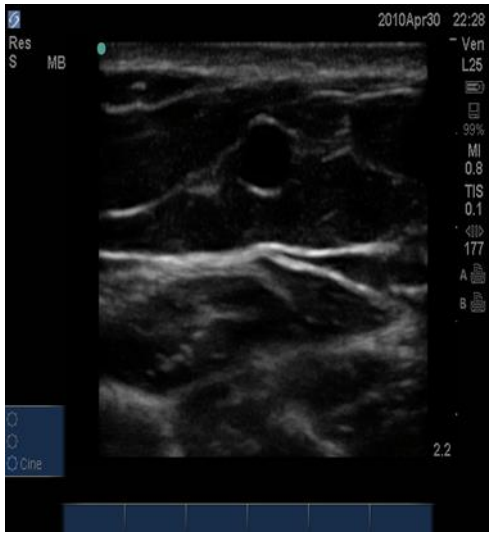
How it works (1):

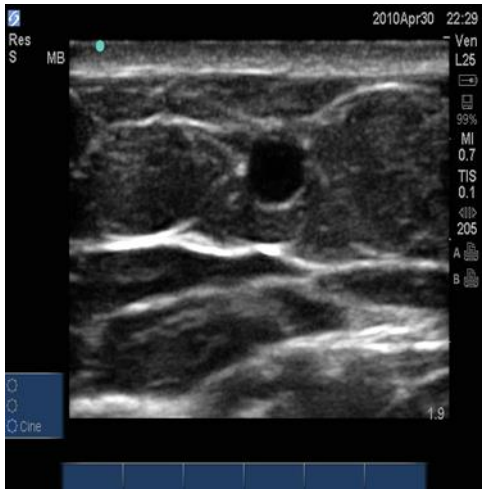
- Probe:
  - Crystals vibrate at a set frequency and send out a thin ultrasound beam that outline structures (think of it like a narrow torch beam)
  - Higher frequency = shallow depth but better resolution
  - Often have a centre mark and side-notch to help alignment
  - Probes are very expensive to drop!

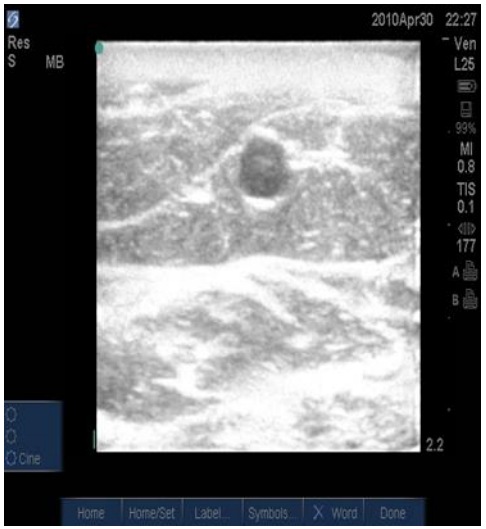
- Gel:
  - Provides medium for ultrasound wave to travel through
  - Both non-sterile and sterile options
  - Challenge to clean off and then secure catheter

How it works (2):

- Knobology:
  - **Exam** choice sets up general parameters e.g. venous
  - **Gain** control gives you increased contrast in the picture
  - **Depth** control allows you to adjust the target vessel to be in the middle of the picture (best image)
  - Marks down the side of picture in cm
  - An optional **centre guide** is useful

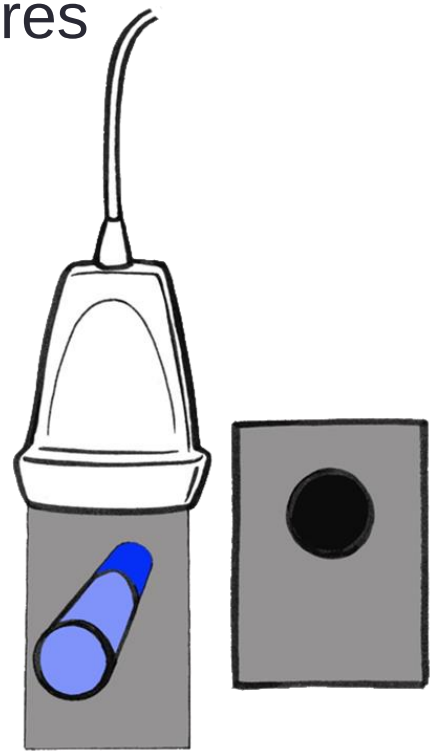






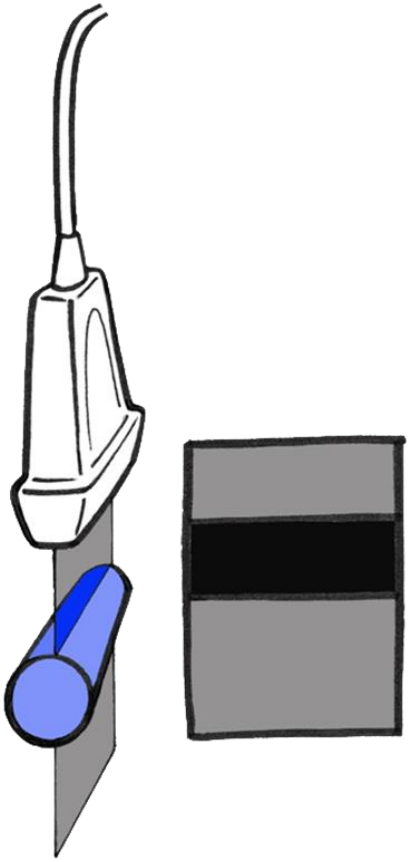
Transverse plane:

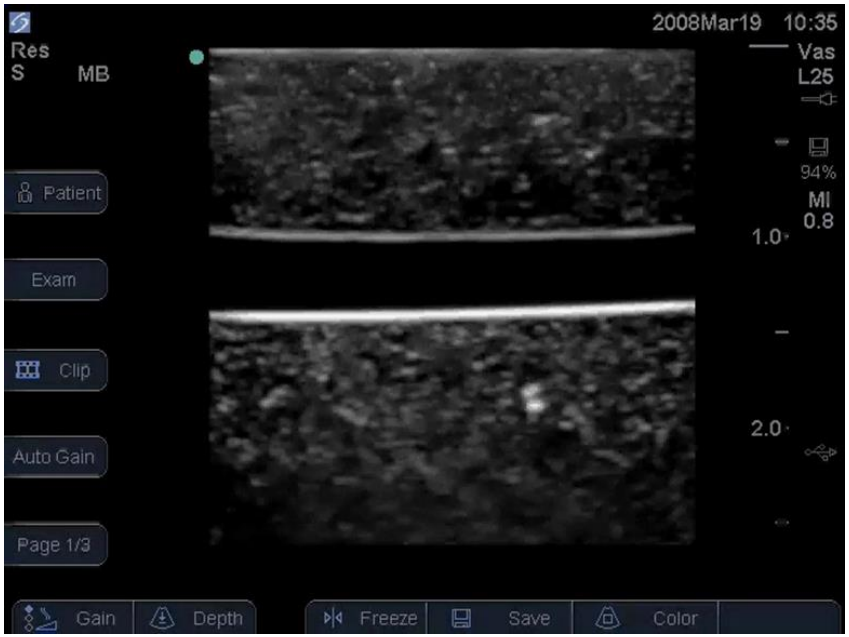
- Strongly suggest using the Transverse plane to start with
- Veins and arteries appear as round or oval anechoic structures



Longitudinal plane:

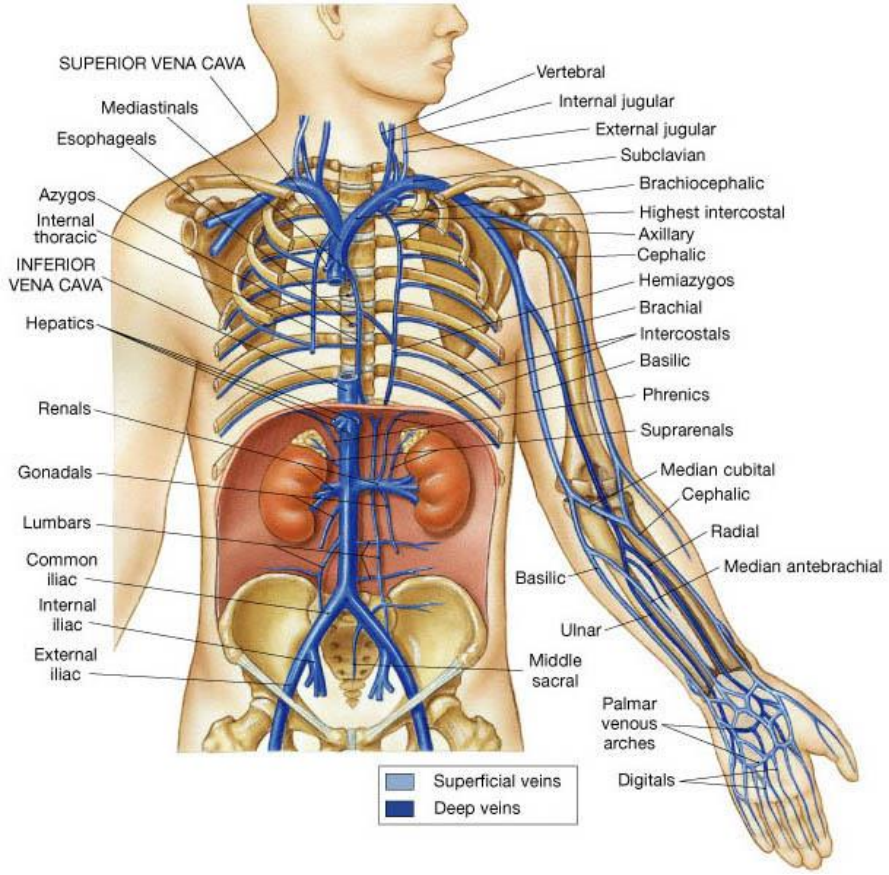
- Experienced operators can use this to verify catheter placement within vessel

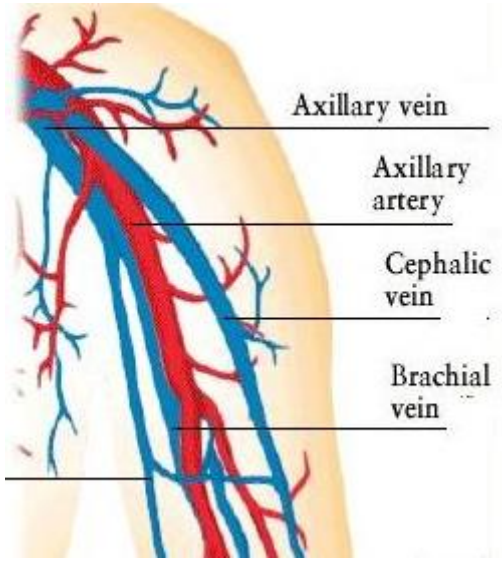




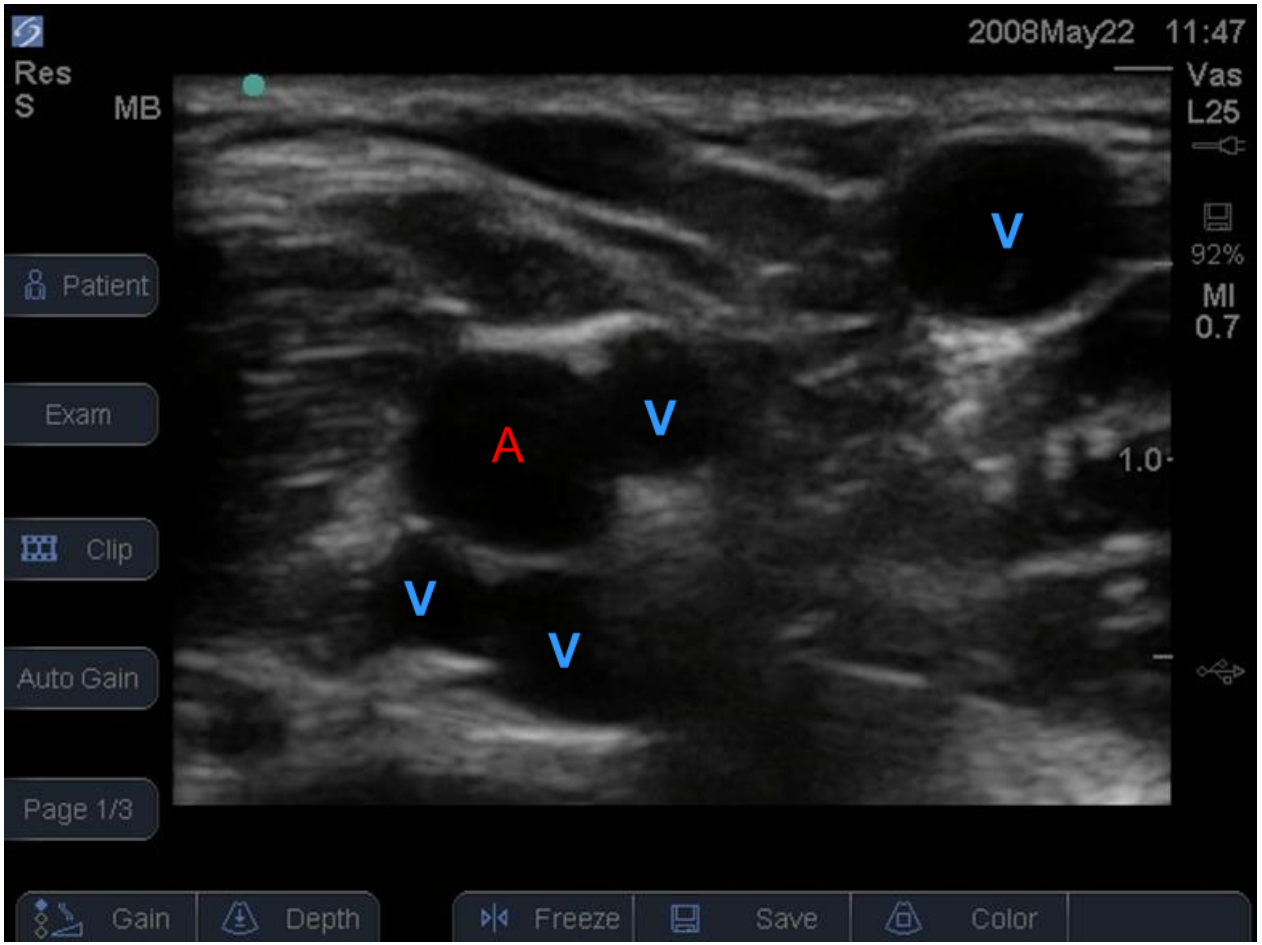
Key vessels within the arm:

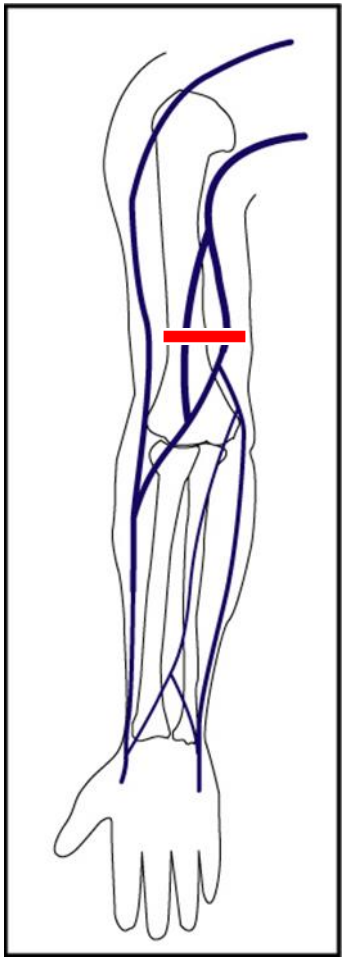
- Ultrasound is commonly used to cannulate vessels mid forearm to mid upper arm (avoiding the ACF, if possible)



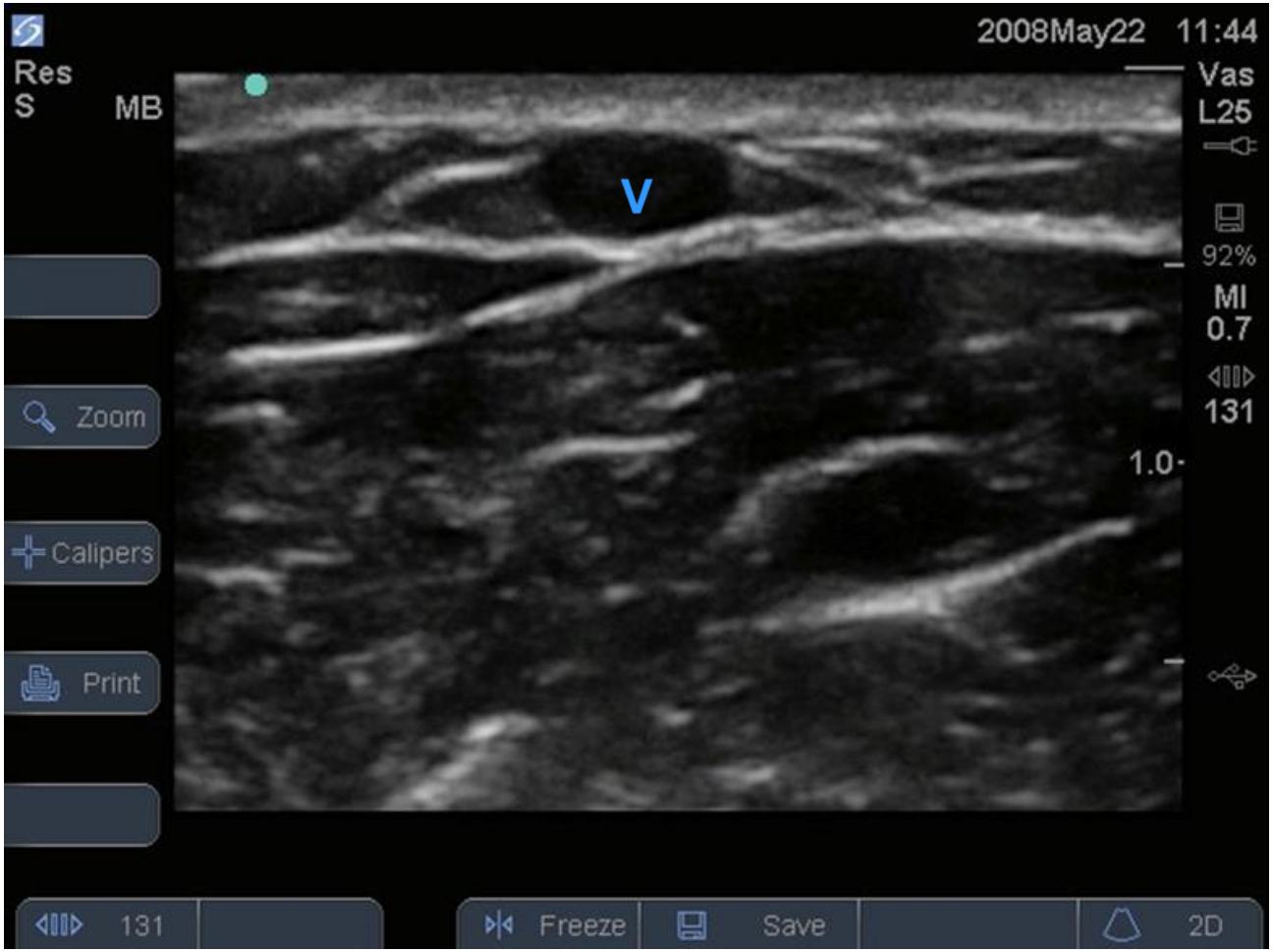


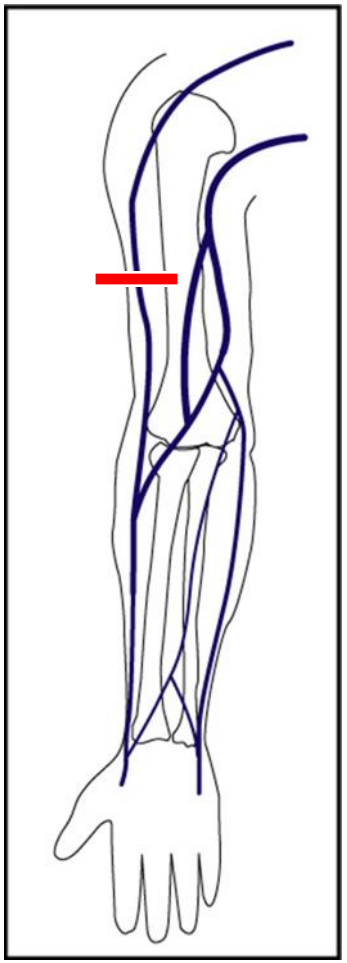
Brachial and Basilic vessels:





Cephalic vessel:

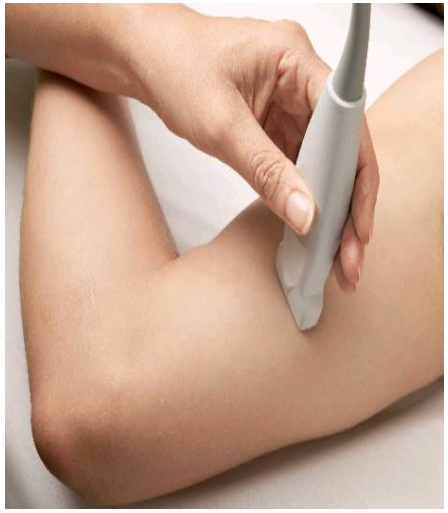




Visualising the arm anatomy – Pre-scan:

- *A volunteer please…*

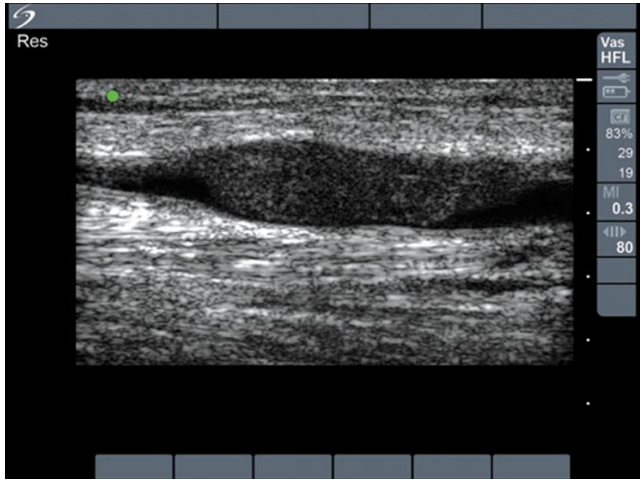
- Inform patient and prepare environment
  - Reduced lighting
  - Protect linen/clothes
- Apply tourniquet firmly and apply gel to ACF
  - Tourniquet can get uncomfortable!
- Comfortably hold and orientate probe
  - Notch to your left shoulder
  - Transverse versus Longitudinal
  - Don’t grip or press too hard

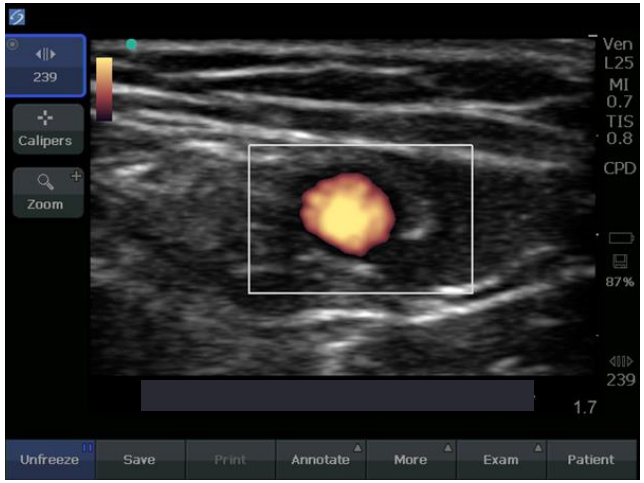


Assessing for suitable veins:

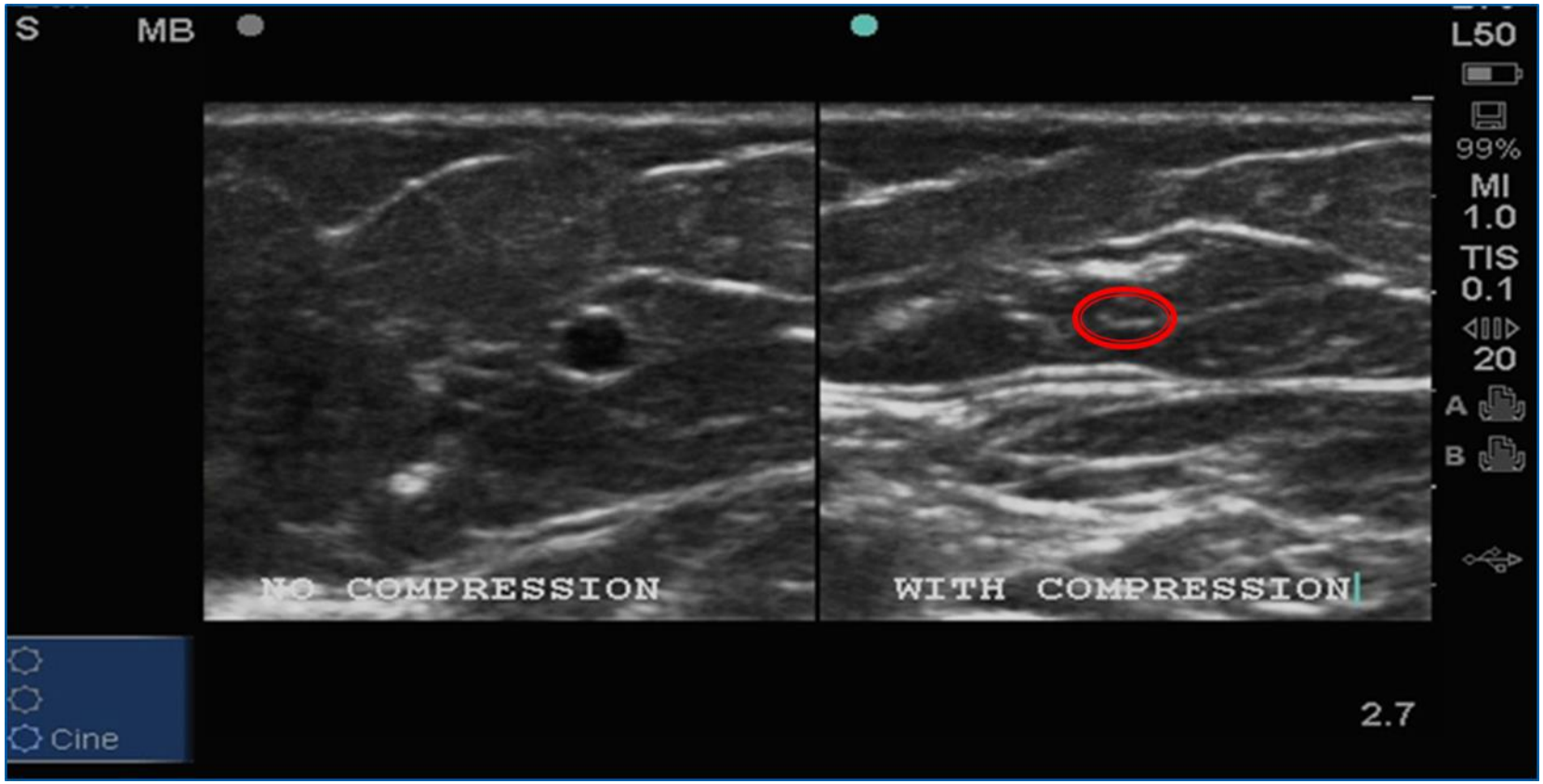
Map along the veins:

- Large enough for cannula?
- Compressible?
  - Healthy vessel
  - Vein versus artery
  - Note: Children's arteries can often be compressed)
  - Some machines have Doppler to help differentiate
- No unusual bifurcations or narrowing upstream?





Vein compression (winking!):



Preparation for cannulation:

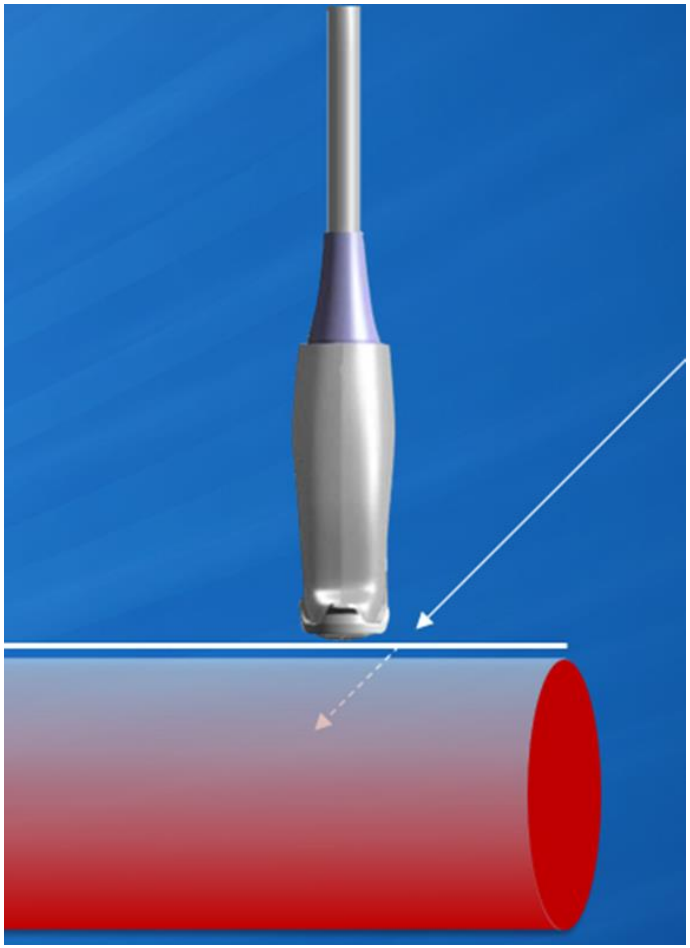
- Infection control
  - Sterile gel and cover (INS standard)
    - Tegaderm can be a cost effective option
  - Dressing pack and clean gloves
- Local anaesthetic
  - 0.2ml of 1% Lignocaine
  - Do you have or need a standing order?
- Reduced lighting if possible
- Comfortable positioning with U/sound machine angled suitably
- Cannula, extension, blood sampling gear, dressing plus extra securement strategies!

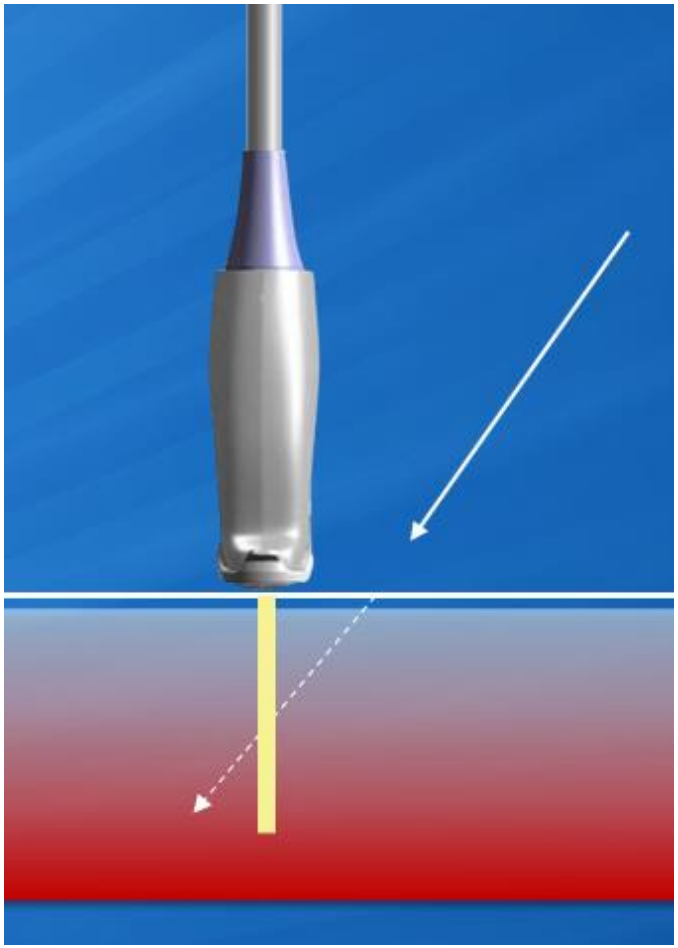
Guiding the cannula using u/sound:

- Locate the vessel and infiltrate LA into the site
  - Check for blood return in case of vessel penetration
- Position cannula close to centre of probe and slowly insert
  - Angle of cannula 45 degrees
- As soon as you see cannula tip on screen, slide your transducer further away and advance cannula again back into view. Repeat this step as you advance towards the vein…

ALWAYS view cannula TIP – not the shaft!

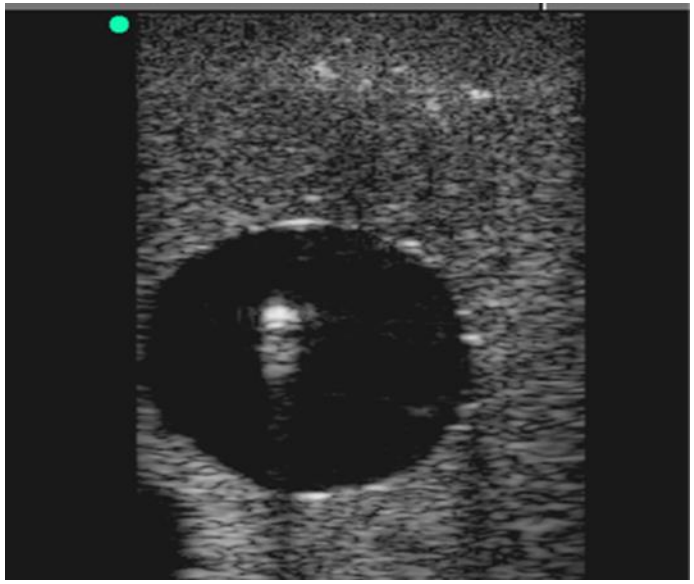
The Slide Technique:





Accessing vein:

- Cannula will ‘tent’ vein and then penetrate. Check for flashback…
- Drop angle and feed cannula into vein.
- Success – now wipe off gel and secure well in place!



4 Key Tips:

1. Be familiar with your machine.
2. Use a long needle.
3. Orientate the probe correctly.
4. Utilise the Slide Technique to ensure you visualise the tip.
5. Don’t rush the procedure!

All the best!