Central Venous Catheterization

Fb/Nurse-Info

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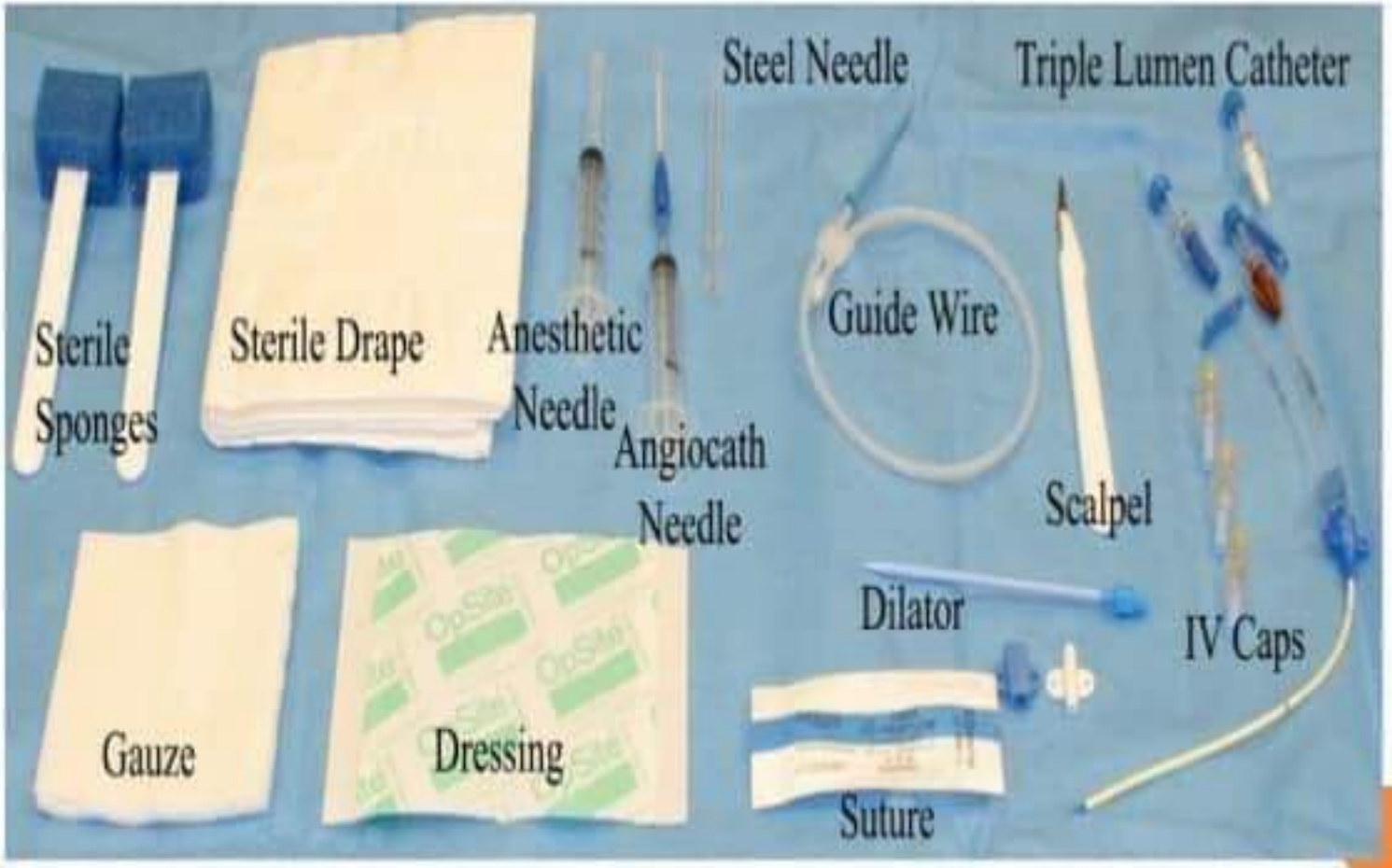
CONTENTS OF THE TRIPLE LUMEN CENTRAL LINE KIT.



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

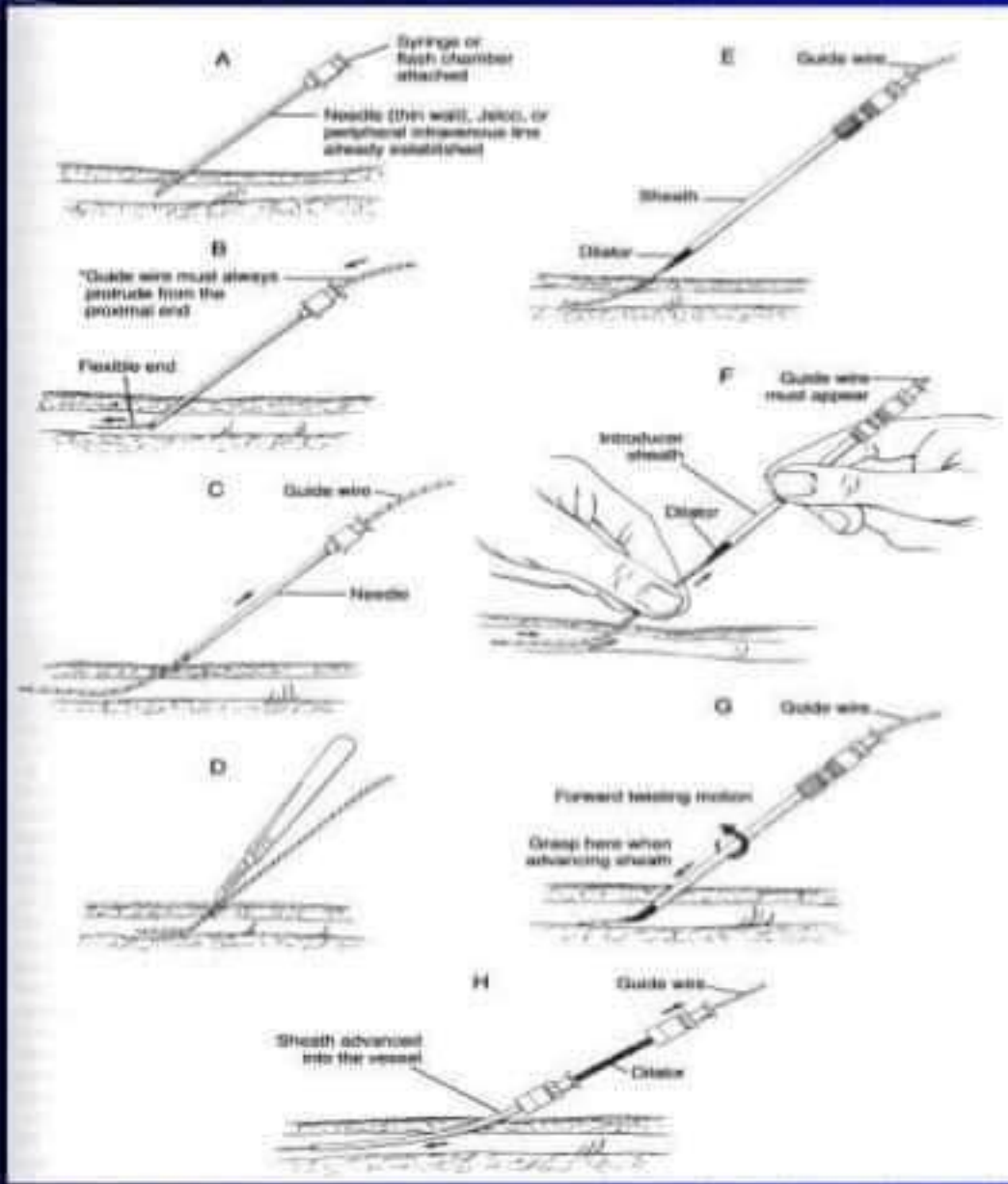
- Bleeding disorders
- Anticoagulation or thrombolytic therapy
- Combative patients
- Distorted local anatomy
- Cellulitis, burns, severe dermatitis at site
- Vasculitis

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

- Seldinger technique
  - Use introducing needle to locate vein
  - Wire is threaded through the needle
  - Needle is removed
  - Skin and vessel are dilated
  - Catheter is placed over the wire
  - Wire is removed
  - Catheter is secured in place


A
Syringe or flash chamber attached
Needle (thin wall, Jelco, or peripheral intravenous line already established)
B
*Guide wire must always protrude from the proximal end
Flexible end
C
Guide wire
Needle
D
E
Guide wire
Sheath
Dilator
F
Guide wire must appear
Introducer sheath
Dilator
G
Guide wire
Forward twisting motion
Grasp here when advancing sheath
H
Guide wire
Sheath advanced into the vessel
Dilator

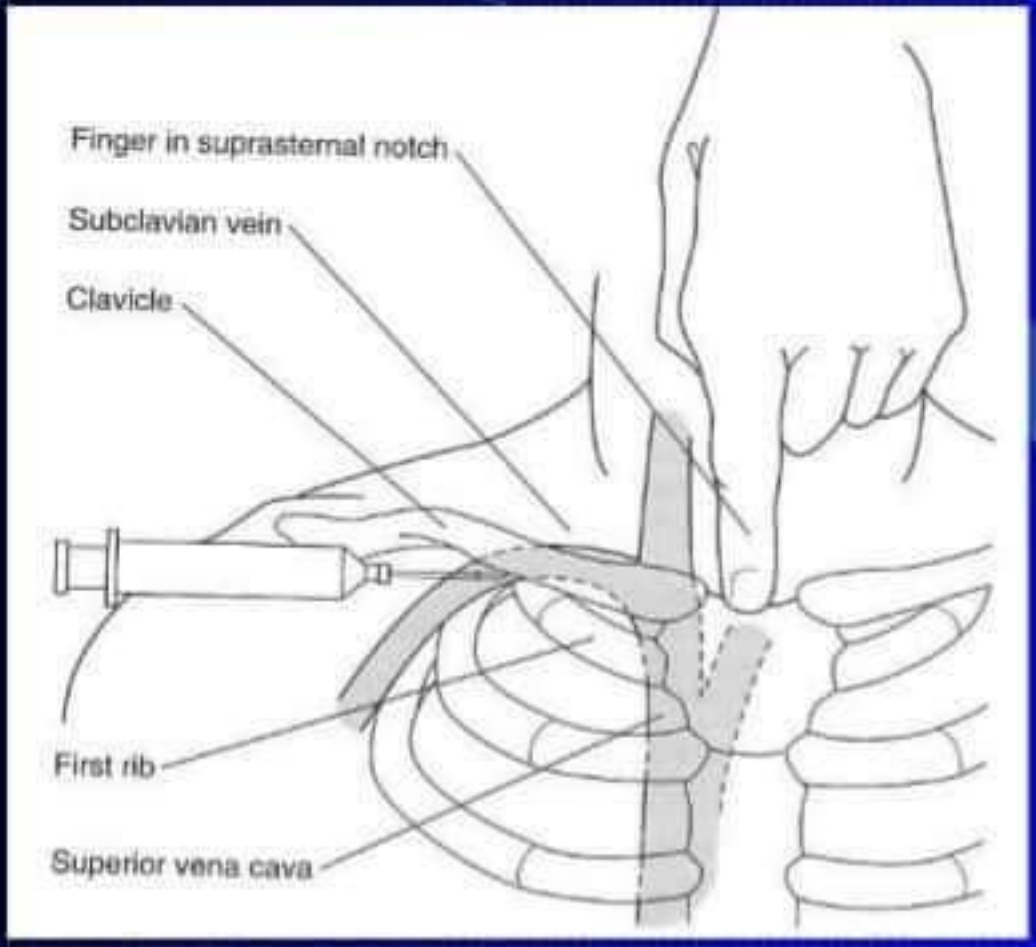
Basic Principles

- 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	• Bleeding can be recognized and controlled • Malposition is rare • Less risk of pneumothorax	• Risk of carotid artery puncture • PTX possible
Femoral	• Easy to find vein • No risk of pneumothorax • Preferred site for emergencies and CPR • Fewer bad complications	• Highest risk of infection • Risk of DVT • Not good for ambulatory patients
Subclavian	• Most comfortable for conscious patients	• Highest risk of PTX, should not do on intubated pts • Should not be done if < 2 years • Vein is non-compressible

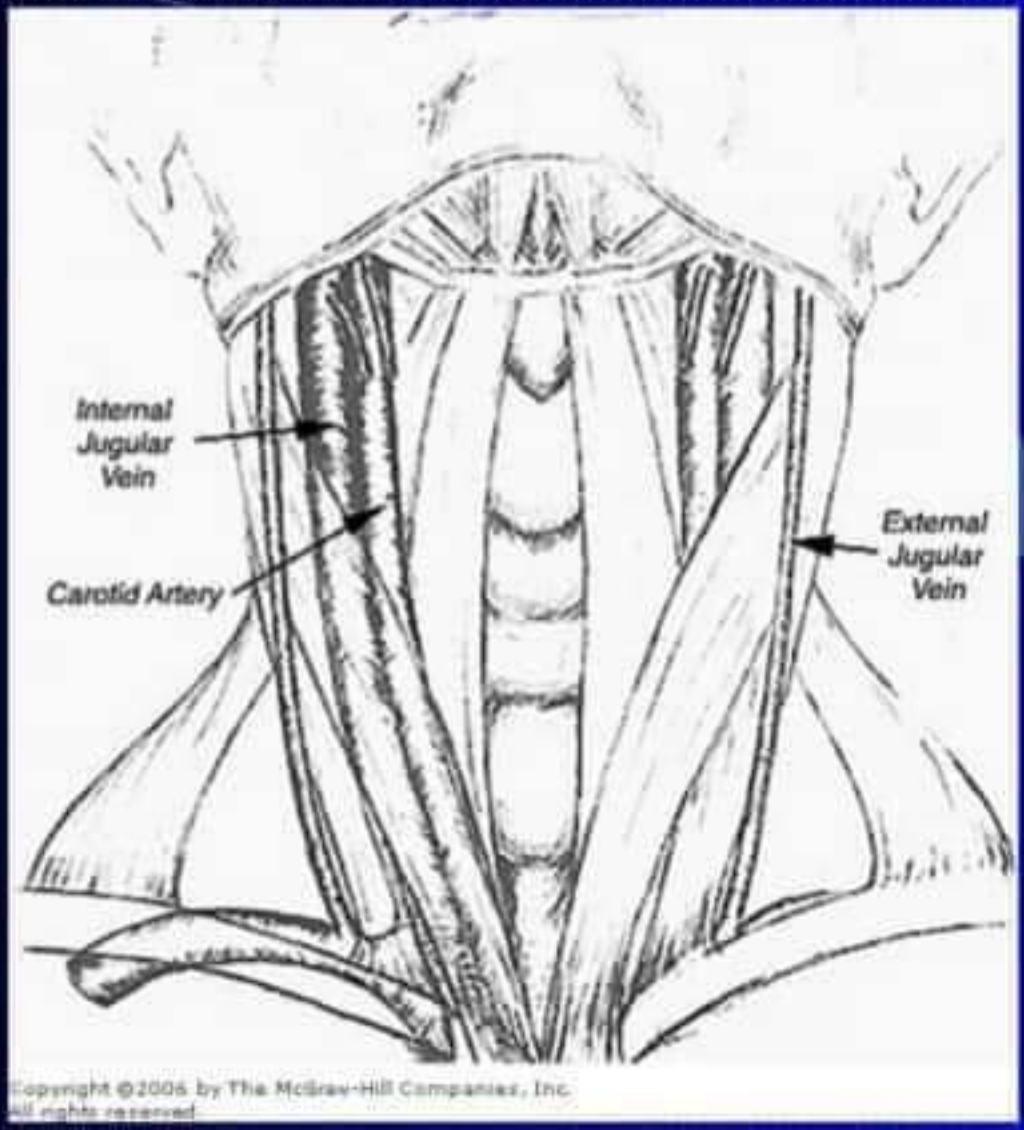
Subclavian Approach

- Positioning
  - Right side preferred
  - Supine position, head neutral, arm abducted
  - Trendelenburg (10-15 degrees)
  - Shoulders neutral with mild retraction
  - Right side preferred
- 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


Finger in suprasternal notch
Subclavian vein
Clavicle
First rib
Superior vena cava

Internal Jugular Approach

- Positioning
  - Right side preferred
  - Trendelenburg position
  - Head turned slightly away from side of venipuncture
- 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



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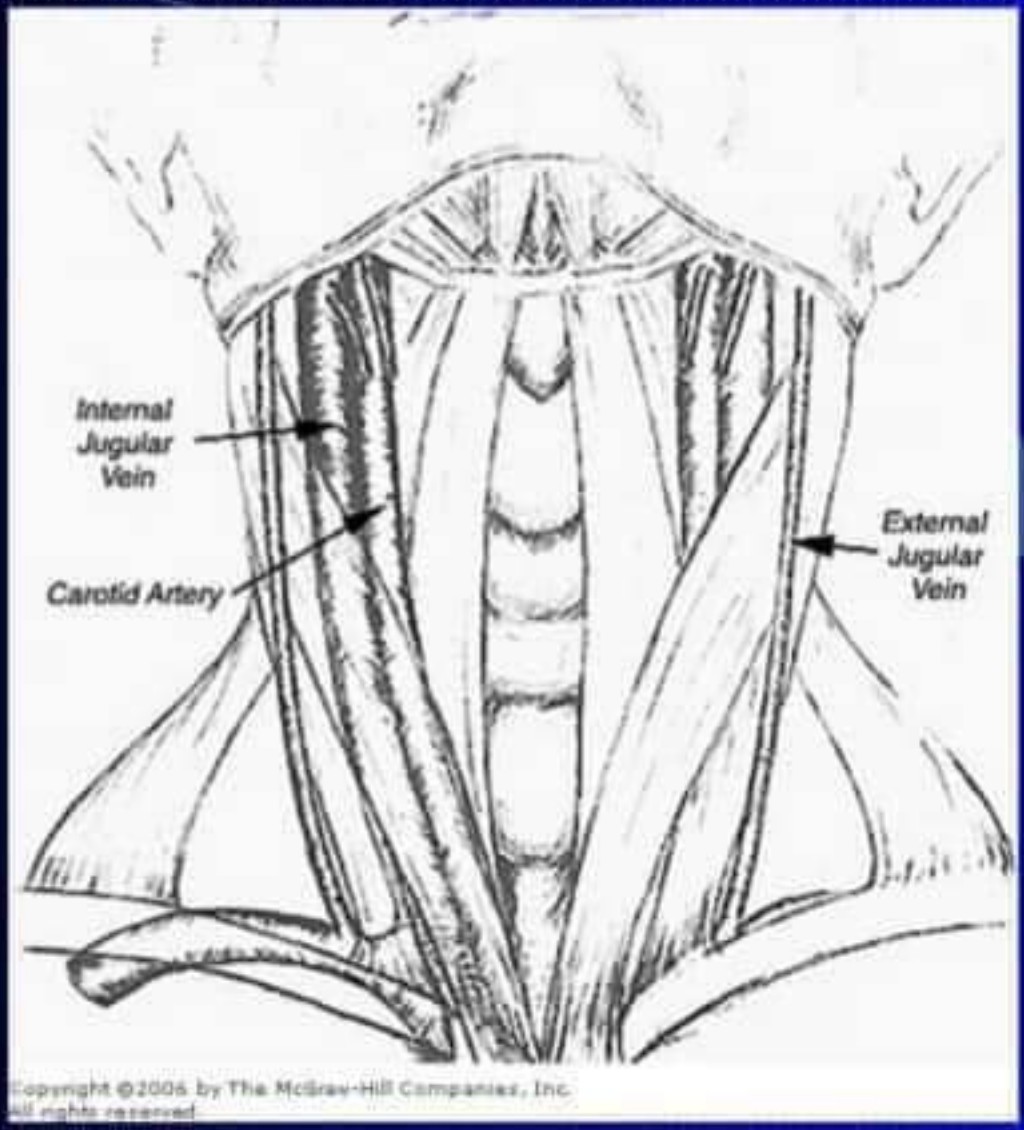
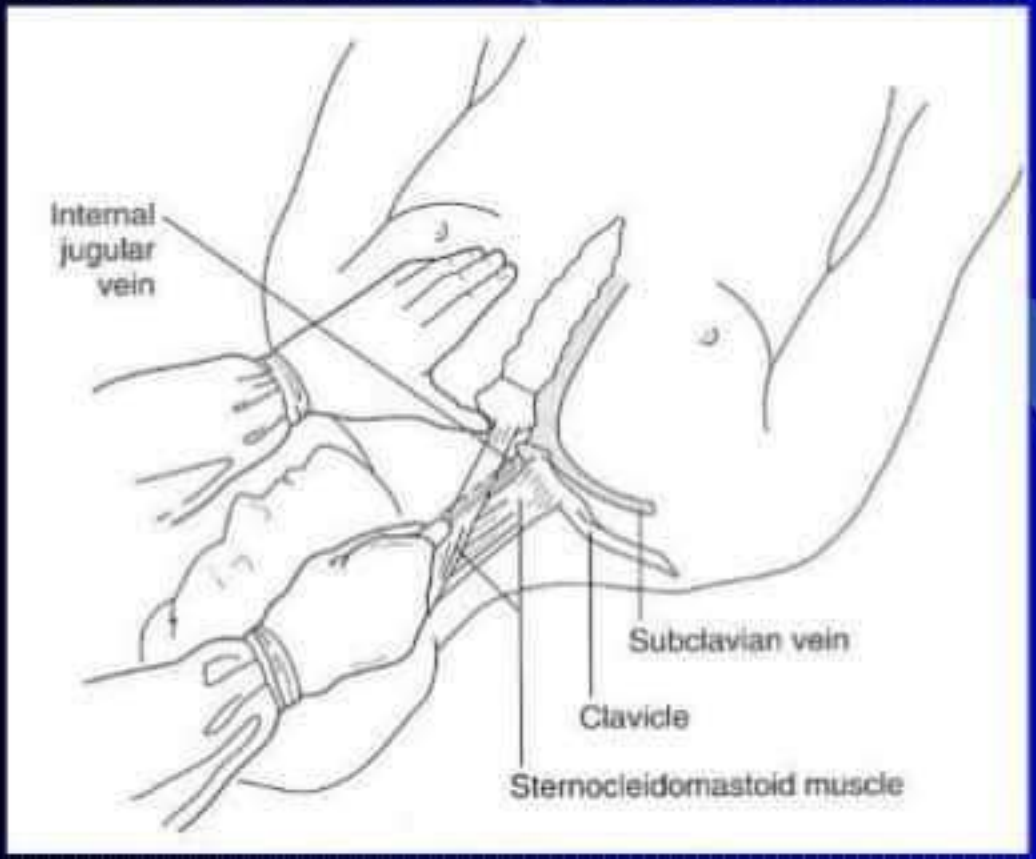


Internal Jugular Central Approach



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

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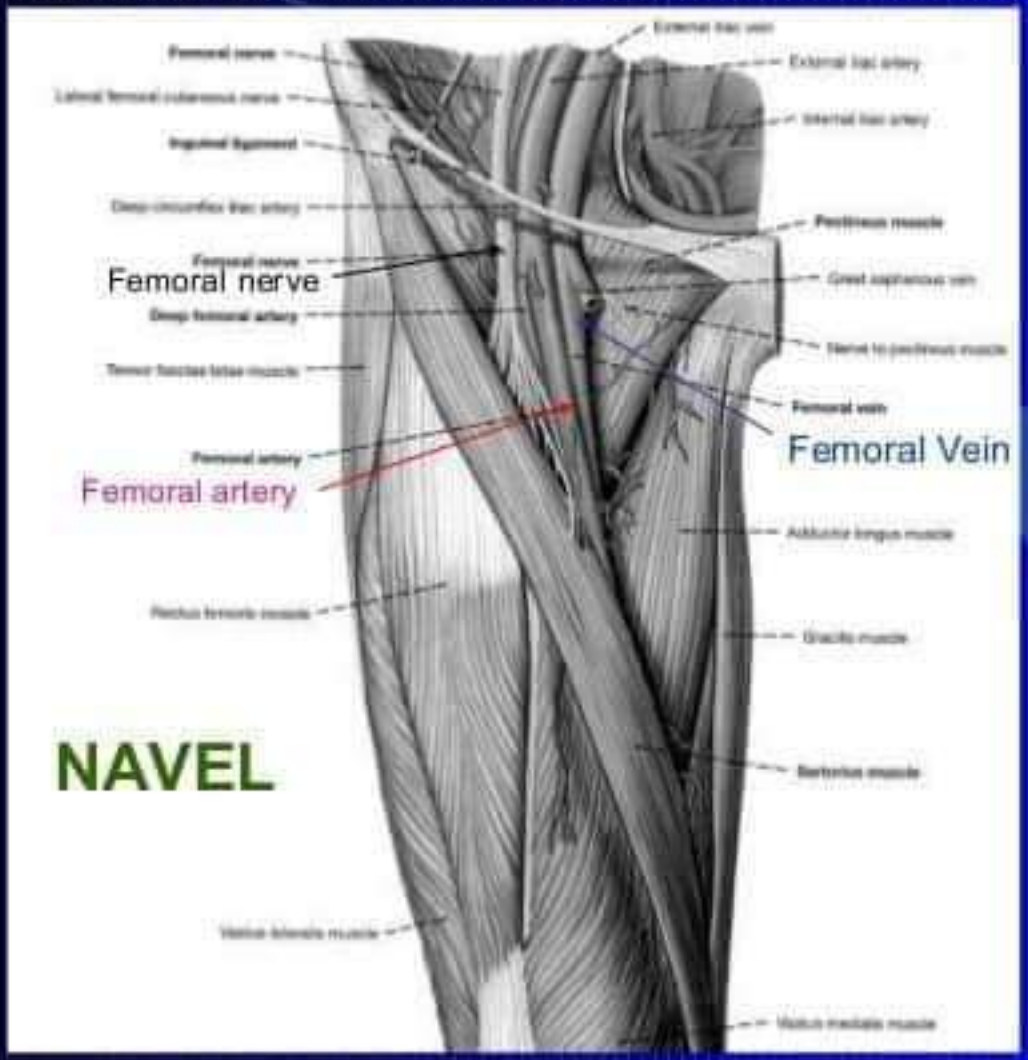
Femoral nerve
Femoral nerve
Femoral artery
Femoral Vein
NAVEL

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

Tips

- After 3-4 tries, let someone else try
- Get chest x-ray after unsuccessful attempt
- If attempt at one site fails, try new site on same side to avoid bilateral complications
- Halt positive pressure ventilation as the needle penetrates the chest wall in subclavian approach
- If you meet resistance while inserting the guide wire, withdraw slightly and rotate the wire and re-advance
- Align the bevel with the syringe markings
- Use the vein on the same side as the pneumothorax
- Withdraw slowly, you will often hit the vein on the way out

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