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OBJECTIVES

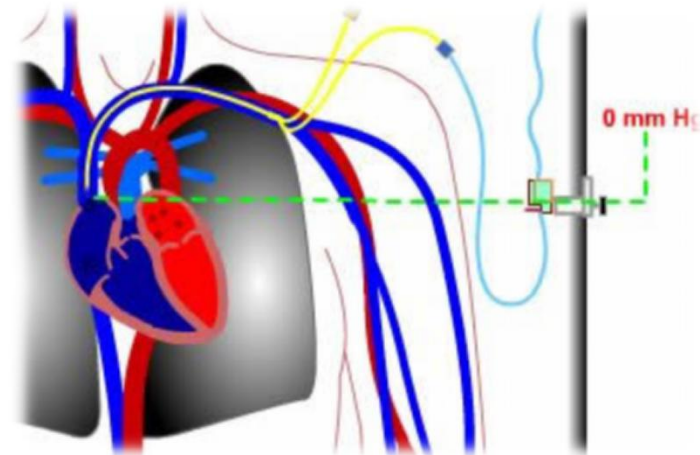
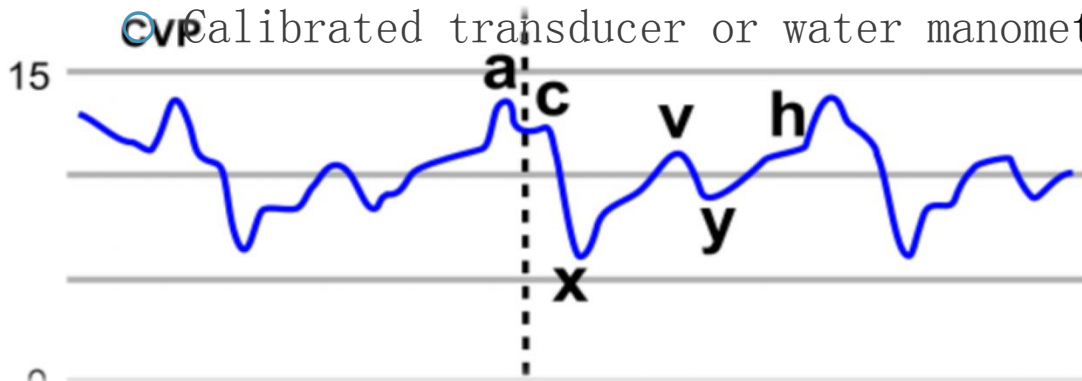
- Introduction
- Indications and Contraindications
- Complications
- Technique
- Basic principles
- Specifics by Site
- Basic materials

WHAT IS CENTRAL VENOUS PRESSURE... ???

- Clinical measure of right ventricular filling
- The zero reference point for venous pressures in the thorax is a point on the external thorax where the fourth intercostal space intersects the mid-axillary line (i.e., the line midway between the anterior and posterior axillary folds).
- This point (called the phlebostatic axis) corresponds to the position of the right and left atrium when the patient is in the supine position.

○ MEASUREMENT

- Calibrated transducer or water manometer



INDICATIONS

- Central venous pressure monitoring
- Volume resuscitation
- Cardiac arrest
- Lack of peripheral access
- Infusion of hyperalimentation
- Infusion of concentrated solutions
- Placement of transvenous pacemaker
- Cardiac catheterization, pulmonary angiography
- Hemodialysis



RELATIVE CONTRAINDICATIONS

- Bleeding disorders
- Anticoagulation or thrombolytic therapy
- Combative patients
- Distorted local anatomy
- Cellulitis, burns, severe dermatitis at site
- Vasculitis



COMPLICATIONS

○ Vascular

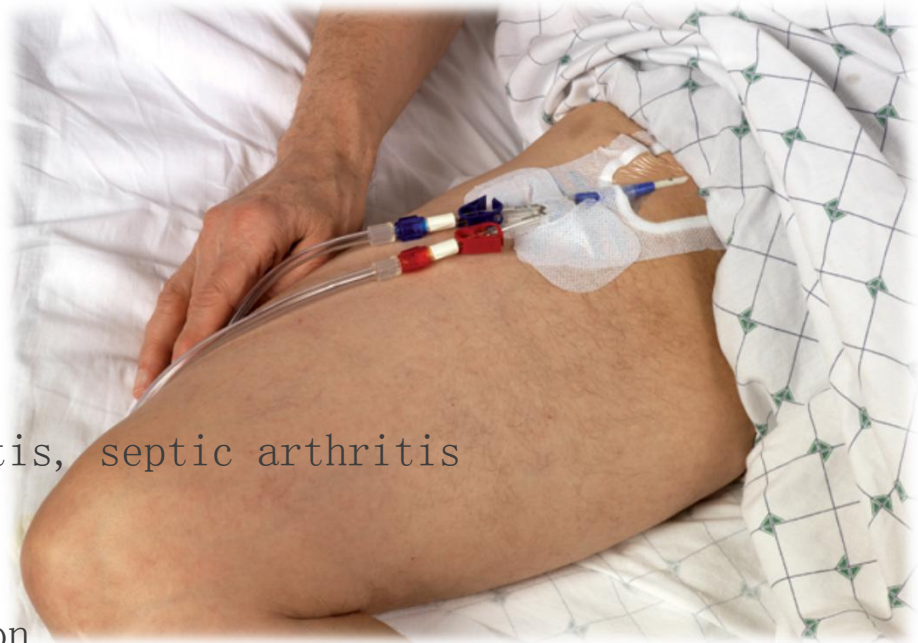
- Air embolus
- Arterial puncture
- Arteriovenous fistula
- Hematoma
- Blood clot

○ Infectious

- Sepsis, cellulitis, osteomyelitis, septic arthritis

○ Miscellaneous

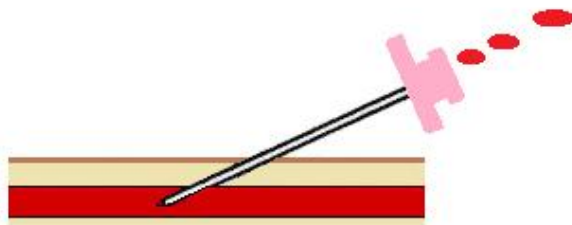
- Dysrhythmias
- Catheter knotting or malposition
- Nerve injury
- Pneumothorax, hemothorax, hydrothorax, hemomediastinum
- Bowel or bladder perforation



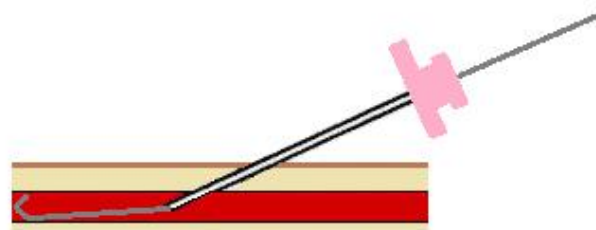
TECHNIQUE

○ Modified Seldinger technique

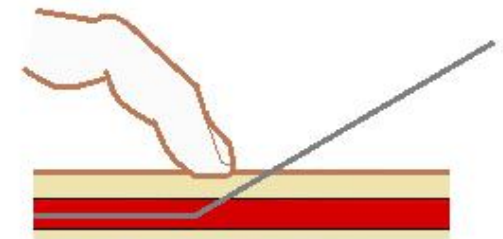
- Use introducing needle to locate vein
- Wire is threaded through the needle
- Needle is removed
- Catheter is placed over the wire
- Wire is removed
- Catheter is secured in place



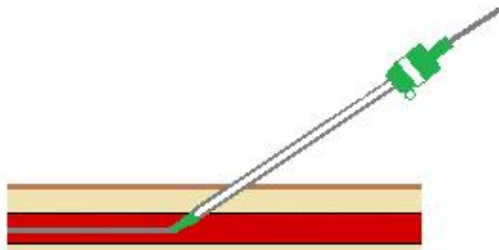
A. Pulsatile blood flow upon entry.



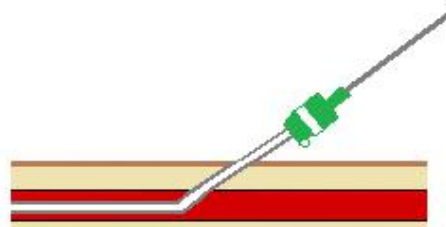
B. J-tip guidewire is advanced



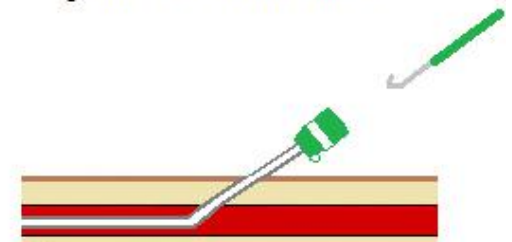
C. Needle is removed leaving guidewire inside of the vessel



D. Sheath is advanced over guidewire



E. Sheath advanced to skin entry

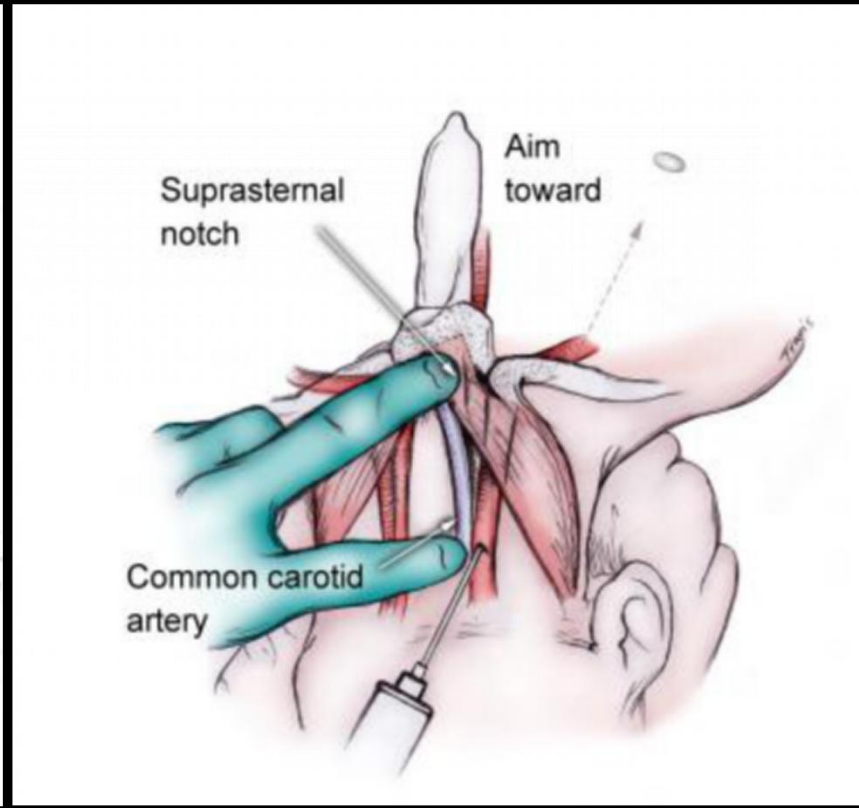
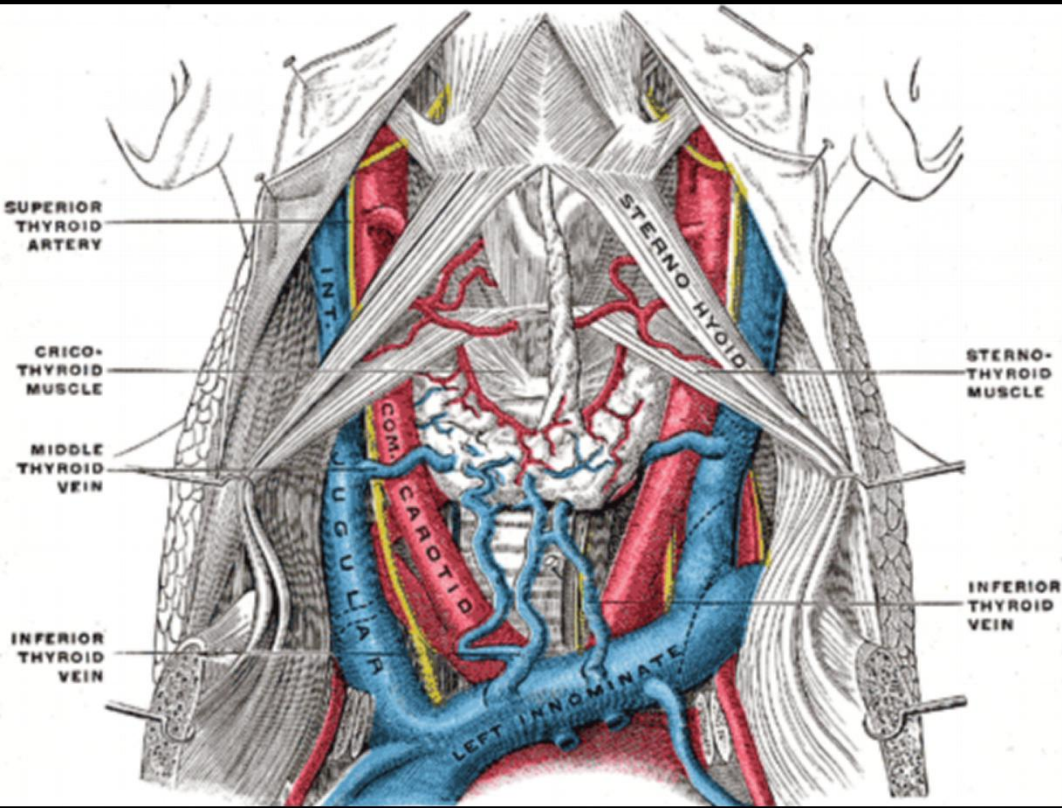


F. Guidewire and dilator removed.

BASIC PRINCIPLES

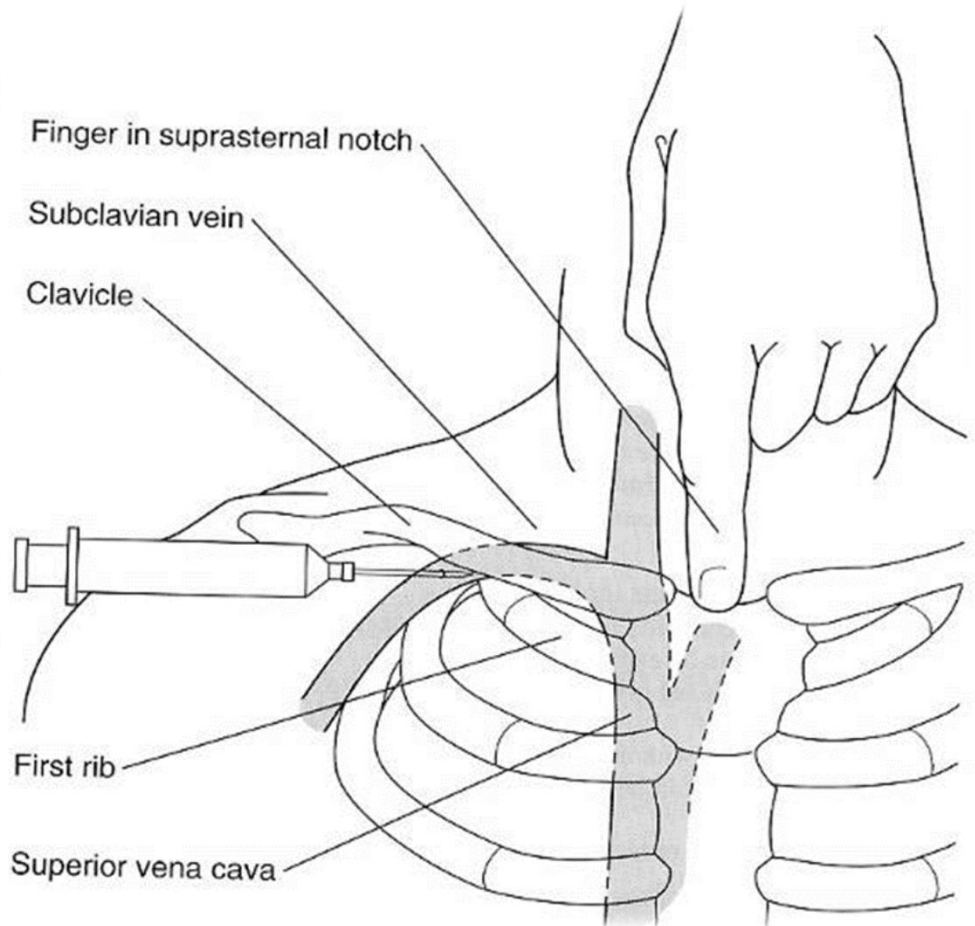
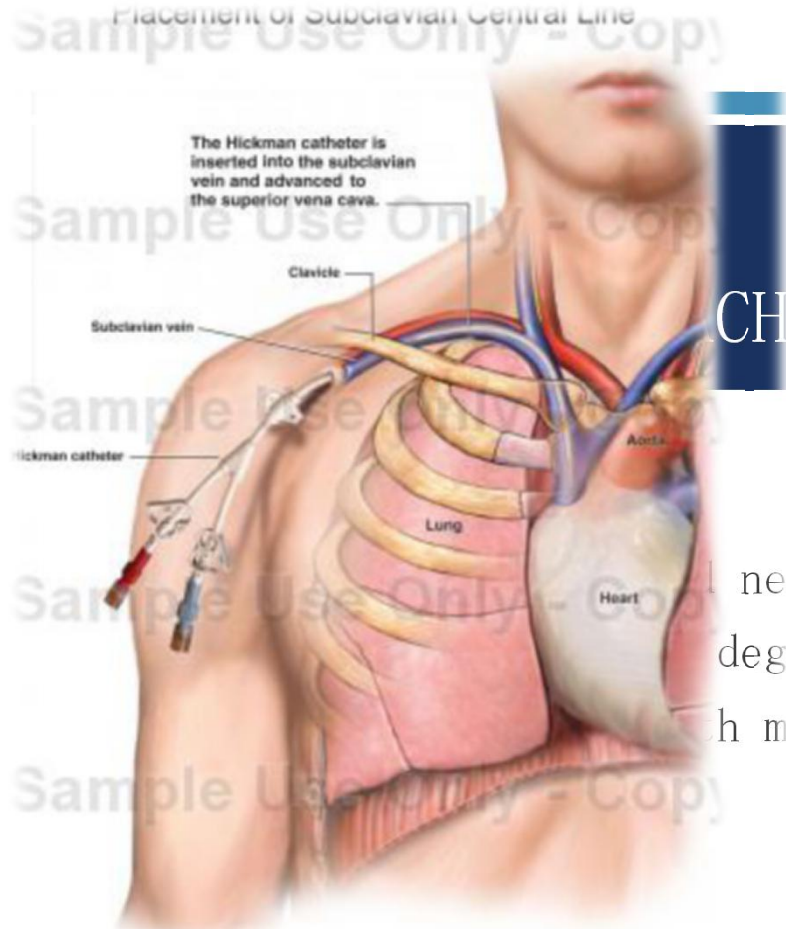
- Decide if the line is really necessary
- Know your anatomy
- Be familiar with your equipment
- Obtain optimal patient positioning and cooperation
- Take your time
- Use sterile technique
- Always have a hand on your wire
- Ask for help
- Always aspirate as you advance as you withdraw the needle slowly
- Always withdraw the needle to the level of the skin before redirecting the angle
- Obtain chest x-ray post line placement and review it

Location	Advantage	Disadvantage
Internal Jugular	<ul style="list-style-type: none"> • Bleeding can be recognized and controlled • Malposition is rare • Less risk of pneumothorax 	<ul style="list-style-type: none"> • Risk of carotid artery puncture • PTX possible
Femoral	<ul style="list-style-type: none"> • Easy to find vein • No risk of pneumothorax • Preferred site for emergencies and CPR • Fewer bad complications 	<ul style="list-style-type: none"> • Highest risk of infection • Risk of DVT • Not good for ambulatory patients
Subclavia	<ul style="list-style-type: none"> • Most comfortable for conscious patients 	<ul style="list-style-type: none"> • Highest risk of PTX, should not do on intubated



○ Needle placement: Central approach

- Locate the triangle formed by the clavicle and the sternal and clavicular heads of the SCM muscle
- Gently place three fingers of left hand on carotid artery
- Place needle at 30 to 40 degrees to the skin, lateral to the carotid artery
- Aim toward the ipsilateral nipple under the medial border of the lateral head of the SCM muscle
- Vein should be 1-1.5 cm deep, avoid deep probing in the neck

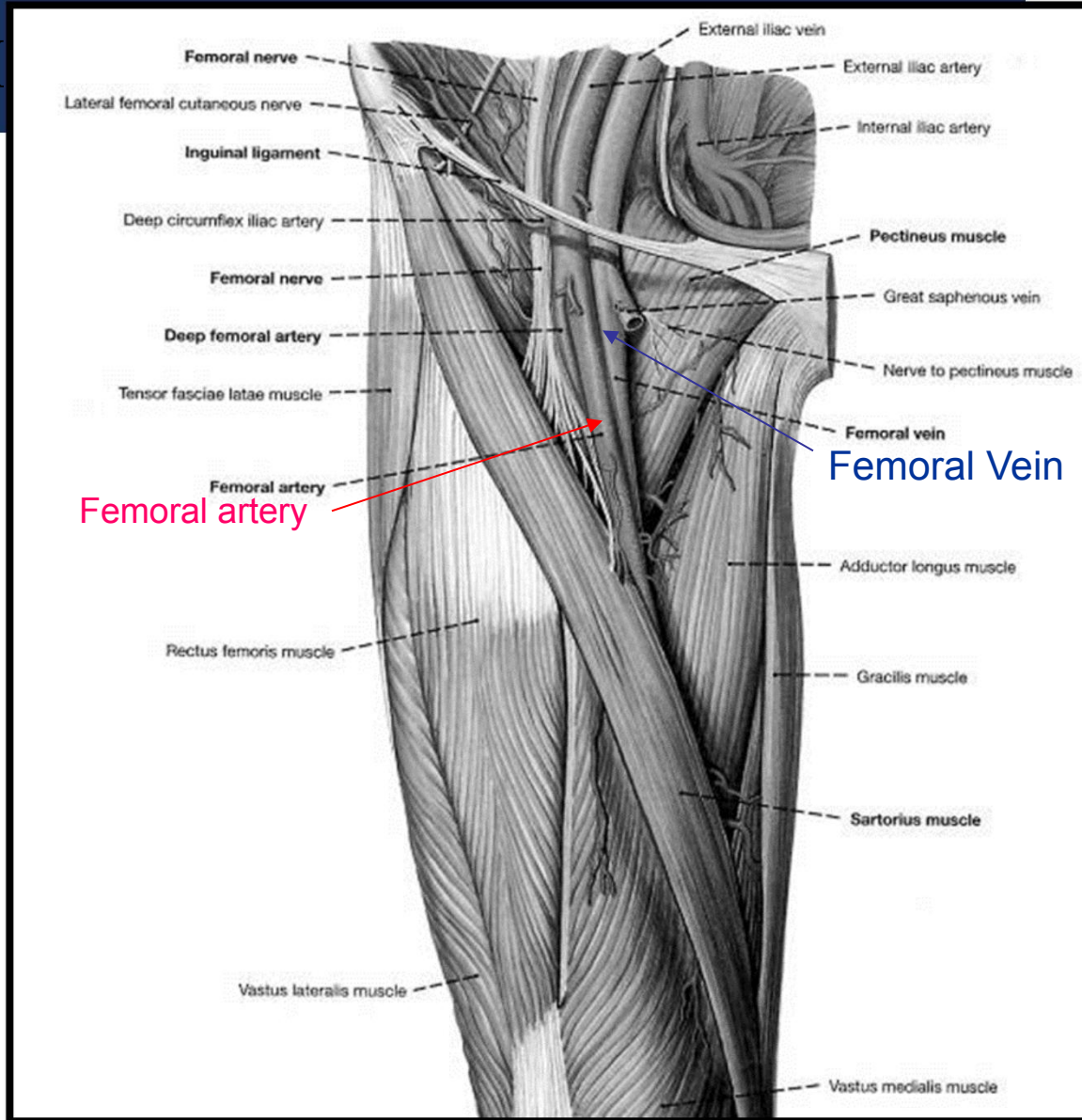


Needle placement

- Junction of middle and medial thirds of clavicle
- At the small tubercle in the medial deltopectoral groove
- Needle should be parallel to skin
- Aim towards the supraclavicular notch and just under the clavicle

○ FEMORAL APPROACH

- Positioning
 - Supine
- Needle placement
 - Medial to femoral artery
 - Needle held at 45 degree angle
 - Skin insertion 2 cm below inguinal ligament
 - Aim toward umbilicus



POST-CATHETER PLACEMENT

- Aspirate blood from each port
- Flush with saline or sterile water
- Secure catheter with sutures
- Cover with sterile dressing (tega-derm)
- Obtain chest x-ray for IJ and SC lines
- Write a procedure note

PROCEDURE NOTE

- Name of procedure
- Indication for procedure
- Comment on consent, if applicable
- Describe what you did, including prep
- Comment on aspiration/flushing of ports
- How did patient tolerate procedure
- Any complications

ULTRASOUND-GUIDED CENTRAL VENOUS ACCESS

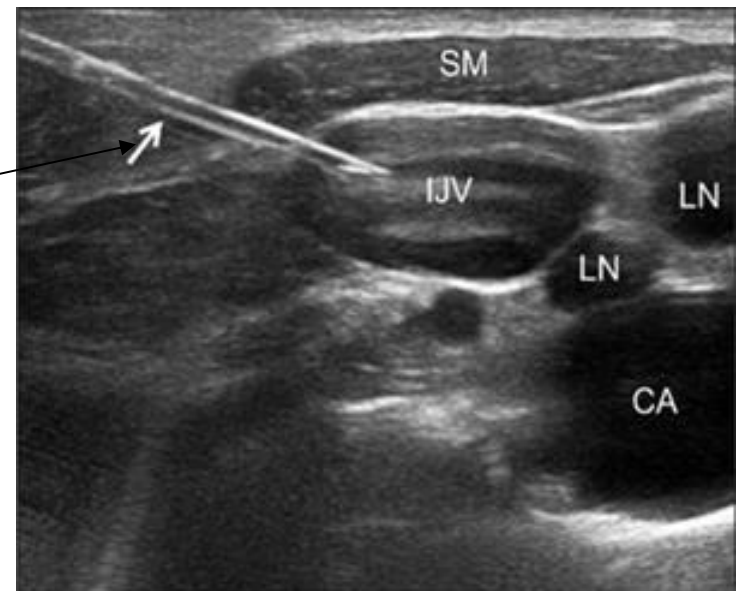
- Becoming standard of care
- Vein is compressible
- Vein is not always larger
- Vein is accessed under direct visualization
- Helpful in patients with difficult anatomy

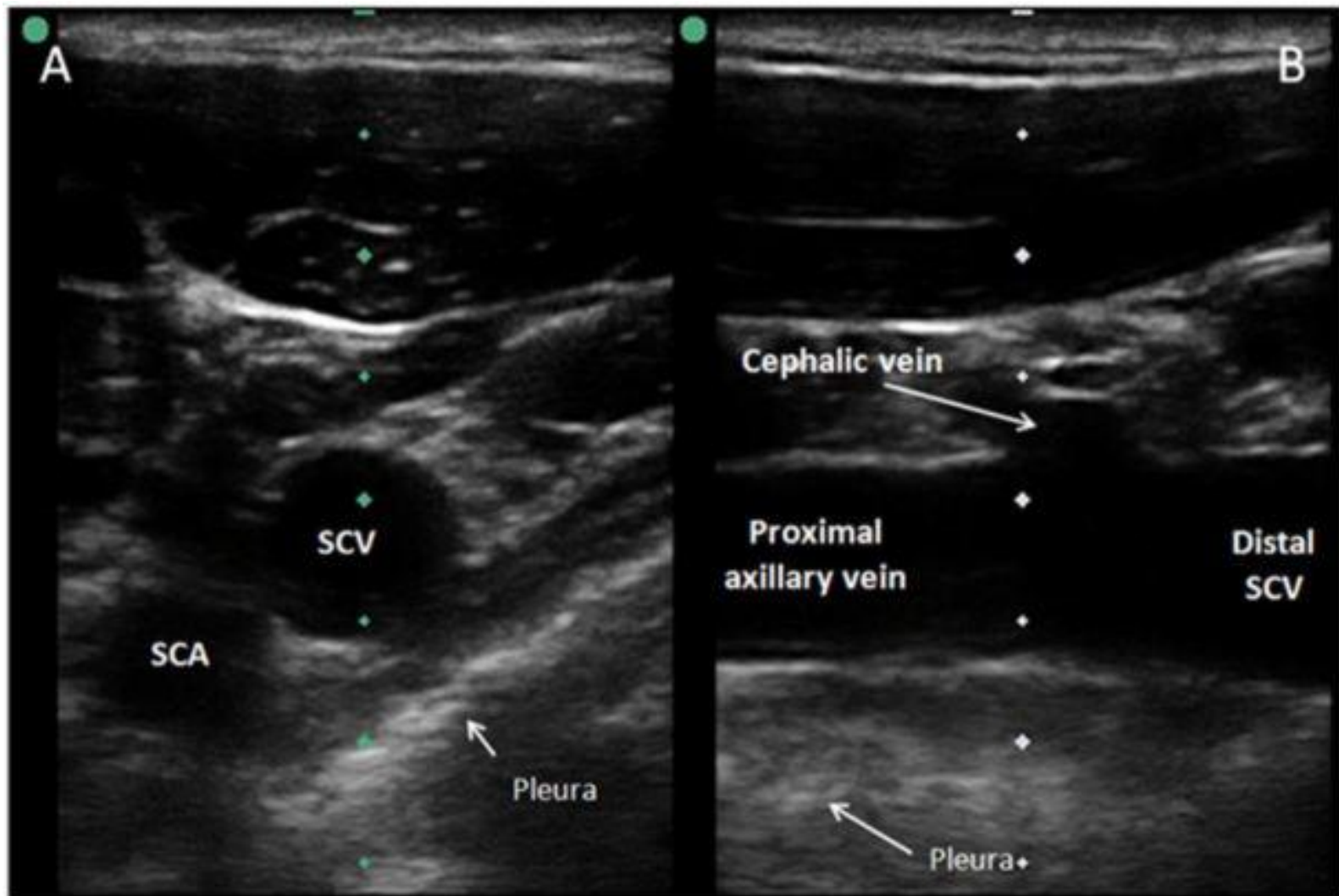


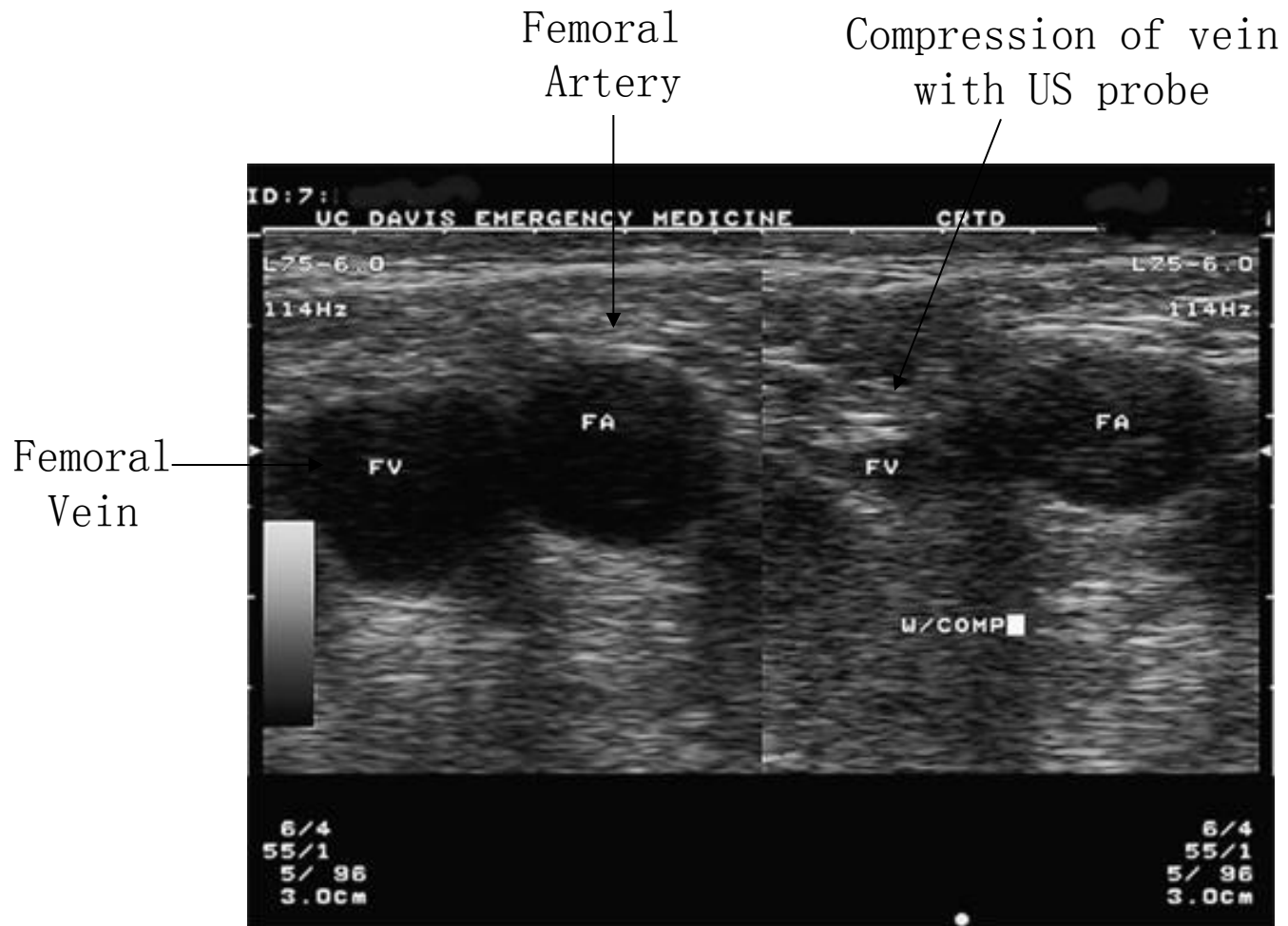


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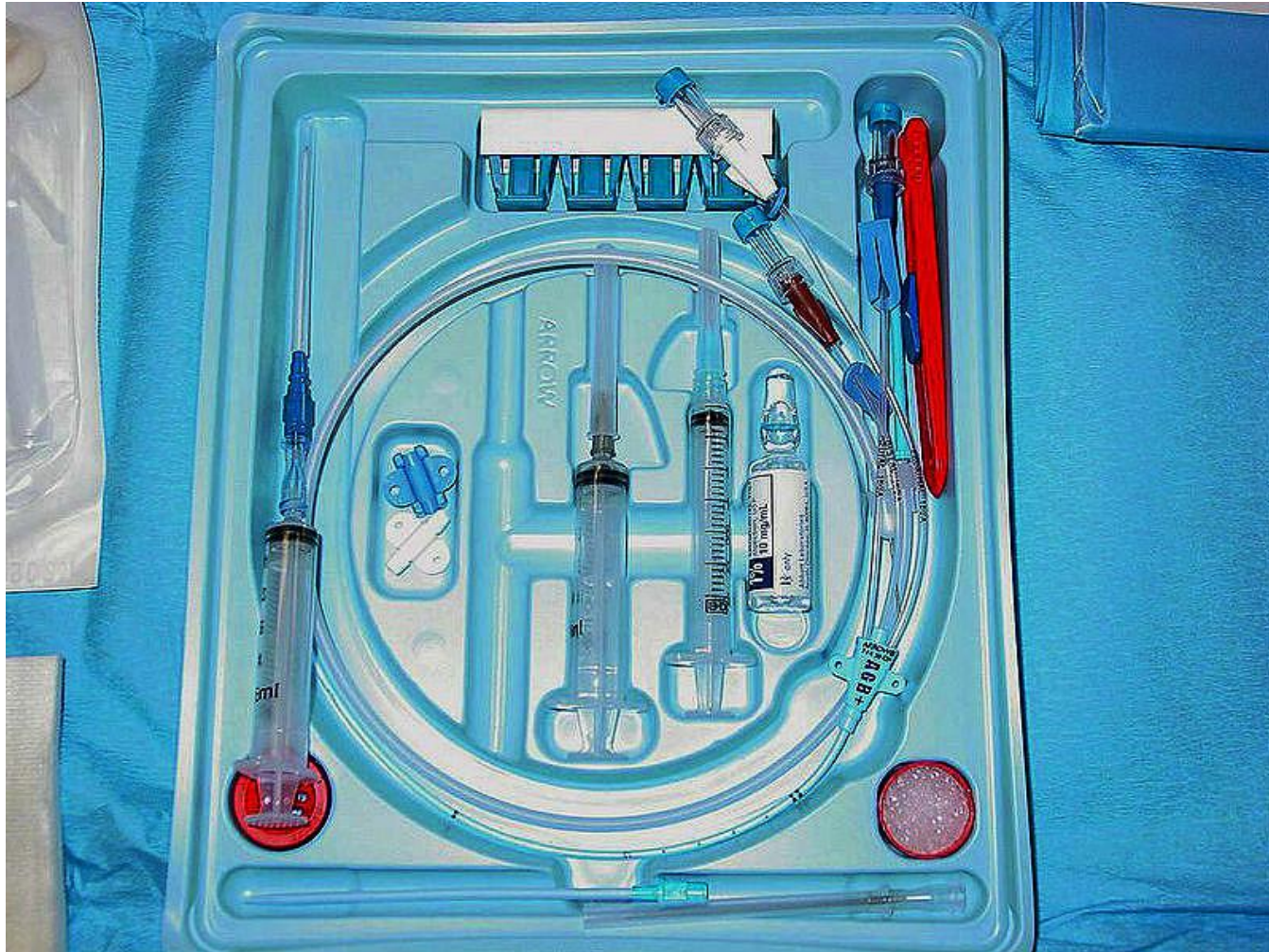
Needle entering IJ







CATHETERIZATION KITS



REFERENCES

- *Clinical Procedures in Emergency Medicine*, Roberts and Hedges, 4th edition
- *Clinician's Pocket Reference*, Leonard Gomella, 8th edition
- *Atlas of Human Anatomy*, Frank Netter, 2nd edition