



PHYSICIAN
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ACCESS SITES

- Femoral (vast majority): Right side is preferred, left side is adequate but has greater angulation in the pelvis.
- Internal jugular access is used 1% to 10% of the time due to iliac or distal inferior vena cava thrombus or other contraindication to accessing the femoral vein, such as trauma to the site.

DIAGNOSTIC AND INTERVENTIONAL DEVICES USED

SHEATH SIZES

We currently use 8-F sheaths, ranging from 6-F to 10-F.

FLUSH DIAGNOSTIC CATHETERS FOR VENACAVOGRAM

Many devices now come with their own introducer and sheath that are used for the venacavogram, otherwise a 5-F or 6-F, 55-cm to 80-cm pigtail catheter can be utilized in combination with a 5-F or 6-F short sheath for the diagnostic portion.

DIAGNOSTIC GUIDEWIRES

.035-inch J wire or Bentson wire. Wires 100 cm to 180 cm long are adequate, depending on the working length of the filter delivery system. Note: hydrophilic guidewires may have an increased risk of dissection or perforation, although dissection is less likely within the venous system. Once the wire has been used to accomplish access, it should be exchanged for a different wire with a less-aggressive tip.

CONTRAST

We use nonionic, iso-osmolar contrast solution (20 mL to 40 mL). It may be diluted 50:50 if renal insufficiency exists. Consider gentle preprocedural intravenous hydration with normal saline in patients who have renal insufficiency.

ADDITIONAL EQUIPMENT

Occasionally, a retrievable filter will tilt during placement, making future removal difficult or impossible.

When this happens with the Günther-Tulip filter, use a snare catheter to engage the filter hook and capture the filter for redeployment. The same process can be used to reposition a Recovery filter using the retrieval cone. This may require a different access site for capture and redeployment than was used for initial placement. Another way to straighten a tilted Günther-Tulip filter is to use a Fogarty balloon catheter. Using the same access site as was used for the filter insertion, slide the catheter tip next to the tilted apex and inflate the balloon. This will push the apex of the filter into the center of the vena cava.

VENA CAVA FILTER PLACEMENT

DIAGNOSTIC NOTES

- The diagnostic catheter tip should be placed at the common iliac vein for ideal imaging. A relatively high-volume (30 mL to 40 mL) contrast bolus is usually necessary to adequately visualize the entire inferior vena cava due to its large size and volume capacity. This higher-volume contrast bolus also helps to achieve some retrograde flush through the renal veins and contralateral iliac vein. Pressure settings on the power injector should be set to at least 500 psi to achieve an adequate flow rate, but high pressures should be avoided (usually, not greater than 900 psi). Typical infusion rates are 15 mL/sec for 30 mL, or 20 mL/sec for 40 mL.
- Occasionally, a duplicate inferior vena cava or duplicated venous system may not be visualized via a venacavogram through access from one iliac vein. If this is suspected, a contralateral injection can be performed via the contralateral iliac vein, or a venous duplex ultrasound or CT scan with intravenous contrast may be performed.
- Use extreme caution if an IVC thrombus is suspected or is previously visualized by another imaging modality (venous duplex ultrasound, CT scan, MRI/MRV).
- Side-hole catheters, such as as pigtail catheters, provide better contrast dispersal and reduce the slight risk of perforation or dissection that end-hole catheters may produce. Always check that an end-hole catheter is not flush against a vessel wall. This can be determined by being able to easily withdraw and flush fluid through the catheter.
- A marker tape, marker pigtail catheter, or fixed markers on a catheter are ideal for assisting in the measurement of the vena cava diameter and length.
- Marker tape or external markers tend to introduce some measurement distortion compared with markers on an indwelling, intravenous catheter when measuring the venous diameter.

IMAGING NOTES

- The ideal imaging system incorporates digital subtraction techniques; however, this is not always available. Cine filming may be utilized, but the radiation dose and the amount of contrast required for visualization is greater. Cine filming allows the operator to assess flow of the contrast column and assists in visualizing the often subtle contrast backflow into the renal veins.
- By placing the diagnostic catheter more distally, more anatomy and possible anomalies may be visualized.

FILTER INSERTION NOTES

- Most of the available IVC filters are indicated for use in IVCs with diameters of 28 mm or less. Placing filters in larger-than-indicated vena cava diameters may increase

the risk of misdeployment or filter migration.

- Always try to advance an introducer and sheath or filter over a guidewire to avoid perforation.
- The renal veins should be visualized to safely assess for filter placement, typically below the level of the renal veins, except in rare circumstances. The left renal vein is typically the lowest.

PHARMACEUTICALS

Local anesthesia, usually 1% lidocaine without epinephrine for the puncture site.

TESTS USED

- Check for contrast allergies, standard blood urea nitrogen, and creatinine are usually performed prior to infusion of contrast dye. Check prothrombin time/partial thromboplastin time, and international normalization ratio or coagulation panel if the patient is, or has been recently anticoagulated.
- A venous duplex examination of the lower extremities should be performed before the procedure if deep venous thrombosis is suspected, to avoid mobilizing thrombus within a common femoral or iliac vein.
- After the procedure, there is a small incidence of puncture site deep vein thrombosis and hence, a venous duplex study should be performed, if clinically indicated. ■