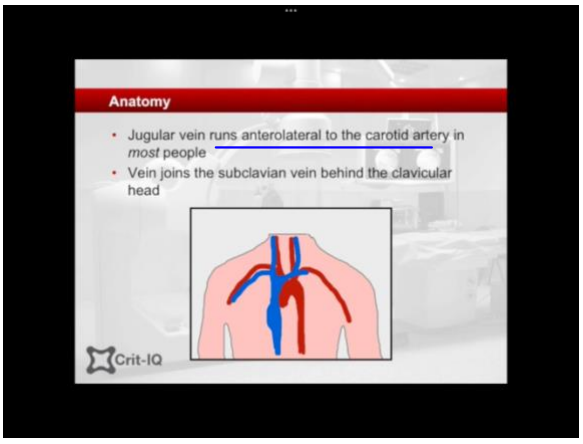
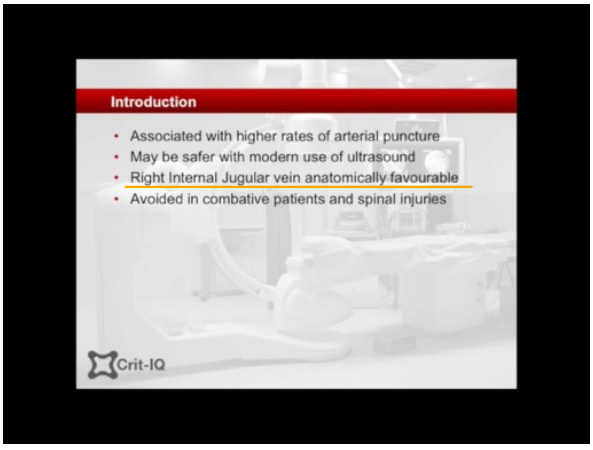
(له ما بين أيدينا وما خلفنا وما بين ذلك وما كان ربك نسيا)

central venous catheterisation

Introduction and Rationale

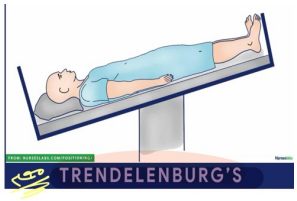
The video introduces the **internal jugular approach to central venous catheterisation**. Historically, this method carried a higher risk of **arterial puncture**, but the widespread use of **ultrasound guidance** has greatly reduced such complications. The **right internal jugular vein** provides a straight anatomical route to the **superior vena cava**, making it an ideal access site for **renal replacement therapy** and **temporary pacing wire insertion**





Patient Positioning and Anatomical Considerations

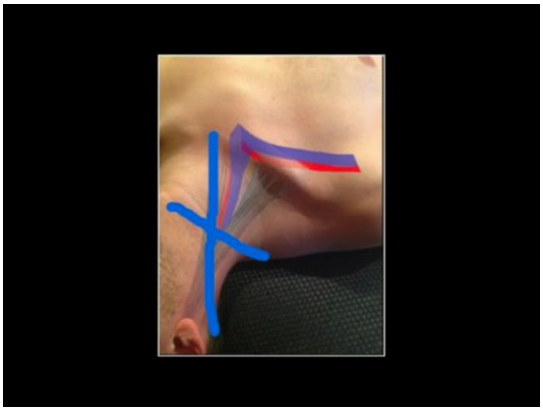
This approach should be avoided in **combative patients(عدواني ،لا يتعاون مع الطبيب)** or those with **neck trauma**. The ideal patient position is **head down (Trendelenburg) at ≥15°**, with the head turned slightly away from the side of insertion. With ultrasound, insertion can often be achieved with the head in the midline.

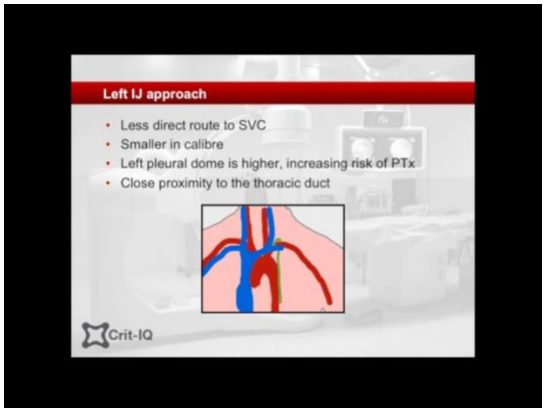


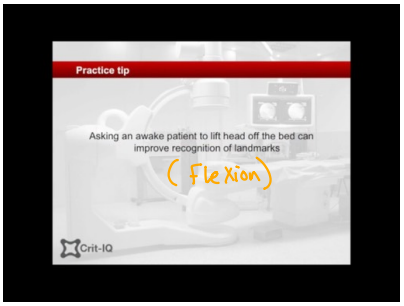
Anatomically, the **internal jugular vein (IJV)** runs in the **carotid sheath** alongside the **carotid artery** and **vagus nerve**. It usually lies **anterolateral to the carotid artery**, passes behind the **sternocleidomastoid (SCM) muscle**, and emerges between its sternal and clavicular heads. It then unites with the **subclavian vein** to form the **brachiocephalic vein**.

The **left IJV** is less favorable: it has a less direct route to the superior vena cava, is usually smaller, sits above a higher pleural dome, and is close to the **thoracic duct**, which increases the risk of duct injury. For these reasons, the **right side is generally preferred**.

Key surface landmarks include the two heads of the SCM and the carotid artery. Traditionally, two imaginary lines (sternal notch–mastoid process and lateral from thyroid cartilage) intersect at the carotid location. Before ultrasound, clinicians relied on expected anatomy, but many anatomical variations exist. **Ultrasound guidance** has improved **speed, accuracy, and safety**, becoming the **standard of care**.





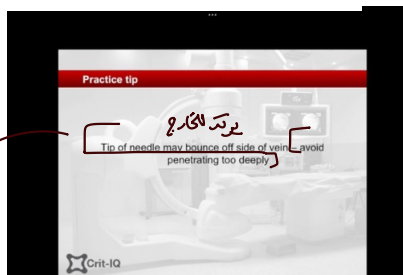


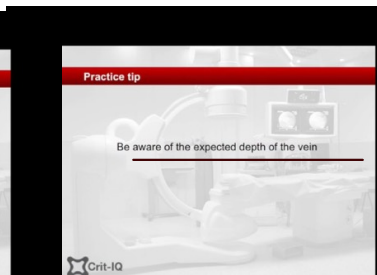
Practical steps before insertion:

- Use ultrasound to confirm anatomy, insertion point, and depth.
- Apply **local anesthesia** to skin and suture area.
- Insert the needle at a **~40° angle** under ultrasound guidance, visualizing the **needle tip** rather than the shaft. (That will prevent pentration for deep structures & the transfixion of the vein)
- A slight "give" is felt when entering the vein, with **free venous blood aspiration** confirming entry.

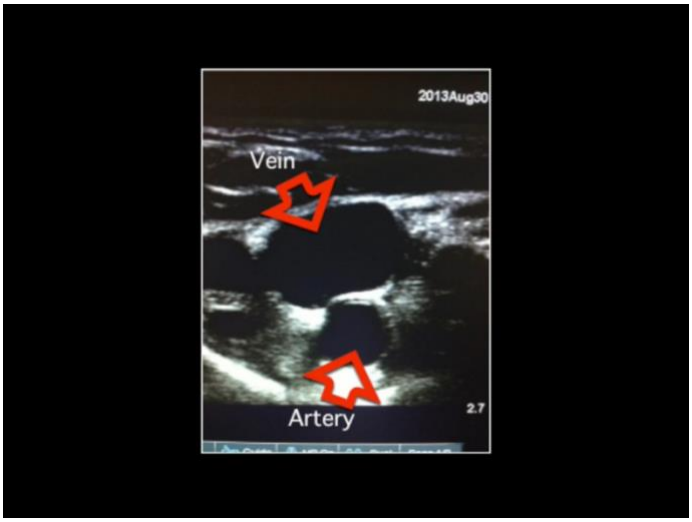
(تشعر بالانزلاق بالوريد)

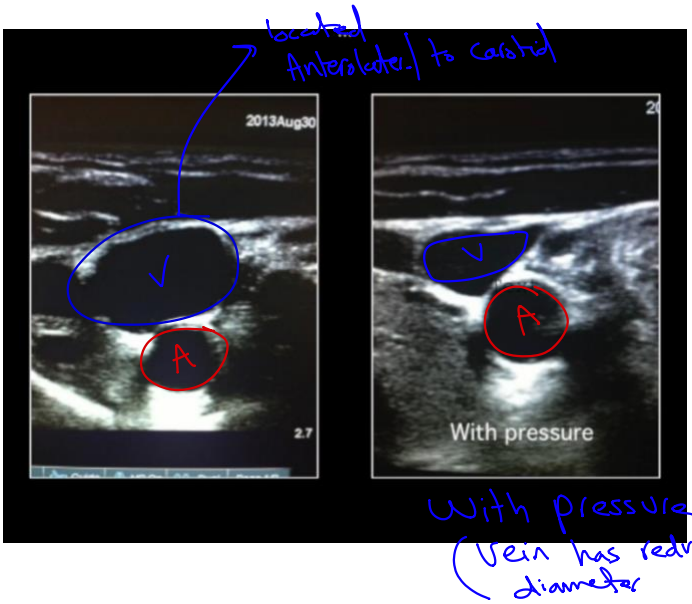
(ظهور الدم بالـ flashback chamber)





لا تدفع الإبرة بعمق شديد؛ إذا شعرت بمقاومة، أعد توجيه الإبرة بلطف بدلاً من زيادة القوة.





Vein is more compressible than the artery

Wire Insertion, Catheter Placement, and Risks

Once venous blood aspiration is confirmed, a **guidewire** is threaded. If resistance occurs, withdraw and confirm blood flow; recheck with ultrasound to ensure correct placement. If the needle has exited the vein, remove it, apply gauze pressure for 3–5 minutes to prevent **hematoma**, and retry. Persistent failure may suggest **stenosis, thrombosis, or complications**, requiring assistance.

When the wire passes easily, confirm placement with ultrasound, then proceed with **dilation** and catheter insertion. Recommended catheter depth:

- **Right IJV:** 12–15 cm (adult)
- **Left IJV:** 14–18 cm (adult)

Finally, aspirate and flush lumens, secure and cover the line, and document the procedure.

Advantages of IJV approach:

- High **success and safety** with ultrasound.

Limitations and risks:

- Carotid artery injury
- Air embolism
- Injury to neck/chest structures
- Catheter malposition

- Higher infection risk, especially with **tracheostomy secretions** or **prolonged cannulation**

Despite limitations, the internal jugular route remains a **safe, teachable, and valuable option**, particularly in emergencies. (ICU)

لا تنسونا من صالح الدعاء 🌈🌸🌸

Arterial line video

Introduction and Indications

This video demonstrates radial arterial line placement using two methods: the **over-the-wire** technique and the **over-the-needle** technique. Arterial lines are indicated for **continuous arterial pressure monitoring** and **direct arterial blood sampling**.

Palpation and Perfusion Check

The **radial pulse** is palpated between the distal radius and the flexor carpi radialis tendon. Before placement, **extremity perfusion** should be checked. For radial catheters, an **Allen test** or modified Allen test may be performed.

Allen Test Procedure

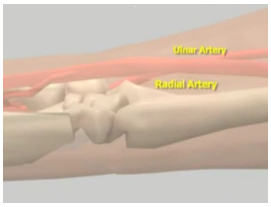
Although its accuracy is debated, the Allen test provides a **qualitative assessment** of collateral circulation. The operator compresses both radial and ulnar arteries while the patient clenches a fist. The hand is then opened, and the ulnar artery is released.

Interpreting the Test and Contraindications

Circulation should return within **5 seconds**; delayed return suggests poor collateral flow. The test can be repeated for radial circulation. **Contraindications** include coagulopathy, advanced atherosclerosis, Raynaud's phenomenon, and thromboangiitis obliterans.

Equipment and Wrist Positioning

Required equipment includes sterile prep materials, a catheter/needle/wire, **1% lidocaine**, a 25-gauge needle with 1 cc syringe, a larger needle or scalpel, sutures with needle driver, and a wrist board/roll. Positioning the wrist in **dorsiflexion**brings the radial artery closer to the skin.



Securing Position and Sterile Prep

Position is maintained with gauze rolls or a dedicated arm board secured with tape. Once positioned, the area is **sterilely prepared and draped**.

Infection Control and Local Anesthesia

Meticulous sterile technique is essential to prevent infection. In conscious patients, a **small wheal of lidocaine** may be injected to minimize pain.

Over-the-Wire Technique: Initial Steps

Check that the catheter glides smoothly. Insert the assembly at a **30–45° angle** toward the artery. When blood return is seen, advance the catheter into the vessel and withdraw the needle.

Wire Insertion

Withdraw the catheter until **pulsatile blood flow** is observed, then advance the wire into the vessel. Once the wire is in place, advance the catheter over it.

Completing Over-the-Wire and Starting Over-the-Needle

Apply distal pressure on the artery, remove the wire, and connect the catheter to the **transducer system**. In the **over-the-needle technique**, advance an angiocath(needle with catheter)

at 30–45°. After blood return, advance the needle slightly further to ensure vessel entry.

Advancing the Catheter

Lower the angle to **10–15°** and advance the catheter into the vessel. Apply proximal pressure, remove the needle, and connect the catheter to the transducer. Care is needed to maintain catheter position.

Securing the Catheter

Although adhesive tape can be used, the most reliable method is **suturing** with non-absorbable material (silk or nylon). Multiple suturing techniques exist..

Dressing and Rechecking Perfusion

Apply a **clear dressing** for added security. After connecting to the transducer, **recheck extremity perfusion**.

Monitoring and Common Problems

Perfusion should be checked periodically while the line is in place. A common issue in over-the-needle technique is **lack of blood return**; in this case, the over-the-wire method may be used.

Difficulty Passing the Catheter

Sometimes free blood flow is seen, but the catheter won't advance because the needle is inside the vessel while the catheter remains outside. (Solution)——> Advancing the needle slightly further after the flash can allow proper cannulation.

Additional Obstacles

The catheter may catch on the skin; this can be prevented by making a **small skin nick(شق)** with a scalpel (مشرط صغير)or large-bore needle. Multiple failed attempts may cause **arterial spasm**, requiring a new site.

Conclusion

By following these steps, **radial arterial catheterization** can be performed **safely and effectively** for continuous monitoring and blood sampling.(indications)