

## Cutdown for Venous Access

Monica Bianca Balictar and Ariel Santos

### Introduction:

Secure venous access is crucial in the management of any adult or pediatric patient, as a means for administering fluids and medications, parenteral nutrition, and physiologic, hematologic and biochemical monitoring. While percutaneous insertions under sonographic guidance are preferred as the simplest and least invasive method of access, there are some situations in which an open approach using venous cutdowns may be the only feasible option for vascular access. These include scenarios in which patients are being managed in under-resourced areas, where peripherally-inserted catheters or ultrasound machines may be unavailable; or when multiple attempts at percutaneous or intraosseous insertion have failed.

Umbilical access is preferred for the newborn, if possible. Venous cutdowns can be performed on the following sites, for long-term access:

#### For adults and older children:

- Cephalic or Basilic vein
- Femoral vein
- Saphenous vein

#### For infants and younger children:

- Internal jugular vein
- External jugular vein
- [Femoral vein](#)

The following materials will be needed for the procedure:

- Personal protective equipment; gown, mask and eye protection
- Chlorhexidine solution
- Syringe with Lidocaine HCl 1%
- 10cc syringe with sterile saline
- Surgical scalpel blade 15
- Silk/Vicryl 4-0 strands
- Silk/Vicryl 4-0 atraumatic suture
- Central line catheter or 5 French sterile feeding tube
- Sterile gauze
- Sterile drapes
- Transparent adhesive dressing (antimicrobial dressing if available).

- Sterile needle holder, curved fine-tipped forceps (like Mosquito), sharp Iris or Mayo scissors, and Senn retractors



*Materials and equipment for venous cutdown.*

A brief overview of the essential steps for internal jugular vein cutdown is listed below:

- Make a short incision and dissect through the muscle.
- Identify and isolate the internal jugular vein.
- Apply circumferential proximal and distal sutures and ligate the distal (cranial) aspect of the vein.
- Perform venotomy and insert the cannula.
- Anchor the cannula with a proximal suture
- Close the wound, anchor the distal aspect of the cannula, and apply a sterile dressing.

### Steps:

1. It is crucial to obtain a history of previous central line insertion, to aid in the choice of site for catheter placement. Clotting studies may be considered in the context of a history or symptoms and signs of any bleeding disorders.
2. Venous cutdowns, regardless of site, are preferably done under moderate sedation with local anesthesia. For very small or premature infants, sedation is not needed and the child can be calmed by being allowed to suck on a gloved finger dipped in dextrose.
3. Place the patient in supine position, with the head turned about 30 degrees to the contralateral side. A soft linen pad placed underneath the upper torso, specifically under the scapula, allows for better exposure by hyperextending and elevating the neck.

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*Patient positioned supine, with the head turned to the contralateral side.*



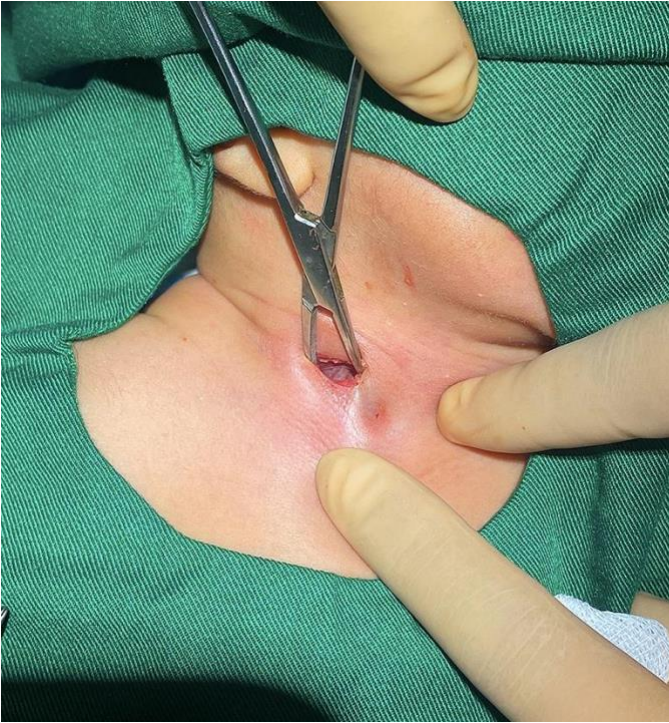
*Infiltration of local anesthesia into the planned incision site.*

4. Thoroughly prepare the skin with chlorhexidine antiseptic, from the ipsilateral jawline down to the upper chest. Apply and secure sterile drapes in place, ensuring adequate space in the field for the catheter exit site. The surgeon stands with shoulders relaxed, on the side to be cannulated.
5. Infiltrate local anesthesia into and around the planned incision site. Apply a short transverse incision along a skin crease, 1-2cm above the clavicle, and 1-2cm lateral to the anterior border of the sternocleidomastoid muscle, where the clavicular and sternal heads diverge. Carry this incision down to the subcutaneous tissue, applying gentle pressure for hemostasis.
6. Using careful blunt dissection with fine-tipped (mosquito) clamps, deepen the incision through the platysma fibers, then through the sternocleidomastoid muscle, until the carotid sheath is reached.
7. Insert a small (Senn or Ragnell) retractor to help expose the vascular bundle, consisting of the internal jugular vein laterally and the common carotid artery medially. The ipsilateral vagus nerve may be visualized in between the two vessels.

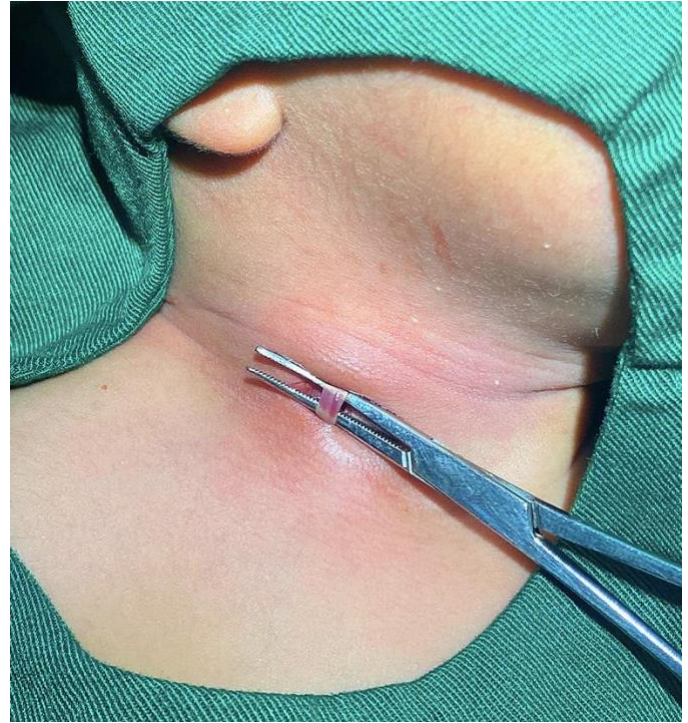


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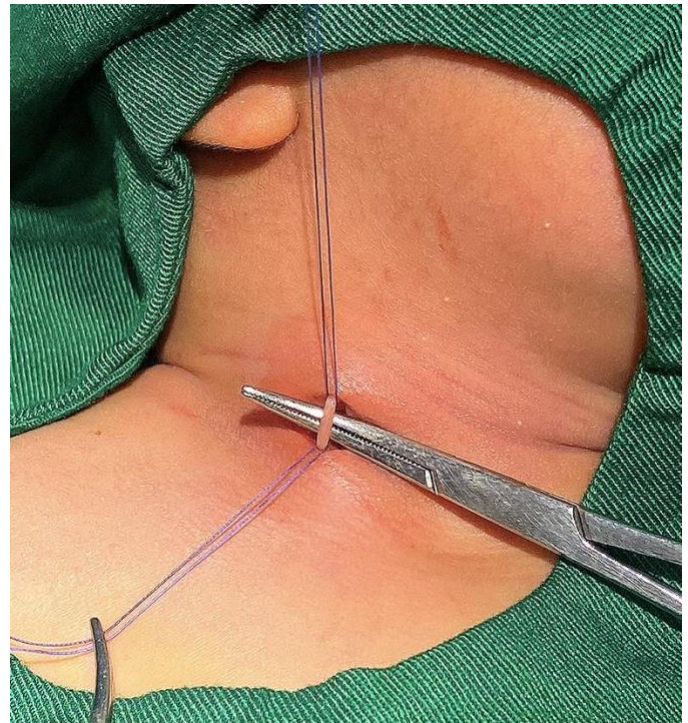


*Identification the internal jugular vein, located adjacent to the carotid artery.*



*Isolation of the internal jugular vein from adjacent structures.*

8. Isolate the internal jugular vein by gently and bluntly dissecting along either side of the vessel, until a clear plane is developed and it is visibly separated from the underlying vascular bundle.
9. Insert a fine-tipped mosquito clamp underneath the vessel to deliver it into the field. Using the clamp, insert two 4-0 Silk or Vicryl ties to serve as gentle retractors for the proximal and distal ends of the vessel.



*Application of proximal and distal sutures onto the isolated internal jugular vein.*

10. Ligate the more cranial, distal suture to prevent further inflow of blood into the vessel. Alternately, to spare the internal jugular vein, a purse-string suture may also be applied along the

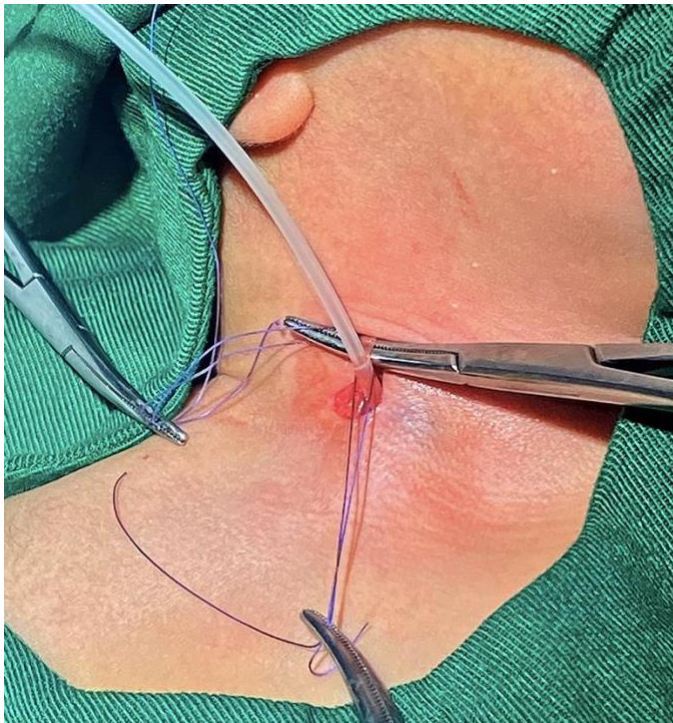


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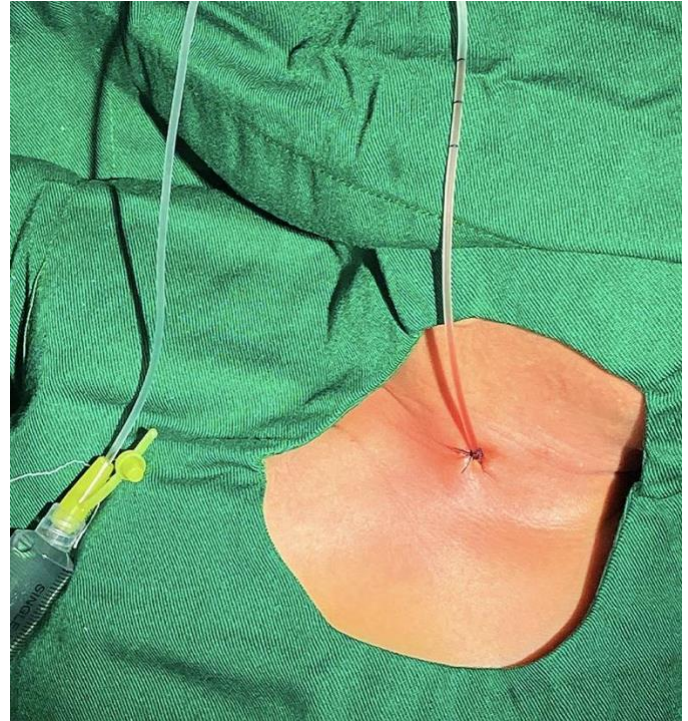
circumference of the vessel using a non-cutting 5-0 Prolene suture to anchor the tube instead of ligation.

11. With a mosquito clamp replaced underneath the vessel, apply a short, clean incision on one side of the vein, enough to accommodate the prepared catheter or feeding tube.
12. Using non-toothed fine (Adson) forceps, gently lift the upper lip of the cut vessel to better expose the vessel lumen. Insert 3-4cm of the catheter into the lumen, or until adequate backflow of blood is encountered to confirm placement. There should also be no resistance or bulging around the insertion site on pushing sterile saline or IV fluids into the catheter.



*Catheter inserted into the internal jugular vein.*

13. Anchor the tube using the proximally-placed suture. Future leaks or loosening of the tube may be prevented by first creating a secure knot, then passing one end of the suture again underneath the vessel, and reinforcing the tube tie with a second knot.
14. Close the wound using an interrupted subdermal approach, with 4-0 Vicryl sutures. An additional interrupted anchoring suture around the tube may be placed to further secure it in place.



*Catheter anchored in place and wound closed. Backflow of blood on gentle aspiration confirms proper placement within the vessel lumen.*

15. Apply a sterile transparent adhesive dressing over the insertion site. To further prevent accidental removal of the tube, secure the more distal parts of the tube with thin strips of adhesive onto the pre- and postauricular skin.





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*Catheter secured with sterile adhesive dressing and reinforced distally with adhesive strips.*

16. If the catheter is inserted for use as a central line, order a subsequent chest radiograph to confirm placement of the tube tip just above the right atrium.

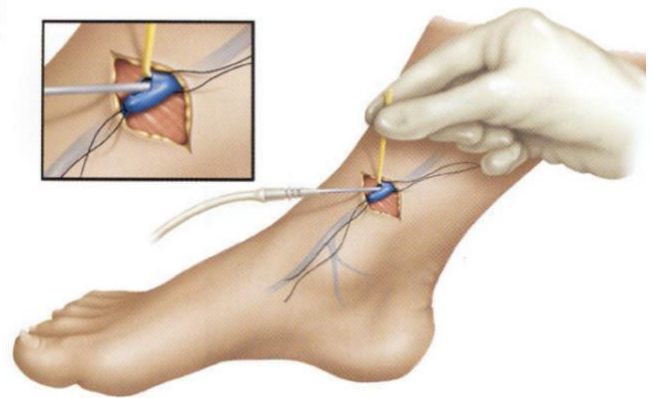
### Variations

The external jugular vein may be used as an alternative branch for vessel cannulation. It is often grossly palpable prior to cutting, located superficial to and obliquely crossing the sternocleidomastoid. While its superficial location allows for more minimal dissection, it is often smaller in caliber.

The same principles apply for great saphenous vein cutdown, by preparing and draping the anteromedial ankle and making a 1.5 to 2 cm transverse incision 1 cm anterior and 1 cm superior to the medial malleolus. Avoid this site in pelvic injury and lower extremity fractures.



*For a great saphenous vein cutdown, make a transverse incision between the extensor hallucis longus tendon and the medial malleolus. In the unconscious patient, grasp the great toe and retract it cranially to demonstrate the tendon. Apply the principles in this chapter to isolate, encircle, ligate and cannulate the vein.*



*After identification and dissection of the great saphenous vein, insertion of the catheter proceeds as described above. Source: Charley Randazzo et al, Venous Cutdown. WikEM, The Global Emergency Medicine Wiki. July 16, 2021. Available at: [https://wikem.org/wiki/Venous\\_cutdown](https://wikem.org/wiki/Venous_cutdown). Accessed 19 February, 2023*

### Pitfalls

- Persistent bleeding may result from inadvertent injury of the external jugular vein, internal jugular vein, or carotid artery. Take great care with handling and isolating vessels, employing surgical magnification as needed, and use blunt, non-toothed forceps to reduce this risk. It is also important to examine the field prior to closure to check for any uncontrolled bleeding and maintain adequate hemostasis at all times.
- As with any open procedure, any breaks in sterility may result in infection of the wound or a catheter-related bloodstream infection. As much as possible, conduct the procedure fully gowned in a sterile environment, and always use proper sterile technique.
- Catheter malfunction may result from blood clots within the lumen, occlusion of the catheter tip via a kink or malposition against the vessel wall or small branch, and/or stenosis of the vein.
- Other technical complications to watch out for include: pneumothorax/hemothorax, vessel injuries resulting in bleeding and hematomas, and air embolism. These may all be avoided with proper site choice, careful identification of the anatomic structures, and gentle handling of vessels and surrounding muscle and soft tissue.
- Plain Lidocaine can be infiltrated with maximum dose of 3 to 4.5 mg/kg.

## **Cutdown for Venous Access**

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- Remove the central line once indication for placement is no longer present.

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