Sheath Introducer (Cordis) – Central Venous Catheterization

INTRODUCTION

Sheath introducers (Cordis) central lines are large-bore catheters (6-8.5 Fr) commonly placed in the ED for rapid infusion of large volumes of crystalloid or colloid, insertion of transvenous pacemakers, and administration of medications that needing reliable central access. Sites of placement are the internal jugular (IJ) vein, subclavian vein and femoral vein. A sheath introducer is generally the catheter of choice in an unstable trauma patient - when paired with a rapid transfuser, it can infuse fluids approximately 25% faster than a peripheral 14 gauge IV. Remember that with a triple lumen catheter, the internal catheters are smaller in gauge and longer than a large-bore peripheral IV and thus slower to infuse fluids. The subclavian vein is commonly used in the trauma patient as it is quick, done by anatomical landmarks, above the level of potential abdominal vascular trauma, and the site is accessible in patients with cervical collars. It has the lowest DVT and infection rate out of any central line. In the medically unstable patient, the femoral vein may be easier to access as the patient undergoes closed chest compressions.

GOALS OF THE PROCEDURE

- Obtain reliable central venous access without complications

INDICATIONS

- High volume resuscitation
- Emergency venous access
- Inability to obtain peripheral access
- Administering medications needing central access (ie vasopressors)
- Insertion of transvenous pacemaker (left subclavian or right IJ)
- Hemodialysis
- CVP or PCWP monitoring (not commonly done in ED)
- Infusion of hyperalimentation and other concentrated solutions

GENERAL CONTRAINDICATIONS

- Infection overlying site of placement
- Distorted local landmarks due to trauma, mass, etc.
- Uncorrected coagulopathy
- Prior vessel injury or procedures
- Pathological conditions (ie SVC syndrome or DVT)
- Uncooperative patient

**CORDIS-SPECIFIC CONSIDERATIONS**
- Need for multiple simultaneous infusions (consider triple-lumen)
- Coagulopathy (consider a compressible site such as the femoral vein)

**COMPLICATIONS:**
- Arterial puncture and hematoma
- Pneumothorax
- Hemothorax
- Vessel injury
- Air embolism
- Cardiac dysrhythmia
- Nerve injury
- Infection
- Thrombosis
- Catheter misplacement

**EQUIPMENT**
- Sterile PPE (sterile gown & gloves, mask, face shield, hair net)
- Sheath Introducer (Cordis) Central Venous Catheter kit
- Extra chloroprep or iodine if field grossly contaminated
- Extra Lidocaine for the skin (if patient awake)
- Tegaderm
- Antibiotic patch
- 1 dead head
- 2 saline flushes (if sterile drop on field, if not sterile squirt into the catheter kit)
- Ultrasound probe cover (if US-guided)

**ANATOMY**
- Please refer to the site-specific overviews

**STEPS**
1. Position the patient supine
2. Open your central line kit, prep the skin with chlorhexidine, and get sterile
3. If you are using ultrasound, place sterile probe cover and then identify
4. Anesthetize the skin making sure to aspirate when you enter the skin to avoid infiltration into the vessel

5. **Assemble your central line kit**
   a. Flush the catheter with saline to ensure patency, then close the clamp
   b. *Place the dilator into the introducer sheath*

6. Insert your needle as you normally would for the site you are accessing
7. Once in the vein and dark venous blood enters the syringe, use your non-dominant hand hold the needle in place while you remove the syringe
8. Use your thumb to cover the needle opening to prevent air from entering, make sure the blood is nonpulsatile, and then advance the guidewire through the needle, it should thread smoothly (never force the wire!)
   a. Advance until at least one quarter of the wire is within the vessel
9. Remove the needle while always maintaining a grip on the guidewire
10. Make a skin incision with the scalpel through the dermis at the wire entry to facilitate dilator and catheter advancement (*be generous as the dilator/introducer assembly is large*)
11. Thread the dilator/introducer assembly over the guidewire and grasp the wire as it exits through the dilator base.
12. Advance the assembly over the wire and into the skin with your
dominant hand while maintaining a firm grasp on the wire with your non-dominant hand

13. Once ready to remove the wire, remove both the wire and the dilator at the same time to prevent air embolism

14. Remove the blue cap and attach an empty syringe. While maintaining gentle negative pressure with the syringe, unclamp the catheter and draw blood back until it enters the syringe. Then re-clamp, attach deadhead, and flush with normal saline.

15. The cordis kit comes with a straight needle and no needle driver
   a. Pass the needle completely through the skin with your hand first, then back the needle through the catheter eye to secure

16. Place the biopatch and tegederm

17. Obtain CXR to confirm placement and evaluate for pneumothorax as indicated

**VIDEO**

- EmCrit video: How to place a sheath introducer (Cordis)
  
  [www.vimeo.com/16555889](http://www.vimeo.com/16555889)

**DEEP DIVE**

**Further Reading**


- Cordis/Sheath Introducer pearls:
  
  - If you are meeting sub-Q resistance but your skin incision is adequate, you can use a gentle twisting motion to help advance the assembly
  
  - To prevent kinking of the wire at the end of the catheter, slide the wire gently forward and backward slightly while advancing the assembly to make sure it can still freely move
  
  - Aside from a hemorrhaging medical patient, a triple lumen catheter is generally more appropriate for a sick medical cases
  
  - If there is any doubt that you may have cannulated an artery, do not dilate
  
  - In a trauma or ROSC situation, if you accidentally cannulate the artery leave the line in place and alert the rest of the team
a. These patients are coagulopathic and the line can be safely removed at a later time