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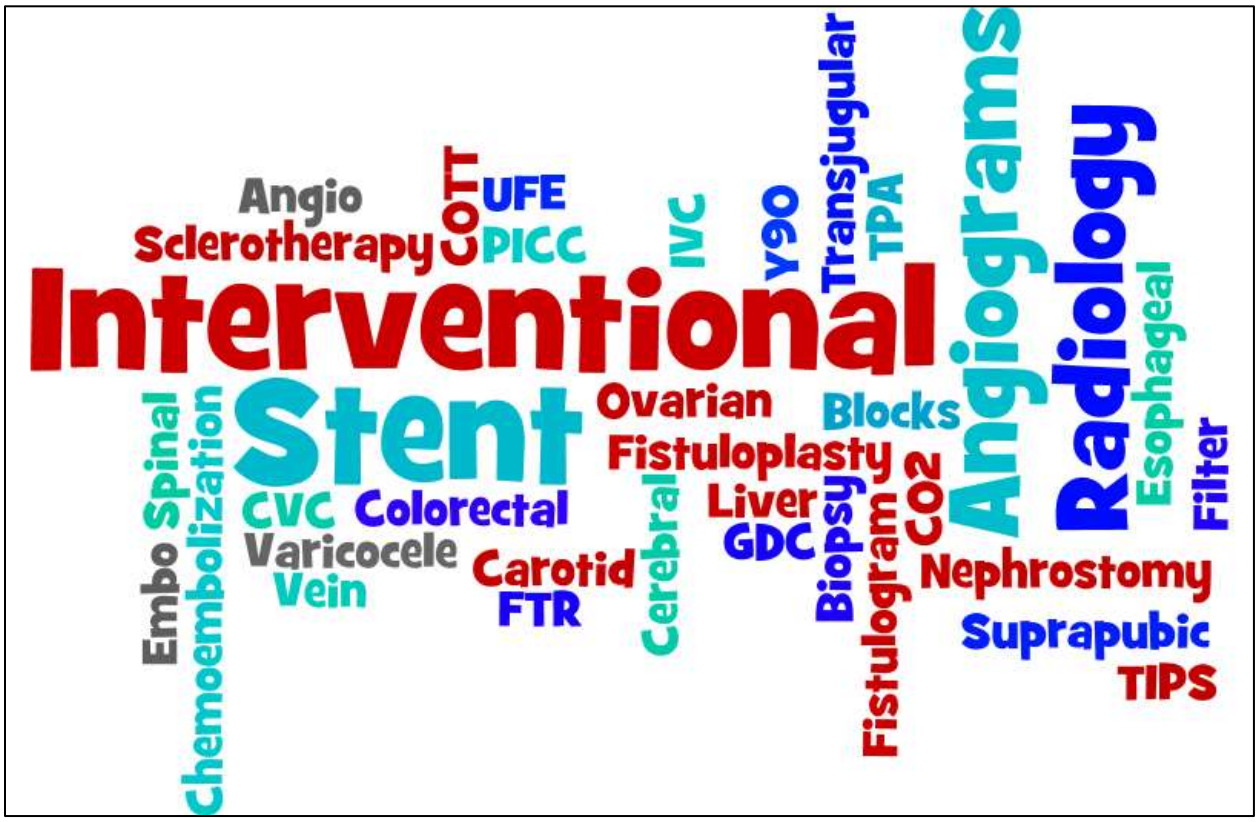
Interventional Radiology Procedure Manual



This IR Procedure Manual is a collection of product & procedure information gathered from vendor resources to be used as an educational document, intended for teaching purposes only and is not to be shared outside LMMI without prior approval.

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Non Tunneled Central Venous Catheters (CVC)

A **non tunneled central venous catheter** is an intravenous that is intended for short term therapy and in emergent situations. They may be placed via the jugular, femoral or subclavian veins.

Indication

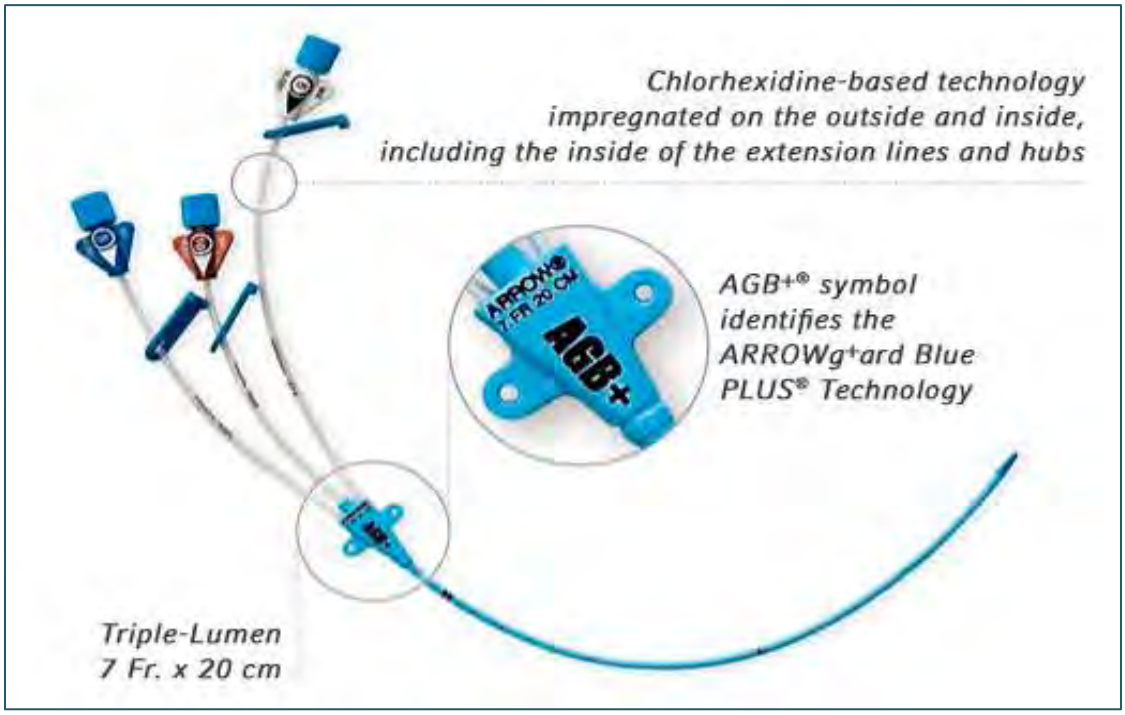
These catheters may be used to administer IV fluids, blood products, nutritional support (TPN), vasoactive (Levophed, Dopamine, etc.), and vesicant (chemotherapy) drugs, perform Hemodialysis or Plasma Exchange, or to monitor hemodynamics (CVP). There are several different styles of catheters, depending on their intended use.

A **standard central venous catheter** is suitable for IV fluids, blood products, TPN, vasoactive and vesicant medications, and CVP monitoring. These catheters have 1-4 lumens.

Standard Triple Lumen CVC with StatSeal

Google Image- Pinterest.com

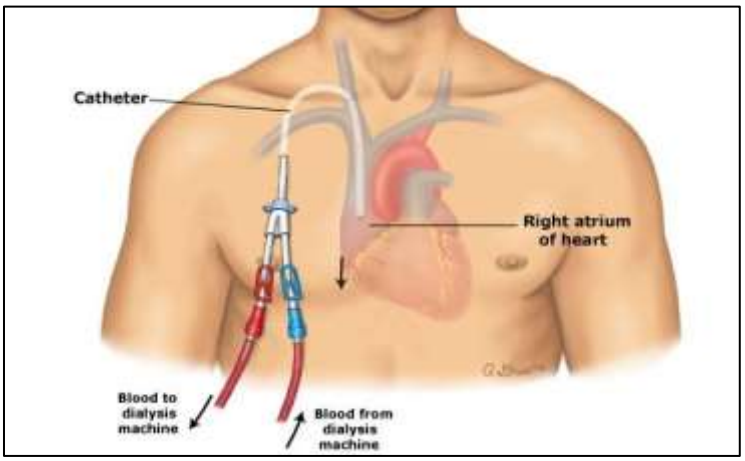
Triple Lumen Catheter



Google Image - Teleflex.com

A **temporary Hemodialysis catheter** placed via the Right Jugular vein. This catheter has 2 lumens for hemodialysis and is a larger French size (12-14 French) than the standard type central venous catheter. This larger size is needed to support the high blood flow rates through the dialysis machine. They come in 15cm, 20cm and 24 cm lengths.

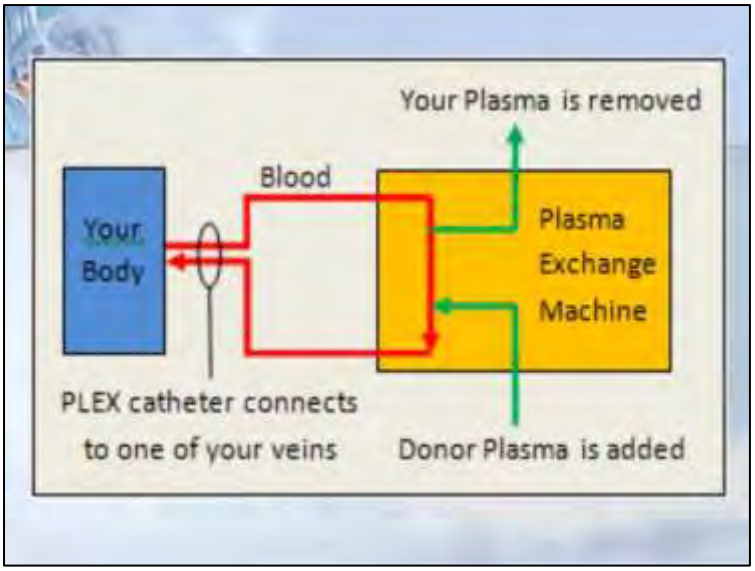
Temporary Hemodialysis Catheter (Niagara)



Google Image – Americanmedicalcoding.com

The **temporary catheter for Plasma Exchange (PLEX)** is identical in appearance to the Hemodialysis catheter above but is a smaller French size (11 Fr). They come in 15cm and 20 cm lengths. Plasma Exchange is done for a variety of medical conditions such as Multiple Sclerosis (MS), Myasthenia Gravis, Thrombotic Thrombocytopenic Purpura (TTP), and Hemolytic Uremic Syndrome (HUS). They may be referred to as PLEX lines or St Paul's catheters.

Plasma Exchange



Google Image - Slideshare.net

Complications

Immediate – air embolism, hematoma, arrhythmia, catheter malposition. Delayed –phlebitis, infection, catheter malposition and breakage.

Nursing Considerations

Pre-Procedure:

- Informed Consent – Standard non tunneled CVC catheters may not require a written consent. Check with your Physician and Hospital Policy.

- Sedation and fasting– not generally required. Usually performed with local anesthetic only. If patient does require sedation, follow the fasting guidelines and ensure adequate transportation home, if applicable.
- Bloodwork – Platelets, INR and PTT
- Identify last dose for all anticoagulants. Are the Management Guidelines for Elective Procedures in Medical Imaging met?
- Shave prep if necessary
- Scrub the insertion site with scrub sponge prior to cleaning with liquid skin disinfectant (Chlorhexidine)

Intra Procedure:

- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation given.
- A combination of ultrasound and fluoroscopy is used for insertion.
- Each lumen of the line must be flushed with saline prior to insertion to prevent an air embolism. Close the clamp on the arterial lumen (red) and leave the clamp on the blue lumen open after flushing. The wire will pass through the blue lumen during insertion. When the wire is removed, the blue clamp should be closed immediately to prevent an air embolism and prevent the backflow of blood.
- The catheter will need to be sutured to prevent dislodgement. (Ethilon 2-0 is common)
- Max Plus caps must be applied to all lumens and clamps must be closed.
- Different types of catheters require different flush solutions.
  1) Standard CVC- normal saline 10ml per lumen
  2) Temporary Hemodialysis Catheter – Sodium Citrate – volume to be injected is printed on each lumen of catheter.
  3) Temporary PLEX catheter – Sodium Citrate – volume to be injected is printed on each lumen of the catheter.
- Tegaderm dressing is usually included in the insertion kit.

Post Procedure:

- Paperwork – Physician to fill out Line Insertion Form and Xray tech to scan to PACS. Nurses notes to be completed and sent to medical records or attached to patient chart for transport to ward.
- Assess site for signs of bleeding and hematoma. Ensure dressing is dry and intact.
- Patient teaching – re: showering and using caution to prevent dislodgement, signs of infection.

Non Tunnelled Catheter Tray Supplies

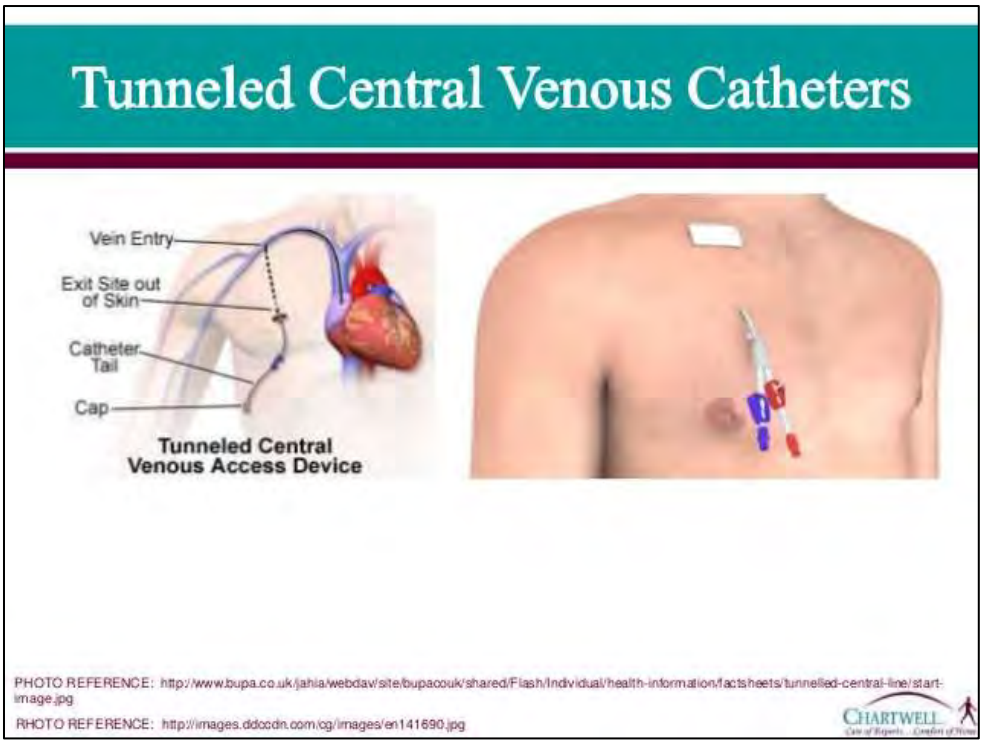
- Small trolley
- Fistulogram Drape Pack
- Kidney Basin/Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack gowns
- 2 packs Radiopaque Gauze
- Ultrasound Probe Cover
- 2 Shower Caps
- 1 Shield Cover
- 2-0 Ethilon suture
- Flush solution (see previous page)
- Amplatz Extra Stiff Straight 145 cm guidewire

  *The prepackaged kits come with Tegaderm dressings that may be used to secure the catheter.

Tunneled Central Venous Catheters and IVADs (Implanted Venous Access Devices)

A **tunneled central venous catheter** is a catheter that is tunneled under the skin and is intended for prolonged therapies. There is a wide array of uses for these catheters and their designs reflect that variety. Common uses of tunneled central venous catheters include hemodialysis, chemotherapy, long term antibiotics, plasmapheresis, TPN, and in patients where no peripheral access is attainable. These catheters commonly have antimicrobial cuffs that help the body to adhere to the line, so sutures can be removed in 7-14 days and the line will remain in place. The cuff should not be exposed outside the skin. If the cuff is visible, the line should be replaced.

Permanent Dialysis Catheter



Google Image - Slideshare.net

Indication

Tunneled catheters are considered when the treatment required will extend past 3 weeks in duration.

Complications

Immediate – air embolism, hematoma, arrhythmia, catheter malposition.
Delayed –phlebitis, infection, catheter malposition and breakage.

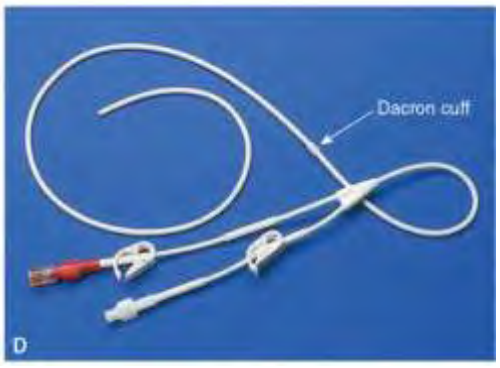
Types of Tunneled Catheters:

1. **Permanent Dialysis (Perm Cath) Catheters**: for long term Hemodialysis. These lines should be used for dialysis only.

2. **Trifusion**: This is used for BMT patients. This line allows for Chemotherapy, blood products and blood work, IV fluids, as well as the ability to perform limited hemodialysis (at a lower flow rate). Some of the BMT patients will shed a lot of their tumour burden with the chemotherapy, and it can overwhelm their kidneys, necessitating periods of dialysis.

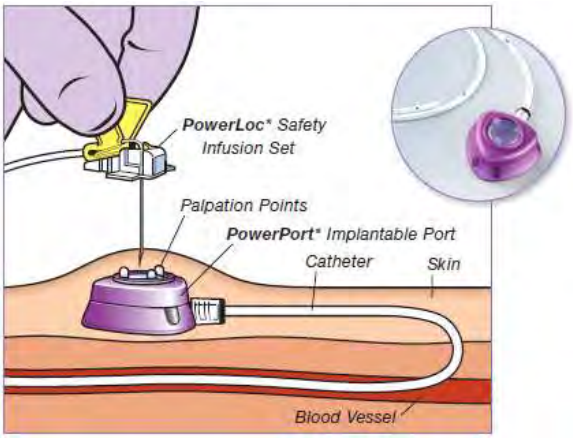
3. **Hickman/Groshong/Powerline**: for chemotherapy or for long term medication administration (antibiotics or Flolan for pulmonary hypertension). May also be used for patients with poor IV access (renal patients).

Hickman Dual Lumen



Google Image - What-when-how.com

4. **Port catheters (Portacath)**: the Port catheter is a tunneled line with a reservoir that is placed under the skin. They are most commonly found in the upper chest, but may also be placed in the upper arm. The Port may be left accessed with a needle insitu or be flushed once a month to maintain patency. Radiology nurses can access Ports.



Google Image - Mercyangiography.co.nz

Nursing Considerations

Pre-Procedure:

- Informed Consent
- Sedation – most patients will require sedation. Are the fasting guidelines met (NPO)? Transportation home with appropriate supervision or going to hospital unit post procedure?
- Bloodwork – Platelets, INR, PTT
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- If patient has had previous central lines, it may be worthwhile to have physician ultrasound the vein prior to draping. The physician can assess the vein to determine if it is still patent and a viable approach. If the vein has thrombosed, an alternative site must be chosen.
- Shave prep
- Scrub the insertion site with scrub sponge prior to cleaning with liquid skin disinfectant (Chlorhexidine)

- IV access will be required for sedation and Antibiotics (Ports).

Intra Procedure:

- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- A combination of ultrasound and fluoroscopy is used.
- Two types of local anesthesia must be drawn up and labelled. Lidocaine 1% for freezing the insertion site, and Lidocaine 1% with Epinephrine to freeze the tunnel. Epinephrine acts as a vasoconstrictor to minimize blood loss.
- Ensure each lumen of the line is flushed with saline prior to insertion to help prevent an air embolism. Close the clamps on the line after flushing.
- Each line should be aspirated and then flushed with saline to ensure adequate blood flow. If resistance, line may need to be repositioned.
- The catheter will need to be sutured to prevent dislodgement. The most common suture is Ethilon 2-0. Only one suture should be placed on the wing of the device. This allows the ward RN to clean under the catheter properly during dressing changes.
- All lumens must have Max Plus cap applied and clamps must be closed.
- Different types of tunneled lines require different flush solutions and assembly.
    1) **Permanent Dialysis (Perm Cath) Catheter** – Sodium Citrate - volume to be injected is printed on each lumen of catheter. The catheters are a fixed length and cannot be trimmed. Cuff should be in the tunnel > 2cm from exit site. Suture permanent wing (x2)
    2) **Hickman** – 100unit/ml Heparin. Each lumen is flushed with 20 ml saline followed by Heparin (100 u/ml) 3 ml per lumen. Trim to length (distal tip). Cuff should be in the tunnel > 2cm from exit site. Roman Sandal suture at exit site.
    3) **Trifusion** – 100 unit/ml Heparin- Each lumen is flushed with 20 ml saline followed by Heparin (100 u/ml) 3 ml per lumen. The

catheters are a fixed length and cannot be trimmed. Cuff should be in the tunnel > 2cm from exit site. Suture permanent wing (x2).

4) **Groshong** – is a tunneled line for renal patients with poor IV access or Home TPN patients and patients requiring Flolan infusions. This is flushed with 20 ml saline. Trim external end of catheter and assemble over sleeve to create catheter hub. Cuff should be in the tunnel > 2cm. Suture the add-on wing (x2). 10-12 cm external length.
5) **Powerline** – is a tunnelled line without a valve. It is used for renal and other patients with difficult IV access. It must be flushed with 20 ml saline followed by 3 ml 100unit/ml heparin. Trim to length. Cuff should be in the tunnel > 2cm. Suture permanent wing (x2).
6) **Port** – most common ports are valved and can be flushed with 20 ml saline. If it is not a valved Port, then it must be flushed with 20 ml saline followed by 5 ml of Heparin 100 unit/ml.
7) Mastisol and Steristrips may be used to close the incision.
8) Mepore or Tegaderm dressings are applied. BMT patients should get Mepore dressings.

Post Procedure:

- All tunneled lines get a post procedure Chest X-ray, to determine the tip placement when the patient is upright.
- Paperwork: physician to fill out IVAD Insertion Record (scanned into PACS by X-ray tech), Chest X-ray requisition and post procedure orders.
- It is essential that the IVAD insertion record is completely filled out. For port insertion patients, the GP and referring physician must be entered. The form is given to the unit clerk to be faxed to the physicians and the referring cancer agency. This ensures appropriate follow-up and line care.
- For port insertion patients: leave port accessed with a Huber needle if chemotherapy is to begin in the next 48 hours.
- Assess insertion sites for bleeding and hematoma. Ensure dressing is dry and intact.

- Patients can usually be discharged after post sedation criteria are met and hemostasis is achieved.

Tunneled Line Tray Supplies (not including Ports) (for IR Doctors only)

- Small trolley
- Angiogram Tray
- Fistulogram Drape Pack
- Kidney Basin/Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs Radiopaque gauze
- Ultrasound Probe Cover
- 1 red 18G needle and 1 blue 25G needle
- Control syringe
- 2 Shower caps
- 1 Shield Cover
- 2-0 Ethilon suture
- Mastisol
- ¼ “Steristrips
- Mepore dressing
- Max plus caps for all non-Dialysis lines
- Lidocaine 1% 10 ml in control syringe
- Lidocaine 1% with Epinephrine 10 ml
  in a control syringe
- Amplatz Extra Stiff Straight 145cm guidewire

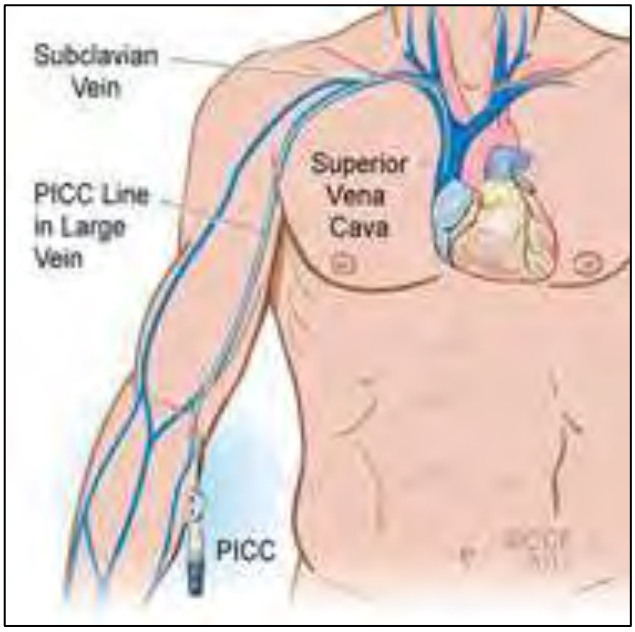
Port Insertion Tray Supplies (for IR Doctors only)

- Small or long trolley
- Angiogram Tray
- Fistulogram Drape Pack
- Kidney Basin/Paint Tray (Sharps Disposal)
- 3 pack sterile gowns
- 2 packs Radiopaque gauze
- Ultrasound Probe Cover
- 1 red 18G needle and 1 blue 25G needle
- Control syringe
- 2 Shower caps
- 1 Shield Cover
- Port instrument set
- Lidocaine 1% 10 ml in a control syringe
- Lidocaine 1% with Epinephrine 10 ml in a control syringe
- 2-0 silk suture (cut off needle, not needed)
- 3-0 PDS suture FS-2
- 4-0 Monocryl suture PS-2
- 8 Fr Airguard Peel-away Sheath
- #15 Blade
- Light handle cover
- Sterile Marking Pen (prn)
- ¼ “Steristrips
- Mastisol
- Mepore dressing
- Amplatz Extra Stiff Straight 145cm guidewire

PICC Catheters- Peripherally Inserted Central Catheters

A **PICC catheter** is a central venous catheter that is used for patients with difficult venous access or that require prolonged treatments. These lines may be placed by specialty trained nurses (Vascular Access Program) or by the IR physician. At VGH, the Vascular Access Program will refer patients that are too difficult to be done without advanced imaging.

PICC Catheter



Google Image - myclevelandclinic.org

PICC catheters are inserted using ultrasound and fluoroscopy. It is helpful to have the IR physician ultrasound the arm prior to draping, to identify the target vein. PICCs are usually single, double, or triple lumen, may be power injectable (PowerPICC). Only PowerPICCs can be used for contrast injection in CT Scan.

Indication

A **PICC** is considered when a patient has poor venous access and /or has planned ongoing intravenous therapy or IV hydration.

- Antibiotics
- Blood Transfusions
- TPN
- Chemotherapy
- Frequent blood draws

A PICC line can be left in from weeks to 12 months or more.

Complications

Immediate – air embolism, hematoma, arrhythmia, catheter malposition.
Delayed –phlebitis, infection, catheter malposition and breakage.

Nursing Considerations

Pre-Procedure:

- Informed Consent - not necessarily needed to have written consent, as these lines are often inserted by nurses (Vascular Access Program). Check with your physician and Hospital Policy
- Sedation – not usually required. If patient does require sedation, follow the Fasting guidelines.
- Bloodwork – Platelets, INR, PTT. May be inserted even if INR >1.5, if patient unable to have IV access any other way.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Confirm number of required lumens prior to opening kit. Kits are provided by the Vascular Access Program. Patients are consulted by

Vascular Access Program prior to referral to IR to ensure appropriate line for each patient.

- Shave prep if necessary

Intra Procedure:

- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- A tourniquet may be loosely placed around arm, prior to draping. The area from just below axilla, on the upper arm, extending to the elbow should be prepped. When the procedure is to start, the tourniquet may be tightened to make accessing the vein easier.
- The PICC insertion kit has a needle and wire included, or a Micro-puncture kit may be used.
- Once the wire is in the vein, the tourniquet should be removed.
- **Groshong, single lumen PICC** –distal valve (internal), trim external length and assemble. Approximately 3cm of catheter visible on the skin is preferred (Statlock may be used). Add wing if > 5cm on skin. Statlock to secure.
- **Groshong, double lumen PICC** – distal valve (internal), fixed 45 and 55 cm length. Add wing if > 5m on skin. Statlock to secure.
- **Bard Solo PICC or Angiodynamics Bioflo PICC** – proximal valve (external hub), trim to length (distal tip). Approximately 3cm of catheter visible on the skin is preferred (Statlock may be used). Add wing if > 5cm on skin. Statlock to secure. After flushing any one lumen, MUST flush all unused lumens. These PICCS are power injectable
- Each lumen should be flushed vigorously with 20 ml Saline.
- Apply Tegaderm dressing
- Avoid the use of sutures.

Post Procedure:

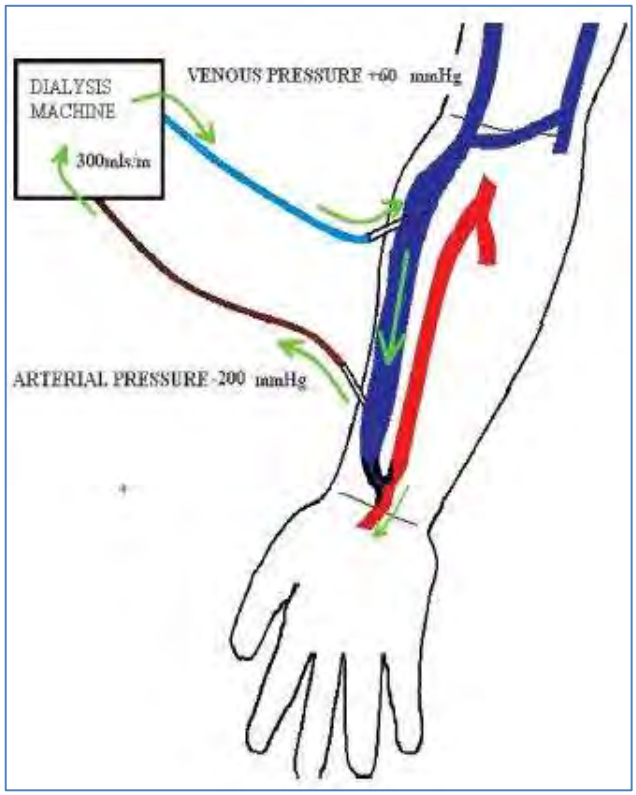
- Paperwork: IR Physician to fill out IVAD Insertion record (X-ray tech scans into PACS).
- Patient to go for chest X-ray following insertion or reposition
- Assess site for bleeding and hematoma, dressing dry and intact.
- Patients can be discharged after hemostasis achieved, if no complications occurred and post sedation criteria are met.

PICC Tray Supplies

- Small trolley
- Angiogram tray
- Fistulogram Drape Pack
- Kidney Basin / Paint Tray (Sharps Disposal)
- Small Instrument Set
- 3 pack Sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 Shield cover
- 2 Shower Caps

Fistulogram +/- Fistuloplasty

A **fistulogram** is a study of a dialysis fistula or graft to determine the anatomy and identify any structural changes. A dialysis fistula or graft is created for patients with chronic kidney failure, who will need long term dialysis. For an AV fistula, an artery and a vein are joined together to produce a large vessel that can handle the needles required for dialysis. AV fistulas and grafts have a large diameter that allows the blood to flow out and back into the body quickly. An AV graft is created by using a synthetic (Goretex) tube to connect the patient's vein to the artery.



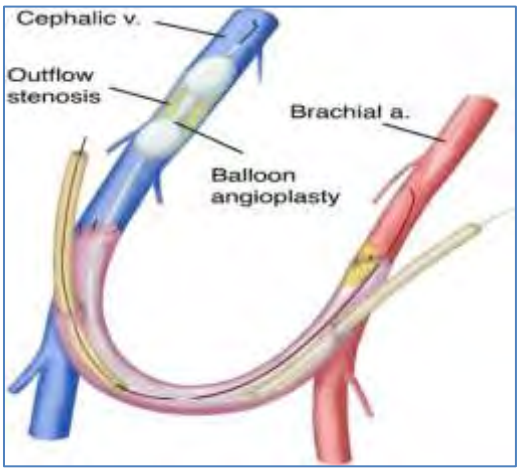
Google Image- Scielo.mec.pt

Indication

Fistulograms are indicated for patients with newly created fistulas that are not easy to access (failure to mature), patients with decreased flow rates,

and patients with decreased thrill or new arm swelling. The dialysis fistula is the patient's life line. Diligent surveillance of the dialysis fistula is done by the Hemodialysis/Nephrology team. When there is concern about the flow within the fistula, a referral to IR is made. Patients with complex and ongoing dialysis problems are reviewed in multidiscilpinary rounds(IR, Vascular Surgery, and Nephrology), to determine the best treatment options for the individual. Some patients will require a surgical intervention.

A **fistuloplasty** is a procedure to treat narrowings within the dialysis fistula, using a balloon. A sheath, wire and angioplasty balloon are used to stretch the narrowing open. Clinical success is measured by having successful dailysis, without recurrence for 3 months. If the narrowing (stenosis) reoccurs, the treatment may be repeated.



Google Image - Cirse.org

If the narrowing persists a stent may be considered.

Google Image – Massachusetts General Hospital

Complications

Fistulograms are very safe procedures but there is a risk of hematoma at the site. Very rarely damage to the fistula may occur, requiring further treatment by an IR Physician, Surgeon or Vascular Surgeon. The risk of infection is very small.

Fistuloplasty is also a very safe procedure. There is a small risk of failure of the treatment (fistula does not respond well to balloon or stent), bleeding, damage or rupture to the vessel. This may cause the fistula to fail and collapse. The fistula would no longer be viable. Emergency surgery may be required. There is also a risk of thrombosis.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- Sedation –Does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision? Patient to recover in IR nursing area or go straight to dialysis afterwards?
- Bloodwork-Platelets, INR, PTT, CR and eGFR
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Assess AV fistula/graft for thrill, bruit, and aneurysm.
- IV access is not usually required. Fentanyl and Midazolam may be drawn up in sterile syringes, and be administered through the fistula access, by the IR Physician. Many patients will only need to receive analgesia. Some patients may prefer to not have any pain or sedation medications.

Intra Procedure:

- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation given.
- May require a blood pressure cuff or tourniquet to be applied to dialysis arm to reflux blood up the arterial limb of the fistula. Reassure patient that this is part of the exam, as they are told to never let blood pressures to be taken on their dialysis arm. Do not inflate this cuff or tighten tourniquet until instructed by IR doctor to do so. The flow in this arm must be maintained and only briefly interrupted for the diagnostic image. Do not forget to release cuff/tourniquet, after image acquired.
- If balloon dilatation is required, an inflation device is commonly used. Fill with 50/50 contrast and heparinized saline.

Post Procedure:

- Paperwork: **always** fax history to patient's dialysis program (VGH) and Community Dialysis, if applicable.
  - For outpatients: send nurses notes, consent and History Sheet to Medical Records with a Face Sheet attached.
  - For inpatients: send consent, history and nurses notes in chart.
- Hemostasis: teach patient about Statseal / dressing removal in 24 hours.
- Patients can usually be discharged after hemostasis achieved, if no complications occurred, and post sedation criteria are met.

Fistulogram Tray Supplies

- Long Trolley
- Angiogram Tray
- Fistulogram Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns plus 1 single Sterile Gown
- 2 packs Radiopaque Gauze

- Ultrasound Probe Cover
- 1-one-way Stopcock
- 1-16” Sterile Extension Tubing
- 2 small Tegaderm
- 1 Shield Cover (if working on Right Side)
- 2 Shower Caps

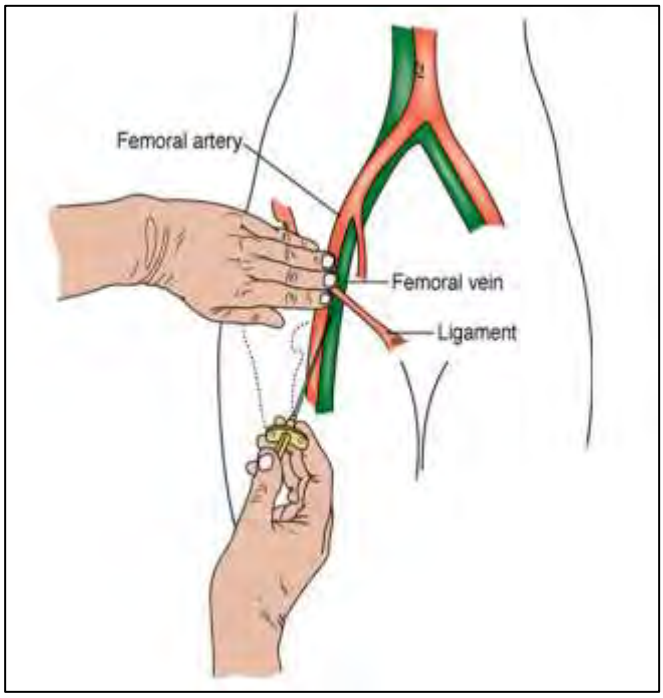
Additional supplies

- 1 Red StatSeal (add at end of procedure. Do not get wet)
- 18 Gauge 48mm (long) IV Insyte (for access) or Micro-puncture Set
- Inflation Device – Normal and High-Pressure models exist
- Vascular Sheath (often Short 5cm) - Size dependent on balloon required
- Angioplasty Balloon catheter – Size determined by native vessel around narrowing. Different types of balloons – Cutting, Drug Eluting, High Pressure
- Wires – Commonly used wires include Terumo, Rosen (Regular and Exchange length), and Amplatz Extra Stiff (Regular and Exchange Length)
- Catheter – A diagnostic catheter may be used to cross the narrowed lesion, prior to the introduction of the balloon catheter. Common catheters include the DAV (Davis) or Bern (Berenstein).

Angiograms

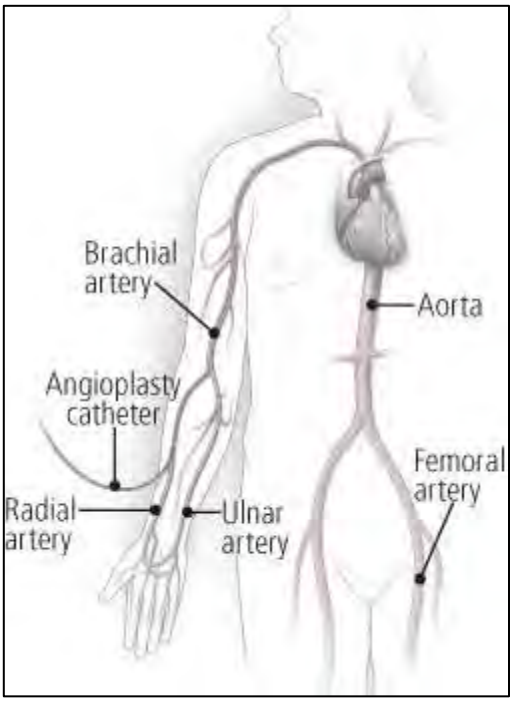
Angiograms are done to visualize the inside lumen of blood vessels and organs within the body.

Femoral approach



Google Image- virclinic.com

Radial Approach



Google Image- Ask Dr.K

Indication

Angiograms can be used to identify abnormalities within the vessels or supplied organ. Some examples include vascular malformations (AVMs and hemangiomas), thrombosis (DVT and PE), stenosis (dialysis fistula, PVD, and central vein occlusion), and aneurysms (brain and spleen).

Arteriograms refers to the imaging of the arteries.

Venograms refer to the imaging of veins.

Complications

General risks of an arteriogram include the following: bleeding, hematoma, pain, infection, blood clots, and damage to the blood vessel.

General risks of a venogram include the following: blood clots, bleeding hematoma, and infection.

Arteriograms

Arteriograms are usually performed via the femoral or radial artery. Less commonly, the brachial and ulnar may be used. The decision to access via the groin (femoral) or wrist (radial) is based on many factors. The Staff Physician will decide on the most suitable and safe approach for each individual patient.

Femoral access is widely used as the vessel tends to be large, near the surface, and located over the femoral head for easy compression post procedure, to control bleeding. This access can be challenging if the patient is obese. This approach is preferred if the patient has extensive peripheral vascular disease. Spine and cerebral angiograms are most often done with this approach, as there is straighter access from the groin.

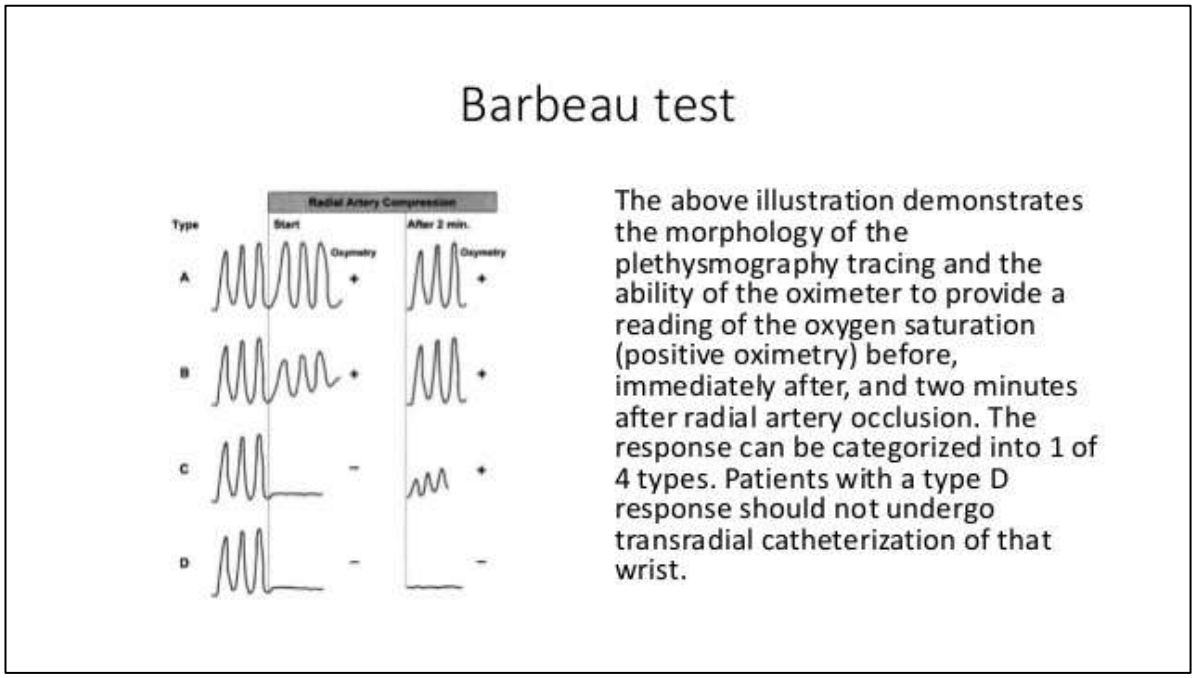
Some drawbacks to femoral access include prolonged bedrest and the risk of occlusion of the distal circulation to the rest of the leg. The femoral artery is the sole supply of blood to the leg. If circulation to the lower limb is impaired emergency surgery may be required. Patients must lay flat for at least 2 hours if a closure device is used, and up to 6 hours if manual compression is used. The patient may find it difficult to safely eat and drink while lying flat. The patient may have difficulty voiding lying flat.

Radial Access is becoming more widespread for many procedures. Conventional radial and distal radial (snuff box) options are used. The benefits to radial access include the following: decreased risk of bleeding, less discomfort, better mobility (can walk to bathroom) and safer to eat/drink post procedure, and the radial artery is not the sole supply of

blood to the hand. Radial access is associated with fewer puncture site complications.

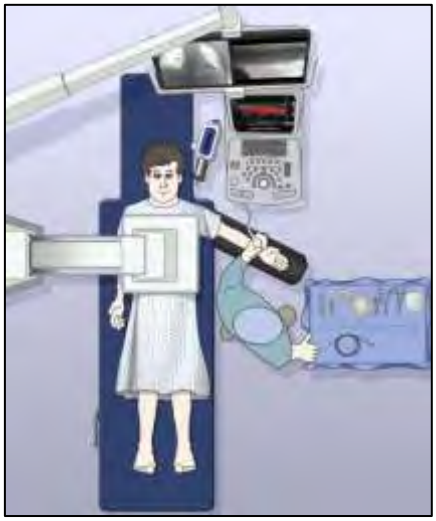
Some drawbacks of radial artery access include the following: the artery is smaller and more technically difficult, and may be prone to vasospasm. This access may not be suitable for elderly patients with extensive peripheral vascular disease. A Barbeau test should be performed by the IR physician to assess the viability of the radial artery pre-procedure.

Barbeau test: is the responsibility of the IR physician. The Barbeau test is performed to ensure adequate collateral circulation via the ulnar artery, and patency of the deep/superficial palmar arch. This test is done by placing the pulse oximetry probe on the patient's thumb or index finger, usually on the left hand. The radial artery is occluded while the ulnar oximetry tracing and saturation numbers are noted. Release the radial artery and record the oximetric reading. If the waveform continues to be dampened 2 minutes after the pressure is released, the test is considered abnormal. Femoral access should be considered.



Google Image - slideshare

Distal Radial Access (Cross Body)



Radial Access

Nursing Considerations

Pre-Procedure:

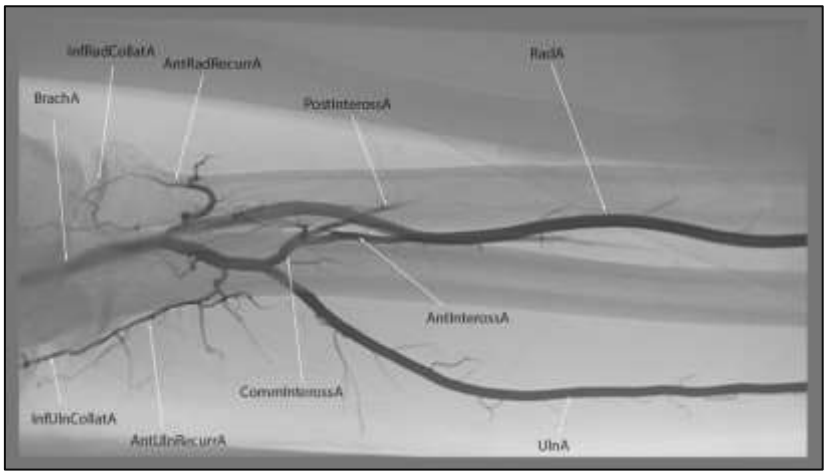
- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation. If radial access is anticipated, place IV in opposite arm (usually right arm).
- Sedation-Does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- **For femoral access**- assess CWSM of both feet, including femoral, DP and PT pulses.
- **For radial access**- assess CWSM of arm including brachial, radial and ulnar pulses.
- Ensure Barbeau test is done prior to radial procedure.

- **For radial procedures**, medications are prepared for sterile injection after arterial access. These medications prevent vasospasm and thrombosis. The three medications are:

  Heparin 50 units per kg for 4 or 5Fr sheath; 75 units per kg for 6Fr or greater. Heparin boluses are given every 60 minutes during the procedure to prevent thrombosis.
  Verapamil 2.5 mg
  Nitroglycerine 200 mcg
- These medications will be drawn up onto the sterile field by the RN at the time of the procedure and will be administered by the IR Physician.
- If the patient has an allergy to any of the above medication, they should not be given. Discuss with IR Physician.
- If the patient is hypotensive, caution should be used. If the patient is actively bleeding, caution should be used. If Anaesthesiology is involved with the procedure, inform them prior to administering the medications, so they are aware of impending potential hypotension.
- Shave prep if necessary

Angiogram of the Extremities-Arm & Leg

Arm and leg angiograms are commonly done to identify, map and potentially treat any problems within the circulation of the limb(s). Arm angiograms will often involve imaging of the arterial supply coming from the subclavian artery.



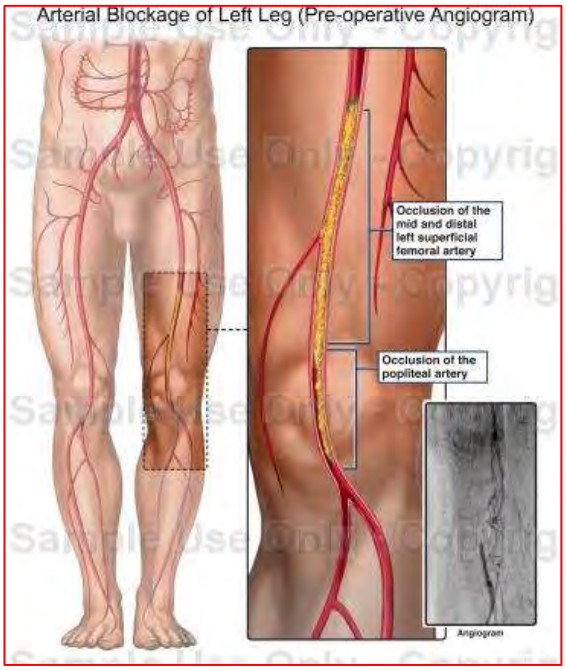
Lower Arm Angiogram- uwmsk.org

Indication:

Arm angiograms may be done if the patient is suspected of having a blocked or narrowed blood vessel in the hand or arm. They may be done for preoperative planning (ex. prior to dialysis AV fistula creation, pacemaker insertion or flap/hand reconstruction 2° trauma or frostbite).

Leg angiograms may be done to evaluate the patency (prior bypass graft or suspected thrombus) and circulation of the legs and feet (diabetic ulcers and PVD, vascular malformations). Intervention may or may not be involved with these procedures, depending on the results.

Upper Arm and Central Veins of Chest - emedicine.medsc



Lower Leg Angiogram- doereport.com

Nursing Considerations See Page 26 (Arteriogram)

Intra Procedure:

- Configure room according to access site.
- Patient will be supine on the table
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- For distal radial access use the First Radial Drape pack as it provides coverage.
- For regular radial access use the extremity drape.

- Draw up the radial cocktail (Heparin, NTG, Verapamil) into 20ml syringe and label syringe immediately.
- The contrast pump is often required.
- Ultrasound is required for femoral and radial access.
- If additional heparin is given during any arterial procedure an ACT (Activated Clotting Time) test should be performed prior to sheath removal. The ACT will show if the patient is fully heparinized and requires reversal (Protamine). An ACT of <200seconds is generally considered safe for sheath removal. Ensure a discard syringe of at least 3-5 ml is drawn and discarded, before drawing specimen to prevent contamination from heparinized saline in the catheter or sheath.
- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).
- **Radial procedure**-a Transradial Band (TR Band) with a Statseal will be used. Once the sheath is removed, the band is applied and approximately 3-7ml of air is injected into the cuff. Within 10-15 minutes, 2-3 ml of air is usually removed at 10-15 minutes intervals until all the air is removed from the band. The TR Band is then left in place for another 15-30 minutes before removal.

Transradial Band with Statseal- Sapub.org

Merit Medical - Distal Radial Band

Post Procedure:

Femoral Procedure- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.

Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.

Radial procedure-Assess site for signs of hematoma/bleeding. Assess CWSM and pulses of affected arm and inform IR physician of any change from baseline.

Patient may mobilize immediately if safe post sedation. Patient to avoid putting pressure/pushing on affected arm.

Femoral and Radial-A band-aid or Statseal with transparent dressing may be used. Discharge teaching for the patient should include band-aid/ Statseal removal in 24 hours. IF a Statseal is used, the patient should allow the brownish powder residue to fall off on its own, rather than scrub it off.

Patient is to avoid heavy lifting and strenuous activity for 48 hours.

Patient can shower in 24 hours.

Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses,

medications given (including radial cocktail and sedation). These patients will usually go to a recovery area after hemostasis (PCC) of be admitted to a ward.

Basic Angiogram Femoral Tray Supplies

- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover
- 2 Shower Caps
- Closed Drainage System
- Regular Namic tubing (not required for radial procedures)
- 120cm high pressure (1200 psi) pump tubing

Additional Supplies

- ACF or single wall needle if femoral approach
- Vascular sheath – depends if femoral or radial
- Wires– depends if femoral or radial
- Catheter – – depends if femoral or radial
- Statseal (add at end of procedure. Do not get wet)
- If difficult access- micro-puncture set may be required

Basic Radial Supplies

- As above, the femoral basic tray plus:
- 1 extra shield cover
- 1 extra 20 ml syringe and one 5ml syringe for the TR Band

- 1 green transfer pin
- Extremity Drape or Radial First Drape
- 1 large and 2 small transparent dressings
- 1 pack drape towels

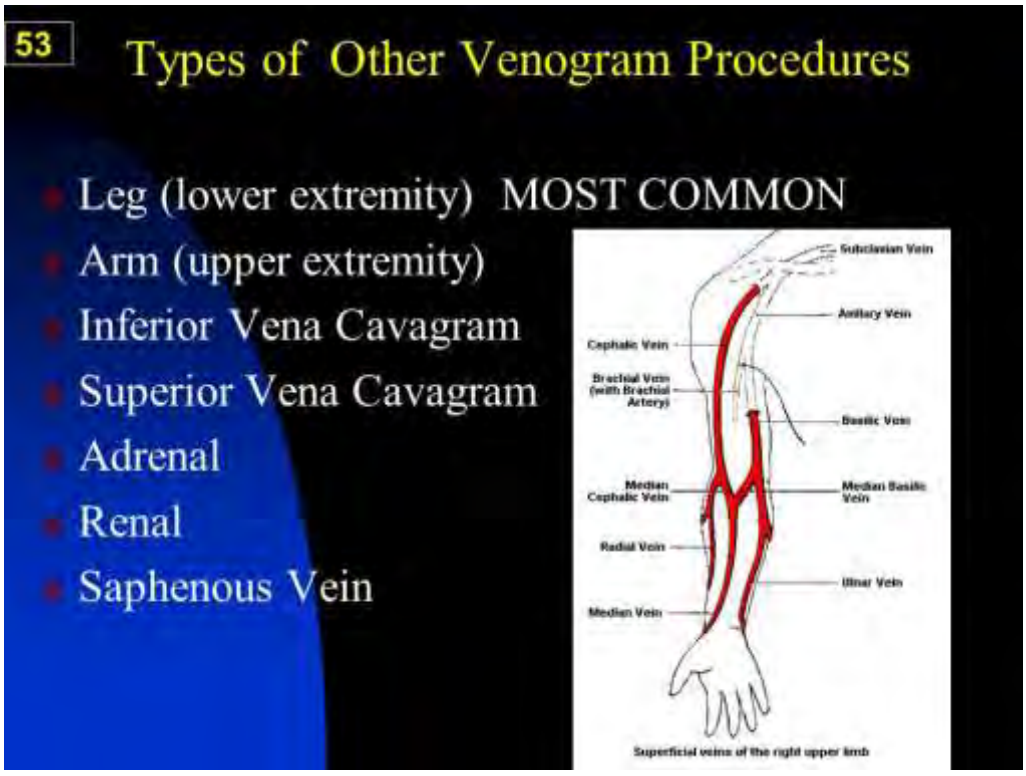
Additional supplies: TR band and Red Statseal (at end of procedure)

Venograms

Venograms are done to visualize the inner lumens of veins.

Indication

They can be used to diagnose blood clots, stenosis and occlusion. They can also be done for mapping the veins prior to AV fistula creation for dialysis or prior to pacemaker placement. Arm or leg venograms are most common. Leg venograms are used to map varicose veins and identify DVT.



Venogram Types -slideplayer

Nursing Considerations

Pre-Procedure:

Depending on the type of venogram, the nursing considerations will vary. Venograms can be simple or complex, depending if intervention becomes necessary. Assess the limb for edema, pain and CWSM (baseline).

Arm venograms: These procedures may involve a simple IV start and injection of contrast or be the preamble to starting TPA for thrombolysis. It is important to review the requisition and patient history. Confirm with the IR physician what the plan is for the patient.

- Informed consent –required if the venogram may lead to intervention
- Bloodwork- CR and GFR if no intervention. HGB, PLT, INR and PTT if intervention (TPA, PTA/stent).
- If no intervention is being considered: the RN must be aware of what vessels are to be imaged. Upper or lower arm? Unilateral or bilateral arms? An IV, preferably #20 or #18 is inserted into the arm(s) to be imaged, below the level of imaging (in hand if lower arm, or ACF if upper arm is to be imaged). If the arm is too edematous, the IR Physician can get access using ultrasound. The contrast is injected by hand under fluoro, and images are obtained. The IV can be removed immediately after the procedure and the patient can go home. No sedation/ride necessary.
- For potential TPA patients, shave a very large prep area. If catheters and sheaths need to be coiled and secured with large transparent dressings, the removal of the dressing with the next check will be very painful for the patient.
- If this is a **potential arm TPA case**, prep the arm like a fistulogram patient and drape in a similar fashion. The patient should have a #20 IV in the unaffected arm and an **active X-match. The patient must have an inpatient bed to be admitted into prior to starting.**

- Sedation-Does the patient need or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Shave prep if necessary

Leg venograms: These procedures require femoral vein access.

- Informed consent
- Sedation- Does the patient need or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Bloodwork –PLT, INR, PTT, CR and GFR
- As above, if intervention (TPA) is required, an inpatient bed and X-match are needed.

Intra Procedure:

- A simple venogram without intervention, does not require monitoring or a RN to scrub in.
- An arm venogram with intervention would require full monitoring (BP, ECG, Resp, O2 Sat). ETCO2 if applicable. The RN would scrub in.
- Leg venograms require femoral vein puncture, so full monitoring is required (BP, ECG, Resp, O2 Sat). ETCO2 if applicable. The RN would scrub in.
- Most contrast injections are done by hand, so contrast pump usually not required.
- Will the patient require a Foley catheter? For leg venogram patients with TPA, a Foley should be considered. The patient will be on strict bedrest.

Post Procedure: For simple arm venograms, the IV can be removed and the patient can go home. Instruct patient to remove band-aid in 24 hours. History sheet is faxed to referring physician/surgeon's office.

For simple leg venograms, the patient is kept on bedrest for 1 hour with the affected leg straight. If no bleeding / hematoma patient can be discharged. Instruct patient to remove band-aid or Statseal in 24 hours. History sheet is faxed to referring physician/surgeon's office.

For interventional arm or leg venograms, they will usually be admitted. Assess the limb for edema, pain and CWSM and document compared to baseline.

Venogram Tray Supplies

Simple Arm venogram:

- 10 count tray and Mayo Stand
- 2-16" extension tubings connected to peripheral IV
- Contrast and heparinized saline (one in each bowl)
- 10 & 20ml syringes

Arm Venogram with Intervention/TPA:

- Make a fistulogram tray to start. Everything else will be added as needed.
- Long Trolley

Leg Venogram with or without intervention:

- Make a basic femoral angiogram tray
- Long Trolley
- Do not need to add pump tubing

May use a micro-puncture set for access.

If TPA is expected, have available nearby 2 -30cm pump tubings, 2-3 packs of 1” Steristrips and 2-15x20cm Large Tegaderm dressings. Ensure a 2 chamber Alaris Pump is available. Use TPA tubing (no ports) when priming lines.

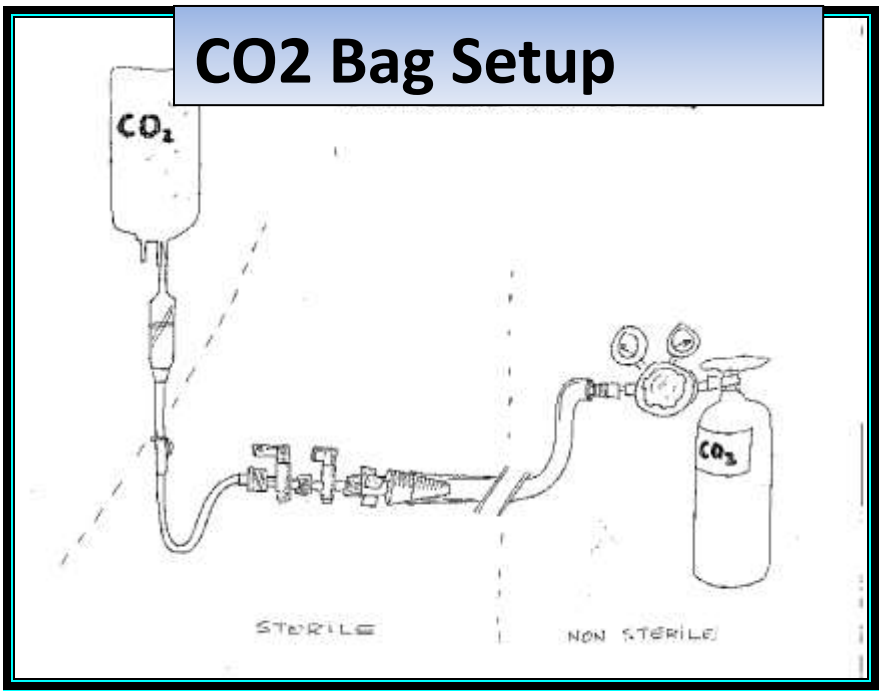
If time, prime the 2 tubings with 50 ml saline bags in advance.

Carbon Dioxide Angiogram (CO2)

CO2 is a colourless, odorless gas which occurs naturally in the atmosphere and human body. It can be used as a safe and useful alternative contrast agent in both arteriography and venography, using digital subtraction angiography. It is primarily used when patients have impaired kidney function.

Indications

It can be used as a contrast agent for aortography and runoff, detection of bleeding, renal transplant arteriography, portal vein visualization with wedged hepatic venous injection, venography, arterial and venous interventions and endovascular aneurysm repair. CO2 is the preferred contrast agent in patients with renal failure or contrast allergy, particularly for patients who require large volumes of contrast for complex endovascular procedures.



Non-Sterile/ Sterile/ Non-Sterile

CO2 Bag----------/ Connections/-------CO2 Tank

Complications

CO2 has potential neurotoxic and cardiotoxic effects, hence it should not be used for cerebral or coronary artery (above the diaphragm) angiograms. CO2 should be used with caution in patients with COPD.

Nursing Considerations (See Angiogram Procedure for Barbeau test and Radial Access setup)

Pre-Procedure:

- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation. If radial access is anticipated, place IV in opposite arm (usually right arm).
- Sedation-Does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- **For femoral access**- assess CWSM of both feet, including femoral, DP and PT pulses.
- **For radial access**- assess CWSM of arm including brachial, radial and ulnar pulses.
- Ensure Barbeau test is done prior to radial procedure.
- **For radial procedures**, medications are prepared for sterile injection after arterial access. These medications prevent vasospasm and thrombosis. The three medications are:

  Heparin 50 units per kg for 4 or 5Fr sheath; 75 units per kg for 6Fr or greater. Heparin boluses are given every 60 minutes during the procedure to prevent thrombosis.

Verapamil 2.5 mg
Nitroglycerine 200 mcg

- These medications will be drawn up onto the sterile field by the RN at the time of the procedure and will be administered by the IR Physician.
- If the patient has an allergy to any of the above medication, they should not be given. Discuss with IR Physician.
- If the patient is hypotensive, caution should be used. If the patient is actively bleeding, caution should be used. If Anaesthesiology is involved with the procedure, inform them prior to administering the medications, so they are aware of impending potential hypotension.
- Shave prep if necessary
- Collect CO2 set up supplies (see page 45) and add to basic angiogram tray

Intra Procedure:

- Configure room according to access site.
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- For distal radial access use the First Radial Drape pack as it provides coverage.
- For regular radial access use the extremity drape.
- Draw up the radial cocktail (Heparin, NTG, Verapamil) into 20ml syringe and label syringe immediately.
- The contrast pump is often required in addition to CO2
- The administration of CO2 is usually well tolerated. Some patients may experience sudden discomfort or nausea associated with the injection, that usually resolves quickly.
- Ultrasound is required for femoral and radial access.
- If additional heparin is given during any arterial procedure an ACT (Activated Clotting Time) test should be performed prior to sheath removal. The ACT will show if the patient is fully heparinized and requires reversal (Protamine). An ACT of <200seconds is generally

considered safe for sheath removal. Ensure a discard syringe of at least 3-5 ml is drawn and discarded, before drawing specimen to prevent contamination from heparinized saline in the catheter or sheath.

- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).
- **Radial procedure**-a Transradial Band (TR Band) with a Statseal will be used. Once the sheath is removed, the band is applied and approximately 3-7mls of air is injected into the cuff. Within 10-15 minutes, 2-3 ml of air is usually removed at 10-15 minutes intervals until all the air is removed from the band. The TR Band is then left in place for another 15-30 minutes before removal.

Transradial Band with Statseal- Sapub.org

Post Procedure:

Femoral Procedure- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.

Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.

Radial procedure-Assess site for signs of hematoma/bleeding. Assess CWSM and pulses of affected arm and inform IR physician of any change from baseline.

Patient may mobilize immediately if safe post sedation. Patient to avoid putting pressure/pushing on affected arm.

Femoral and Radial-A band-aid or Statseal with transparent dressing may be used. Discharge teaching for the patient should include band-aid/ Statseal removal in 24 hours. IF a Statseal is used, the patient should allow the brownish powder residue to fall off on its own, rather than scrub it off.

Patient is to avoid heavy lifting and strenuous activity for 48 hours.

Patient can shower in 24 hours.

Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given (including radial cocktail and sedation). These patients will usually go to a recovery area after hemostasis (PCC) of be admitted to a ward.

Tray Supplies- CO2 Angiogram

- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover
- 2 Shower Caps

- Closed Drainage System
- Regular Namic tubing (not required for radial procedures)
- 120cm high pressure (1200 psi) pump tubing
- CO2 Set up:
  - Sterile suction tubing
  - Sterile Namic tubing
  - 2- one-way stopcocks
  - 1- three-way stopcock
  - 1- Christmas tree adapter
  - 1- Dual Check Valve Set
  - CO2 Reservoir Bag
  - CO2 Tank

Additional Supplies

- ACF or single wall needle if femoral approach
- Vascular sheath – depends if femoral or radial
- Wires– depends if femoral or radial
- Catheter – – depends if femoral or radial
- Statseal (add at end of procedure. Do not get wet)
- If difficult access- micro-puncture set may be required

Basic Radial Supplies

- As above, the femoral basic tray plus:
- 1 extra shield cover
- 1 extra 20 ml syringe and one 5ml syringe for the TR Band
- 1 green transfer pin
- Extremity Drape or Radial First Drape
- 1 large and 2 small transparent dressings
- 1 pack drape towels

Additional supplies: TR band and Red Statseal

Catheter Directed Thrombolysis- Arterial or Venous TPA

Catheter directed thrombolysis is used to improve blood flow by dissolving abnormal blood clots. A blood clot, or thrombus, can block off blood supply to certain parts of the body and cause serious damage.

TPA which is tissue plasminogen activator is a protein involved in the breakdown of blood clots.

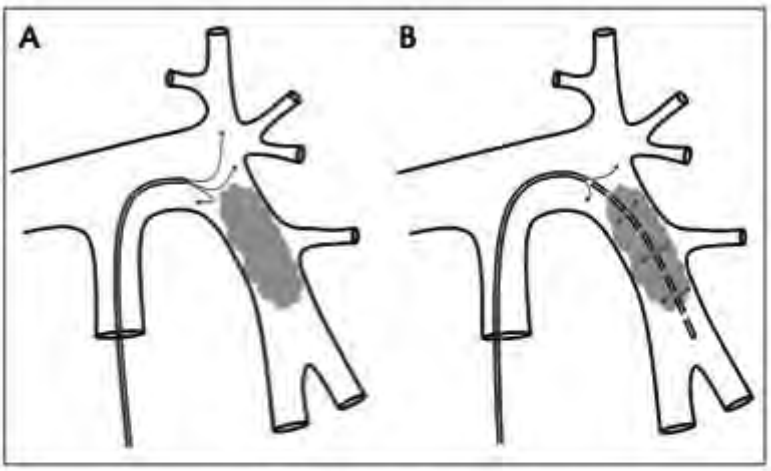
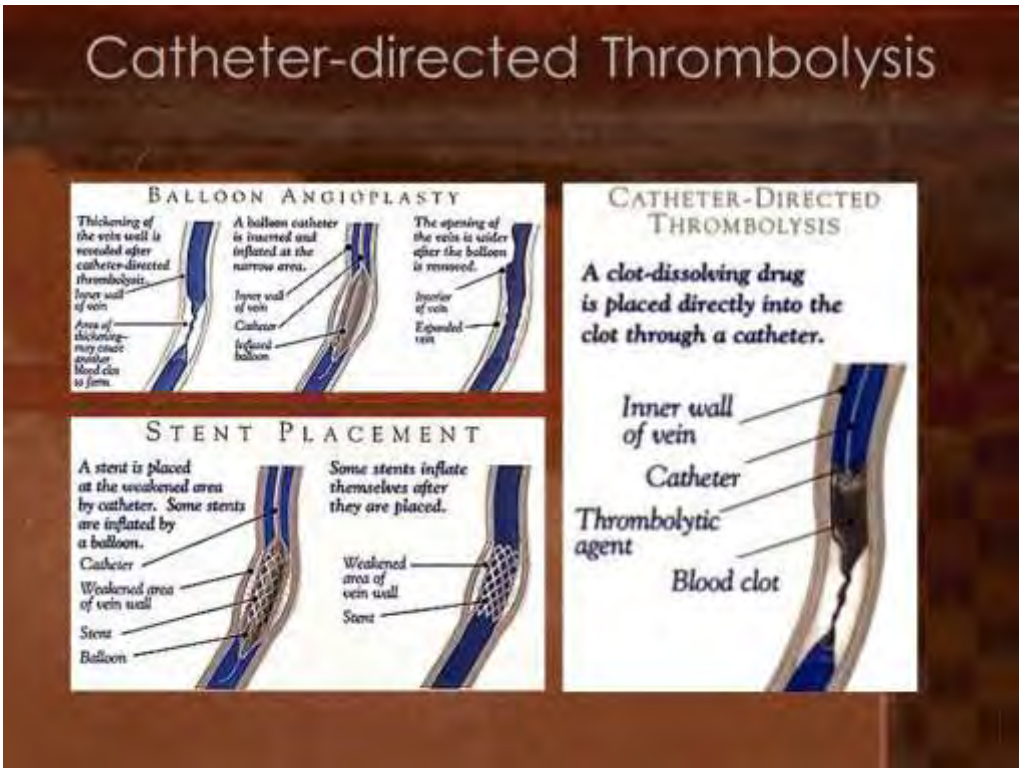


Figure 1. Infusion of a thrombolytic through a nonembedded catheter results in rapid dissipation of the drug through non-obstructed pathways (A). A multisidehole infusion catheter is embedded within an embolus in the left lower lobe, allowing thrombolytics to be infused directly into the clot (B).

Google Image- Endovascular Today

Indications

Catheter directed thrombolysis treats vascular blockages and improves blood flow by dissolving abnormal blood clots commonly occurring in the legs or arms. These blood clots may be in the arterial or venous systems. Catheter directed thrombolysis may also be used to treat pulmonary embolisms (see pulmonary thrombolysis)



Thrombolysis with Angioplasty and Stenting- Slideplayer

Complications

TPA and catheter directed thrombolysis are associated with several major complications including the following: intra-cerebral and system hemorrhage, reperfusion injury with edema, and angioedema. Other TPA complications include re-occlusion, and secondary embolization related to redistribution of the lysed clot.

Nursing Considerations

Pre-Procedure:

- Informed consent and blood transfusion consent
- IV access is required. Minimum #20-gauge catheter is required to address potential complications and administer hydration/sedation. The IV should be placed in the opposite arm to the affected arm.

- Sedation- Does the patient want or require sedation? Are fasting guidelines met (NPO)? Patient will remain in hospital for the treatment duration.
- An In-Patient bed must be arranged prior to start of treatment. The receiving units (Vascular/PACU/ICU/CCU) must be informed of intent to treat with TPA, so appropriate bed and staffing is available. Arterial TPA patients must be in a Step-Down Unit or Critical Care Unit. Venous TPA patients may be cared for in a general vascular bed.
- All arterial and venous TPA patients must be accompanied by the IR nurse after the initiation of TPA during transport to the receiving unit. The IR nurse must give report to the receiving nurse.
- On subsequent trips to IR for TPA recheck the venous TPA patients may come without a nurse. All arterial TPA patients must be accompanied by an RN at all times.
- Bloodwork- recent results for HGB, PLT, INR, PTT, CR, eGFR, FSP (Fibrin Split Products). Usually within one week for all patients.
- Cross-match 2 units Packed Red Blood Cells (PRBCs)
- IF eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met? These patients may be on heparin infusions or other recently administered anticoagulants and still be approved for immediate treatment.
- For all arterial procedures, pre and post assessment of pulses of the affected limb must be documented, as well as CWSM (colour, warmth, sensation and movement). For all venous procedures, documentation should include the location and extent of edema and CWSM.
- Assess neuro vital signs and document.
- Assess need for Foley catheter. Most venous and arterial leg TPA patients will require a Foley.
- Shave prep if necessary

Intra Procedure:

- Configure room according to access site. Identify if patient will be supine or prone (leg DVT's are usually treated prone).
- Full monitoring required (BP, ECG, Resp, O2 Sat, ETCO2).
- Ensure a wide shaved prep area prior to draping. The catheter and sheath will require an extra -large Tegaderm dressing post procedure.
- Contrast pump is not commonly used. TPA procedures are usually done with hand injections of contrast.
- Ultrasound is required for access.
- A bolus dose of TPA may be requested. TPA is kept in medication fridge at nursing station. Each 2 mg vial needs to be reconstituted with 2.2mls of sterile water prior to administration.
- If the Angiojet is required, a pre-mixed bag of 10 mg of TPA in 50mls of NS (Normal Saline) or 20 mgs in 100mls of NS must be available.
- At the conclusion of the procedure, there will be 1 to 2 vascular sheaths and 1 to 2 infusion catheters. The vascular sheaths may be hooked up to Heparin or TPA infusions. The infusion catheters may be hooked up to TPA infusions. The infusion rates will be determined by the IR physician.
- TPA appropriate tubing (no ports) should be used for the IV TPA infusions.
- A Steristrip with tabs at each end, should be applied to the infusion catheter where it enters the sheath, to mark the intended location. Further Steristrips should be used to secure the sheath(s) as well as coils of the infusion catheter. Extra- large Tegaderms may be used to secure the sheath and catheters.
- If TPA is being used in the treatment of pulmonary embolus, a three way stop cock must be added and accessible to the ICU staff for pulmonary artery pressure monitoring.

Post Procedure:

- Most of these patients will be on strict bed rest. They will need to keep the affected limb straight.
- No IM (intramuscular) injections.
- Ensure adequate analgesia as patient will be on prolonged bed rest and may experience increased discomfort due to reperfusion.
- Ensure TPA and heparin infusions are infusing. The infusion catheter may be buried in thrombus and therefore the pressure limits on the Alaris Pump may need to be increased to overcome the resistance. If the pump continues to alarm downstream pressure with maximum pressure limit, notify IR Physician. The Physician may need to pull back the infusion catheter slightly.
- Ensure no kinks in the infusion catheters.
- Check the insertion sites for oozing.
- Check distal pulses and document (arterial).
- Neuro vitals should be checked after the administration of TPA and on an on-going basis.
- After completion of documentation, accompany patient to ward and give report to receiving RN. Show RN treatment site and explain the tubings and infusions.
- Neuro vital signs (NVS) should be checked after the administration of TPA
- If there is any noticeable change in the patient's NVS, inform IR Physician immediately and discuss stopping the TPA infusion. This systemic TPA administration can lead to cerebral hemorrhage and death.

Catheter Directed TPA Tray Supplies

Arm TPA – use fistulogram tray supply list

Leg TPA – use basic angiogram femoral tray supply list. If patient is prone, a pediatric lap drape may be used.

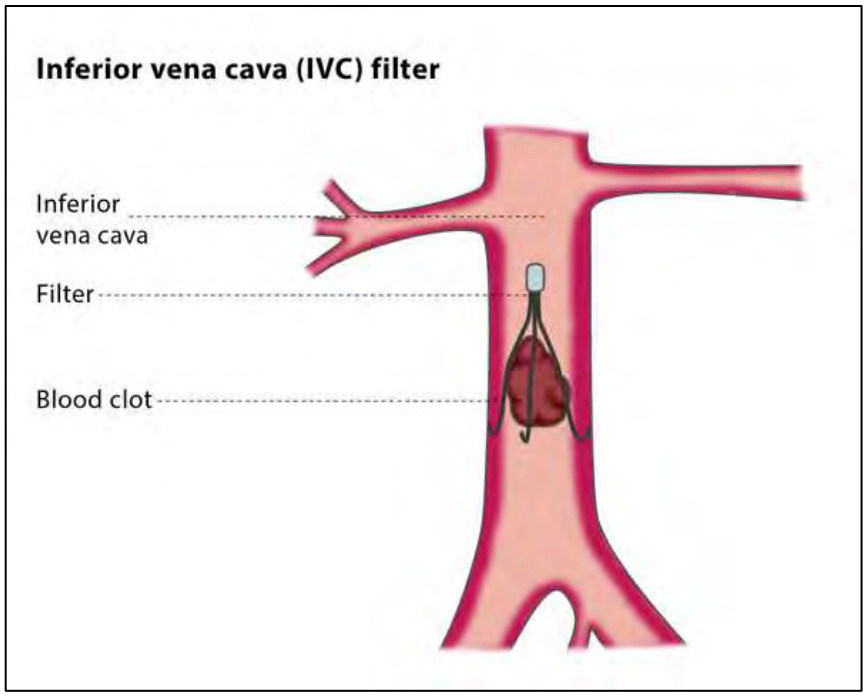
PE TPA – use basic angiogram femoral tray supply list. A pediatric lap drape may be added.

Additional Supplies

- Micro-puncture sets are often used for access. ACF or single wall needle may also be used.
- Vascular sheath(s)
- Infusion catheter(s) or infusion wire(s)
- Diagnostic catheter dependent on location
- Wires – Bentson, Terumo, based on physician preference
- Angiojet or other clot retrieval removal systems-
  See IR Device Catalogue for instructions on “how to use”.

IVC Filter – Insertion & Retrieval

An IVC (Inferior Vena Cava) filter is a device placed within the IVC, a large vein in the abdomen that returns blood from the lower half of the body to the heart. When a patient develops blood clots in their lower extremities (DVT), they are at higher risk for pulmonary embolism. Portions of clot from their legs may travel up through the IVC to the lungs. This is a potentially life-threatening condition.



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Indication

Patients at the greatest risk for pulmonary embolus have proven venous thromboembolism, contradictions to anticoagulation or have recurrent thromboembolism despite anticoagulation therapy. IVC filters can also be used in patients with poor compliance to anticoagulation and for patients with iliocaval DVT. IVC filters are also used prophylactically in trauma

patients and pre-operatively for patients with expected prolonged recovery (malignancy).

Complications

IVC filter insertions are associated with filter fracture, migration, bleeding, hematoma, infection, malposition, thrombosis (DVT), IVC perforation and pulmonary embolism.

IVC filter retrievals are associated with large clot burden (contradiction to removal), wall apposition (prevents successful retrieval), and difficult retrieval.

Nursing Considerations

Pre-Procedure:

- Informed consent
- IV access is required. A #22-gauge cannula is sufficient. The IV is primarily to administer hydration and sedation.
- Sedation – does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate responsible adult, if out-patient (OP).
- Bloodwork – recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for in-patients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Shave prep if necessary

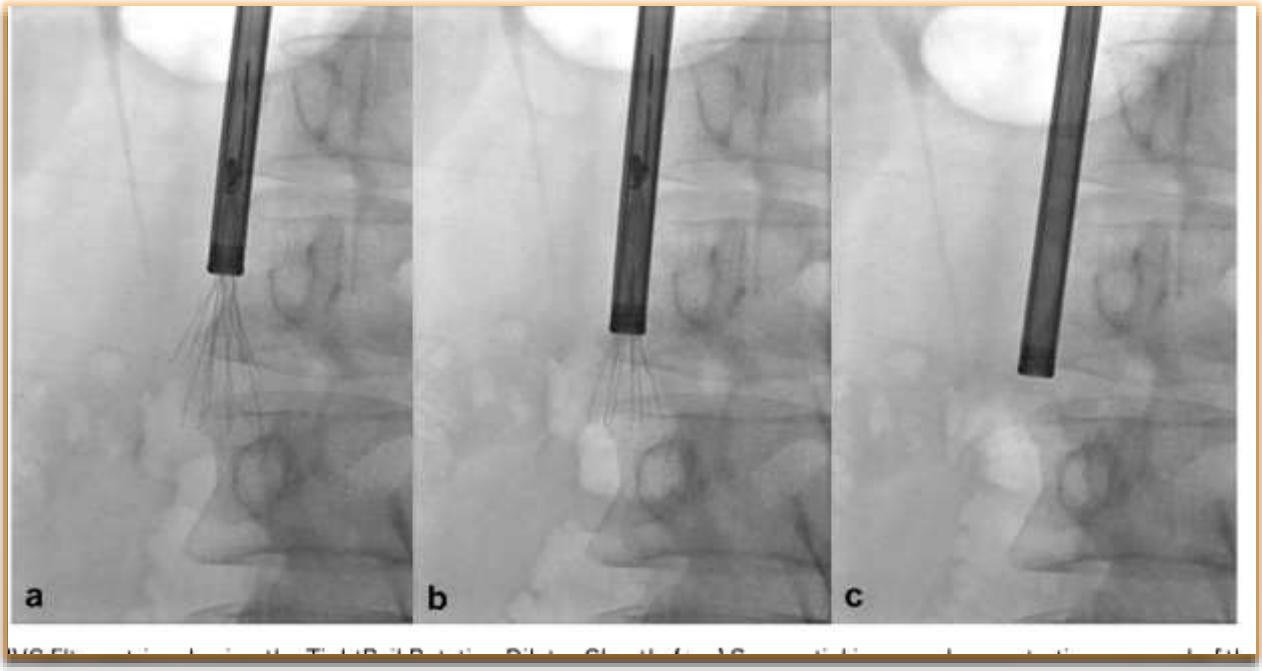
Intra Procedure:

- Determine which insertion site is preferred (jugular vs femoral vein for insertion or jugular for retrieval).
- IVC filters may be inserted through the jugular or femoral vein but are designed to be retrieved through the **jugular vein only**.

- Full monitoring is required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- Ultrasound is required for venous access.
- Contrast pump is usually required.
- Care must be taken to ensure the IVC filter is inserted in the correct orientation. There are several types of IVC filters that are in stock. IVC filters are designed to be retrieved from the neck, and thus must have the retrieval hook oriented to the patient's head.

Post Procedure:

- At the completion of the procedure, manual pressure and a Stat Seal are usually applied to the insertion site. A Band-aid may also be used. Manual pressure of approximately 5 minutes is usually sufficient as these are venous punctures.
- The patient will be on bed rest for 1 to 2 hours post procedure. The patient must lie flat if they had a femoral vein puncture. The patient with a jugular puncture should have the head elevated at least 30°.
- Assess insertion site for bleeding and hematoma.
- Monitor vital signs q15 minutes for 1 hour.
- Patient can be discharged 1 to 2 hours post procedure.
- A green band indicating the presence of an IVC filter in-situ must be placed on patient's wrist prior to leaving IR. Post orders need to be filled in by physician and sent with patient to ward. Referral form needs to be filled in by physician and faxed to **Thrombosis/Hematology Clinic**. Patient pamphlet should be given to patient or family prior to transfer to ward or discharged home (Pre surgery patient). Physician pamphlet should be put on front of chart for transfer to ward (In Patient). If patient is discharged from hospital prior to retrieval of filter, an appointment must be made with hematologist or internal medicine prior to band cut off at time of discharge. (patients who come pre elective surgery for IVC insertion, will keep band on until surgery complete).



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IVC Filter – Insertion & Retrieval Tray Supplies

- Long trolley
- Angiogram tray
- Fistula drape pack (for jugular insertions and retrievals)

  OR

  Femoral drape pack (for femoral insertions)
- Kidney basin/paint tray/sharps cushion (sharps disposal)
- 1 small instrument set
- 3 packs of sterile gowns
- 2 packs of radiopaque gauze
- Ultrasound probe cover
- 1 one-way stop cock
- 1 shield cover

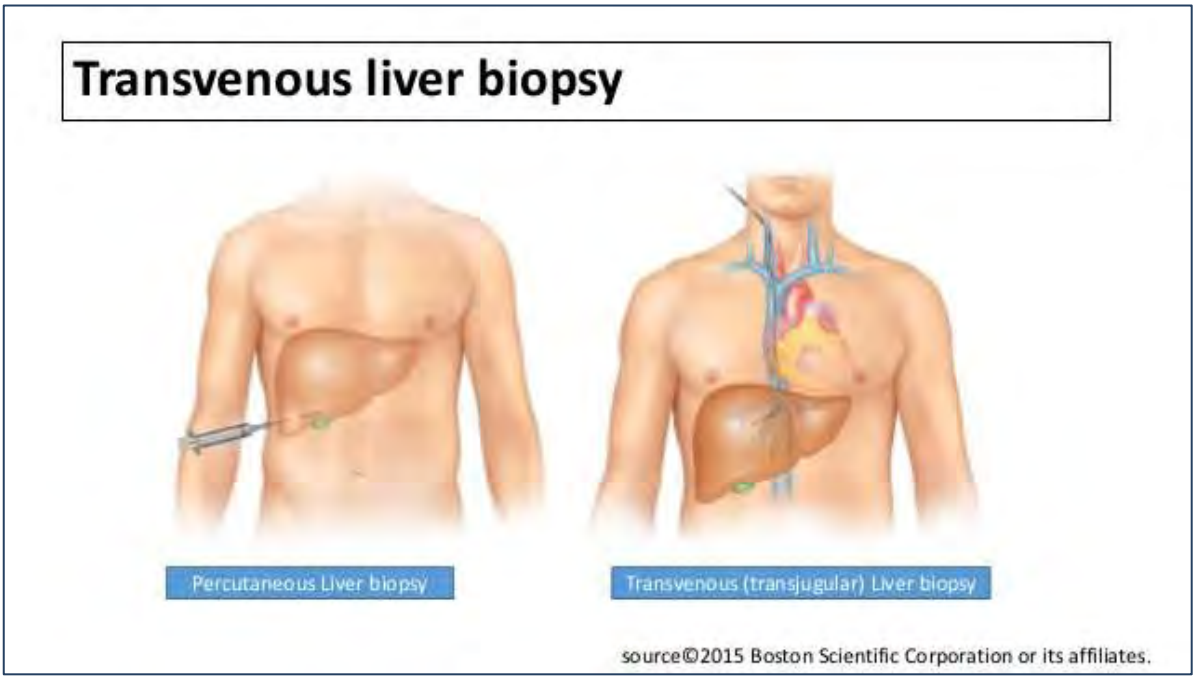
- 2 shower caps
- 120 cm high pressure pump tubing (1200 psi).

Additional Supplies

- ACF or single wall needle
- 5 Fr pigtail catheter
- Amplatz extra stiff .035 straight or Bentson
- Sheath may be required depending on manufacturer of IVC filter
- Stat Seal
- IVC Filter Kit or IVC Filter Retrieval Kit or Snare

Transjugular Liver Biopsy

A transjugular liver biopsy is an alternative to percutaneous liver biopsy in patients with diffuse liver disease.



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Indications

Transjugular liver biopsy is considered for patients with diffuse liver disease, coagulopathy, ascites, morbid obesity and previous failed percutaneous liver biopsy.

Complications

Liver biopsy complications include the following: incidental puncture of adjoining structure (lung, intestine, gallbladder or bile duct), hemorrhage, heart arrythmias, hematoma and transient hypotension.

Nursing Considerations

Pre-Procedure:

- Informed consent
- IV access is required due to the associated risk of bleeding. IV also required for possible sedation.
- Sedation – does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Blood work results – recent results for HGB, PLT, INR, PTT, CR and eGFR.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Sometimes hepatic pressures are done in conjunction with the biopsy. Confirm with physician if pressures are planned.
- Requisition must indicate what specimens are required from the biopsy. The ward is responsible for filling out the laboratory requisitions and sending with patient chart to IR or entering it into order entry.
- The requisition must be photocopied and copy attached to pathology requisition.
- Collect specimen containers required for procedure. Most common are orange top, C&S and formalin containers.
- Shave prep if necessary

Intra Procedure:

- Prep the right neck
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- Contrast pump is often required
- Ultrasound is required for venous access
- Hepatic pressure monitoring may be required
- **Caution must be used when passing the biopsy needle between scrub personnel. The needle is very sharp!**

Post Procedure:

- Manual compression for 5 to 10 minutes may be required for hemostasis. A Band-aid or StatSeal will be applied.
- The patient may have their head up 30° or more.
- Monitor site for bleeding and hematoma
- Ensure samples are labelled, lab requisitions are filled out completely and are sent to lab in a timely manner.
- Monitor vital signs q15 minutes for 1 hour or q30 x 2 (patient can return to ward post procedure when stable).

Transjugular Liver Biopsy - Tray Supplies

- Long trolley
- Angiogram tray
- Fistula or femoral drape pack (RN preference for jugular sites)
- Kidney basin/paint tray/sharps cushion (sharps disposal)
- 1 small instrument set
- 3 packs of sterile gowns
- 2 packs of radiopaque gauze
- Ultrasound probe cover
- 1 one-way stop cock
- 1 shield cover
- 2 shower caps
- 120 cm high pressure pump tubing (1200 psi)

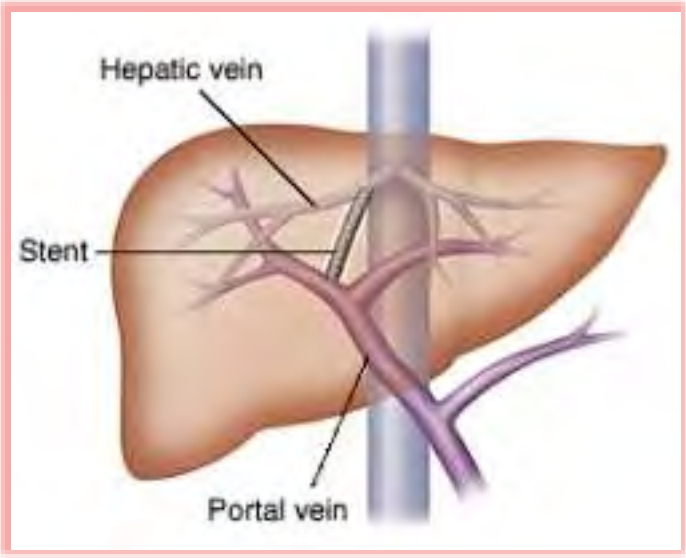
Additional Supplies

- ACF or single wall needle
- Liver Biopsy Set
- Amplatz extra stiff .035 straight
- 9 Fr sheath
- Stat Seal
- Specimen container

Transjugular Intrahepatic Portosystemic Shunt (TIPS)

TIPS is a procedure to create new connections between two blood vessels, the inflow portal vein and the outflow hepatic vein. A stent is placed between the connection, to allow blood draining from the bowel to go back to the heart while avoiding the liver. TIPS may successfully reduce internal bleeding in the stomach and esophagus in patients with cirrhosis.

A thin catheter is navigated from the jugular vein to the liver over a wire. Pressures are measured in the hepatic vein and right heart to confirm portal hypertension. The catheter is then removed, and an angioplasty balloon is inflated to dilate the tract. The balloon is then removed, and a stent is passed over the wire and deployed. The balloon will be reinserted to expand the stent in to place. Hepatic pressures are rechecked. Technical success is defined as a decrease of the portosystemic pressure gradient to 12 mmHg or less, or a reduction of at least 20%.



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Indications

TIPS can be used to treat complications arising from portal hypertension, including variceal bleeding, portal gastropathy, severe ascites, Bud-Chiari Syndrome. A MELD score may be calculated to predict TIPS mortality.

Complications

Most common complications include hemorrhage, encephalopathy, TIPS dysfunction and liver failure.

Nursing Considerations

Pre-Procedure:

- Informed consent and blood transfusion consent
- NPO according to fasting guidelines
- IV access is required. A minimum #20-gauge IV cannula is required.
- Preoperative checklist is required
- Anaesthesiology will be involved as patient will likely require a general anaesthetic. An arterial line/CVC may be required.
- Bloodwork – recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for in-patients and one month for out-patients. Cross-match must be completed.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Foley catheter should be considered.
- If the patient has significant ascites, an abdominal ascites drain may be required. This is usually arranged the day before the booked procedure.
- Hepatic pressure monitoring will need to be set up.
- The contrast pump is usually required.
- Gas machine and anaesthesia Omnicell must be in room.
- Occasionally CO2 (contrast) setup is required

- Patient will go to PACU post procedure and then to ward.
- Shave prep if necessary

Intra Procedure:

- Configure room and table for right neck access
- Once patient intubated, they will be transferred via slider board to IR table.
- Ultrasound is required for venous access. If the patient has significant ascites, the IR Physician may want access to the large ultrasound machine for abdominal scanning.
- On some occasions, the abdomen may also need to be prepped.

Post Procedure:

- Manual pressure for 5 to 10 minutes is required for hemostasis. Stat Seal or Band-aid can be used at insertion site.
- Monitor right neck for bleeding and hematoma
- Patient may have head of bed elevated 30˚ or more
- Patient is usually extubated post procedure
- Alert PACU of intended arrival within 10 minutes
- Ensure any unused blood products get returned to the Blood Bank

TIPS - Tray Supplies

- Long trolley
- Angiogram tray
- Fistula or femoral drape pack (RN preference for jugular sites)
- Kidney basin/paint tray/sharps cushion (sharps disposal)
- 1 small instrument set
- 3 packs of sterile gowns

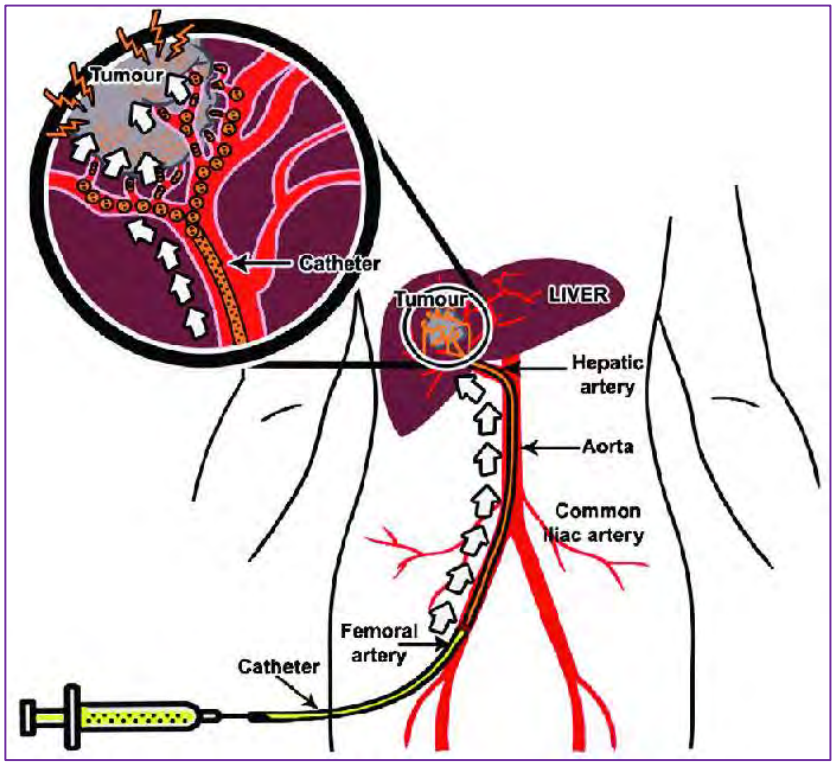
- 2 packs of radiopaque gauze
- Ultrasound probe cover
- 1 one-way stop cock
- 1 shield cover
- 2 shower caps
- 120 cm high pressure pump tubing (1200 psi)
- Arterial pressure set up – See Device Catalogue
- Pressure extension tubing
- Namic tubing
- Large Tegaderm

Additional Supplies

- ACF or single wall needle
- Rosch Uchida Set
- Amplatz extra stiff .035 straight 180cm length
- Terumo .035 angled and Terumo .035 floppy tip (8cm floppy tip)
- 5 or 7 Fr MPA catheter
- Long Marker Pigtail catheter
- 9 Fr sheath
- Stat Seal
- Specimen containers
- CO2 Supplies –CO2 set up
- For abdomen prep: pediatric lap drape, large ultrasound machine and 1012 drape

Chemoembolization (TACE)

Chemoembolization is used to treat liver cancer. It is a minimally invasive procedure in which the blood supply to a tumor is restricted due to small particles coated with chemotherapeutic drugs injected selectively through a catheter into artery directly supplying the tumor.



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Indications

Chemoembolization is indicated for patients with intermediate stage hepatocellular carcinoma (HCC) and relatively preserved liver function. Neuroendocrine liver tumors may also be targeted. Hepatitis B & C are associated with an increase prevalence of HCC. Chemoembolization or TACE (Transcatheter arterial chemoembolization) is the current standard of care for patients with large or multinodular HCC and relatively preserved

liver function, absence of cancer- related symptoms and no evidence of vascular invasion or metastasis. TACE may also be used to treat cholangiocarcinoma (primary cancer of the bile ducts in the liver) and metastasis spread to the liver from: colon, breast, carcinoid tumor, islet cell tumor of the pancreas, ocular melanoma, sarcoma and other vascular primary tumors of the body.

Complications

Most common complications include infection, damage to the blood vessel, bruising or bleeding at the puncture site, and post embolic syndrome (flu-like symptoms that resolve within a week). Reaction to chemotherapy may include nausea, hair loss, a decrease in white blood cells, a decrease in platelets and anemia. TACE traps most of the chemotherapy drug in the liver, so these reactions are usually mild. Major complications may include infection in the liver, or damage to the liver. Approximately 1:100 procedures result in death, usually due to liver failure.

Nursing Considerations

Pre-Procedure:

- Informed consent
- Sedation-Does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision? This procedure usually requires an overnight bed
- IV access is required. Prefer right arm as procedure often done transradially via left radial artery. A #20-gauge IV cannula is preferred.
- Bloodwork- recent results for HGB, PLT, INR, PTT, CR and eGFR, and LFT (Liver function studies). Usually within one week for in-patients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?

- The contrast pump is usually required. If eGFR <60, notify MRP for hydration orders.
- Pre medication with anti-emetics (Decadron and Ondansetron), as well as Morphine and Ativan are common.
- If the patient has a neuroendocrine (carcinoid) tumor, an Octreotide infusion and subcutaneous injection may be required. Octreotide is used to prevent carcinoid crisis, which is characterized by facial flushing, hypertension, that may be followed by shock and hypotension.
- **For femoral access**- assess CWSM of both feet, including femoral, DP and PT pulses.
- **For radial access**- assess CWSM of arm including brachial, radial and ulnar pulses.
- Ensure Barbeau test is done prior to radial procedure. Apply EMLA cream to site covered by a Nitroglycerin 0.4mg/hr patch. (conventional or distal radial)
- **For radial procedures**, medications are prepared for sterile injection after arterial access. These medications prevent vasospasm and thrombosis. The three medications are:

  Heparin 50 units per kg for 4 or 5Fr sheath; 75 units per kg for 6Fr or greater. Heparin boluses are given every 60 minutes during the procedure to prevent thrombosis

  Verapamil 2.5 mg

  Nitroglycerine 200 mcg
- These medications will be drawn up onto the sterile field by the RN at the time of the procedure and will be administered by the IR Physician.
- Shave prep if necessary

Intra Procedure:

- Configure room and table for procedure (must determine arterial access approach prior to positioning patient).
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.

- For distal radial access use the First Radial Drape pack as it provides coverage.
- For regular radial access use the extremity drape.
- Ultrasound is required for arterial access.
- Prepare the contrast pump.
- Prepare an arterial flush line if femoral approach.

Post Procedure:

- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).
    - If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.

- **Radial procedure**- Transradial Band (TR Band) with a Statseal will be used. Once the sheath is removed, the band is applied and approximately 3-7mls of air is injected into the cuff. Within 10-15 minutes, 2-3 ml of air is usually removed at 10-15 minutes intervals until all the air is removed from the band. The TR Band is then left in place for another 15-30 minutes before removal.
    - Follow physician orders for the deflation protocol for the TR (transradial) band.
    - Place O2 Saturation probe on the thumb of the left hand if left radial approach.
    - **Radial procedure**-Assess site for signs of hematoma/bleeding. Assess CWSM and pulses of affected arm and inform IR physician of any change from baseline.
    - Patient may mobilize immediately if safe post sedation. Patient to avoid putting pressure/pushing on affected arm.

- **Femoral and Radial**-A band-aid or Statseal with transparent dressing may be used. Discharge teaching for the patient should include band-aid/ Statseal removal in 24 hours. IF a Statseal is used, the patient should allow the brownish powder residue to fall off on its own, rather than scrub it off.
    - Patient is to avoid heavy lifting and strenuous activity for 48 hours.
    - Patient can shower in 24 hours.
    - Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given (including radial cocktail and sedation). These patients will usually go to a recovery area after hemostasis (PCC) of be admitted to a ward.

Chemoembolization- Tray Supplies

- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover
- 2 Shower Caps
- Closed Drainage System
- Regular Namic tubing (not required for radial procedures)
- 120cm high pressure (1200 psi) pump tubing

Additional Supplies

- ACF or single wall needle if femoral approach
- Vascular sheath – depends if femoral or radial
- Wires– depends if femoral or radial
- Catheter – – depends if femoral or radial
- Statseal (add at end of procedure. Do not get wet)
- If difficult access- micro-puncture set may be required
- Microcatheter and wire to be determined by radiologist
- Green transfer adapter to draw up sterile medications
- Sterile green towels and chemotherapy disposal bucket
- Chemotherapy **SPILL KIT** should be in room

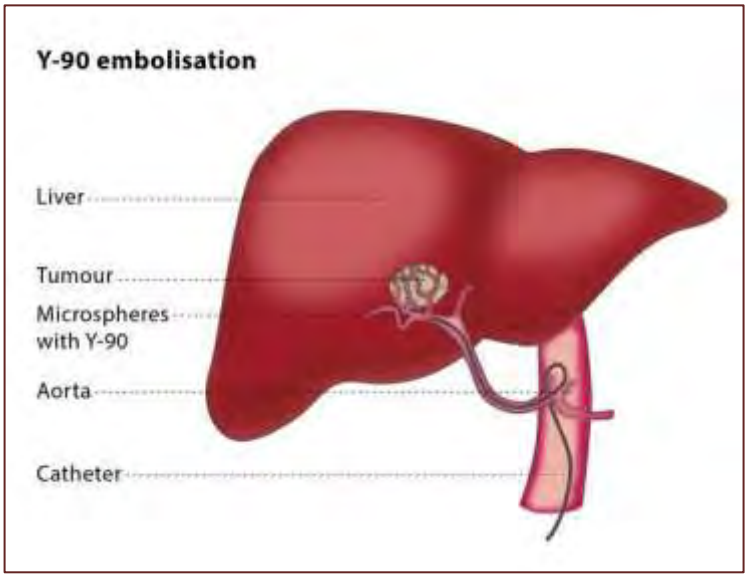
Basic Radial Supplies

- As above, the femoral basic tray plus:
- 1 extra shield cover
- 1 extra 20 ml syringe and one 5ml syringe for the TR Band
- 1 green transfer adapter
- Extremity Drape or Radial First Drape
- 1 large and 2 small transparent dressings
- 1 pack drape towels

Additional supplies: TR band and Red Statseal (at end of procedure)

Yittrium 90 (Y90)

Y90 embolization (radioembolization) is a minimally invasive procedure that combines embolization and radiation therapy to treat liver cancer. Tiny glass or resin beads filled with the radioactive isotope Y90 are placed inside the vessels that feed a tumor. This therapy blocks the blood supply to the cancer cells and delivers a high dose of radiation to the tumor while sparing normal tissue. This treatment can help extend the lives of patients with inoperable tumors and improve their quality of life.



Google Image - CIRSE

Indications

Y90 embolization is used to treat tumors that were initially formed in the liver or have metastasized to the liver. This is a palliative treatment, which means it does not provide a cure, but helps to slow down the growth of the disease and alleviate symptoms. This procedure is an option for patients who are not liver transplant or surgical candidate.

Complications

General risks of Y90 embolization include the following: infection, damage to the blood vessel, bruising or bleeding at the site, and a risk that the

microspheres lodge in the wrong place increasing the risk of an ulcer in the stomach or duodenum.

Nursing Considerations

Pre-Procedure:

- Informed consent
- Sedation-Does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- IV access is required. Prefer right arm as procedure often done trans-radially via left radial artery. A #20-gauge IV cannula is preferred.
- Bloodwork- recent results for HGB, PLT, INR, PTT, CR and eGFR, and LFT (Liver function studies). Usually within one week for in-patients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- The contrast pump is usually required. If eGFR <60, notify MRP for hydration orders.
- To prevent post procedure nausea and vomiting, Ondansetron 8 mg IV and Dexamethasone 8 mg IV are usually given.
- If the patient has a neuroendocrine (carcinoid) tumor, an Octreotide infusion and subcutaneous injection may be required. Octreotide is used to prevent carcinoid crisis, which is characterized by facial flushing, hypertension, that may be followed by shock and hypotension.
- The patient may go home the same day as procedure
- **For femoral access**- assess CWSM of both feet, including femoral, DP and PT pulses.
- **For radial access**- assess CWSM of arm including brachial, radial and ulnar pulses.
- Ensure Barbeau test is done prior to radial procedure. Apply EMLA cream to site covered by a Nitroglycerin 0.4mg/hr patch. (conventional or distal radial)

- **For radial procedures**, medications are prepared for sterile injection after arterial access. These medications prevent vasospasm and thrombosis. The three medications are:
  Heparin 50 units per kg for 4 or 5Fr sheath; 75 units per kg for 6Fr or greater. Heparin boluses are given every 60 minutes during the procedure to prevent thrombosis
  Verapamil 2.5 mg
  Nitroglycerine 200 mcg
- These medications will be drawn up onto the sterile field by the RN at the time of the procedure and will be administered by the IR Physician.
- This procedure is done in conjunction with the Nuclear Medicine Department. Two nuclear medicine technologists will set up to administer the radioactive Y90 dose. Due to the radioactive nature of Y90, the angio suite is locked down, including control room once the Y90 vial is spiked (NO ONE CAN ENTER or LEAVE at this point in the procedure).
- The floor must be lined with disposable, waterproof drapes under and around the procedure area, as well as under the nuclear medicine preparation area.
- Shave prep if necessary

Intra Procedure:

- Double booties must be worn.
- Configure room and table for procedure (must determine arterial access approach prior to positioning patient).
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- For distal radial access use the First Radial Drape pack as it provides coverage.
- For regular radial access use the extremity drape.
- Ultrasound is required for arterial access.
- Prepare the contrast pump.

- Prepare an arterial flush line if femoral approach.
- The nuclear medicine technologist will be set up on the opposite side of the suite to prepare the Y90 dose for administration. Once the microcatheter is in the chosen location for delivery of dose, the nuclear medicine technologist will begin the safety checklist for administration. The radiologist administers the dose and safely disposes of the syringes into the bucket provided by nuclear medicine. The radiologist must change gloves between each dose. The gloves must also go in the bucket.

Post Procedure:

- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).
    - If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.

- **Radial procedure**- Transradial Band (TR Band) with a Statseal will be used. Once the sheath is removed, the band is applied and approximately 3-7 mls of air is injected into the cuff. Within 10-15 minutes, 2-3 ml of air is usually removed at 10-15 minutes intervals until all the air is removed from the band. The TR Band is then left in place for another 15-30 minutes before removal.
    - Follow physician orders for the deflation protocol for the TR (transradial) band.
    - Place O2 Saturation probe on the thumb of the left hand if left radial approach.

- Assess site for signs of hematoma/bleeding. Assess CWSM and pulses of affected arm and inform IR physician of any change from baseline.
- Patient may mobilize immediately if safe post sedation. Patient to avoid putting pressure/pushing on affected arm.

- **Femoral and Radial**-A band-aid or Statseal with transparent dressing may be used. Discharge teaching for the patient should include band-aid/ Statseal removal in 24 hours. IF a Statseal is used, the patient should allow the brownish powder residue to fall off on its own, rather than scrub it off.
  - Patient is to avoid heavy lifting and strenuous activity for 48 hours.
  - Patient can shower in 24 hours.
  - Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given (including radial cocktail and sedation). These patients will usually go to a recovery area after hemostasis (PCC) of be admitted to a ward.

In the event of a SPILL, the nuclear medicine technologist will take control of the room. They will advise to contain the spill.

At the end of all Y90 procedures, the hands, feet, and angio tray are scanned with a Geiger counter. Only after being scanned, may staff leave the room.

- The patients who receive Y90 treatment will travel to nuclear medicine at an arranged time post procedure. They will need to be accompanied by an RN or LPN for monitoring. They can usually be discharged in 2 to 6 hours post procedure. They will be given a prescription, discharge instructions and travel document prior to discharge.

Y90- Tray Supplies

- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One way stopcock
- 1 Shield Cover
- 2 Shower Caps
- Closed Drainage System
- Regular Namic tubing (not required for radial procedures)
- 120cm high pressure (1200 psi) pump tubing

Additional Supplies

- ACF or single wall needle if femoral approach
- Vascular sheath – depends if femoral or radial
- Wires– depends if femoral or radial
- Catheter – – depends if femoral or radial
- Statseal (add at end of procedure. Do not get wet)
- If difficult access- micro-puncture set may be required
- Microcatheter and wire to be determined by radiologist
- Green transfer adapter to draw up sterile medications
- Two packs of green sterile towels

Basic Radial Supplies

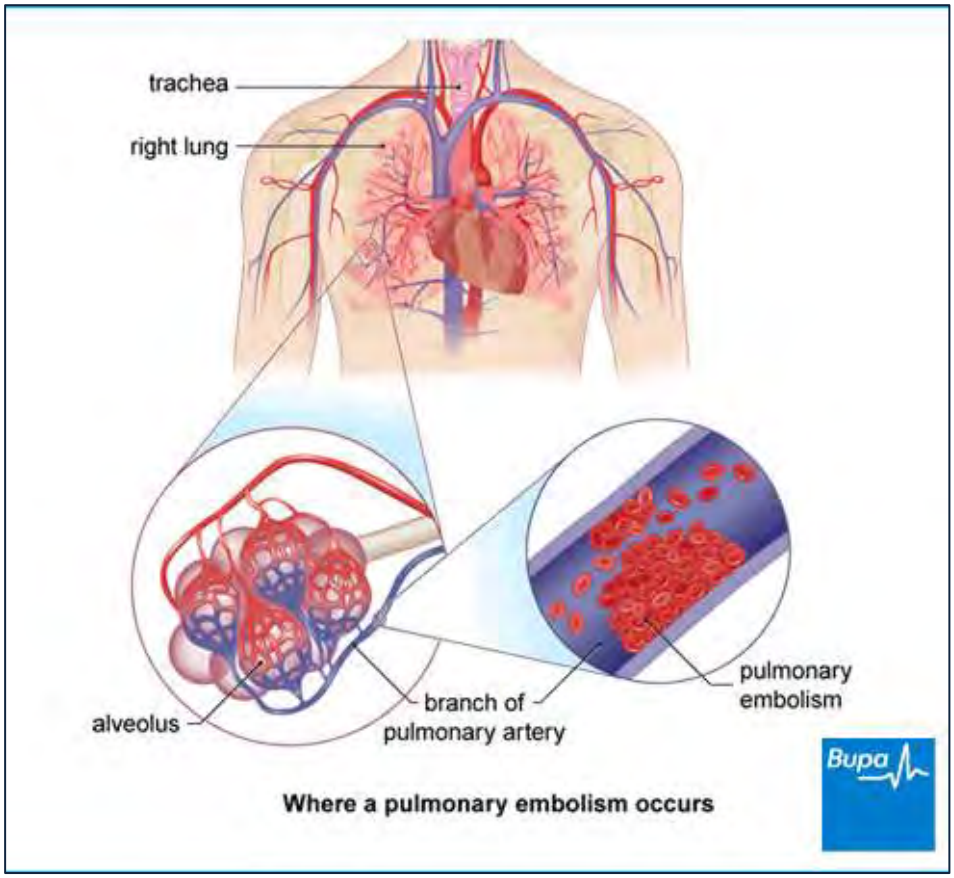
- As above, the femoral basic tray plus:
- 1 extra shield cover
- 1 extra 20 ml syringe and one 5ml syringe for the TR Band
- 1 green transfer adapter
- Extremity Drape or Radial First Drape
- 1 large and 2 small transparent dressings
- 1 pack drape towels

Additional supplies: TR band and Red Statseal (at end of procedure)

Pulmonary Thrombolysis

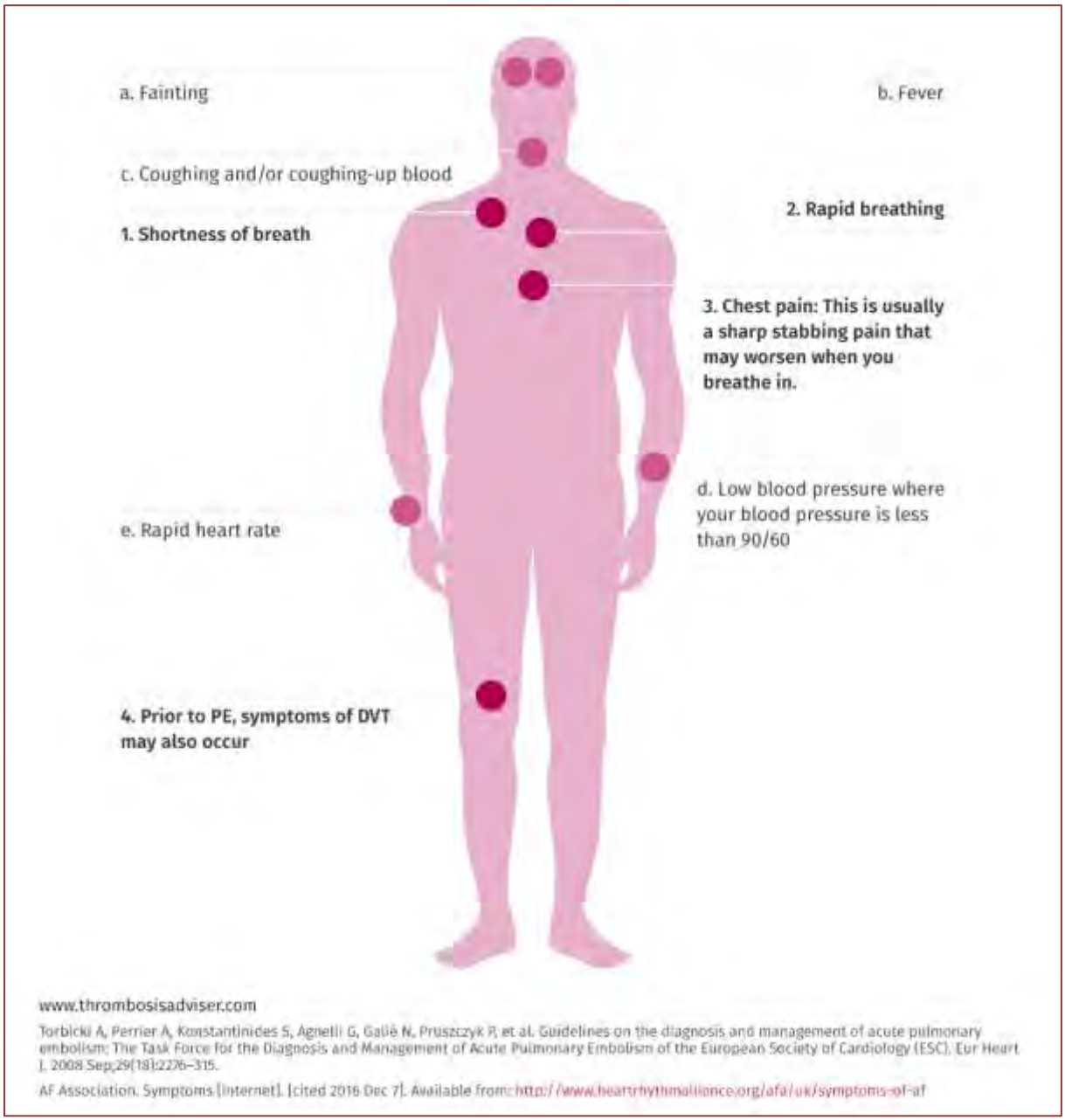
Pulmonary embolism (PE) is a thrombotic disorder. Pulmonary thrombolysis uses TPA (tissue plasminogen activator) to form plasmin, resulting in the accelerated lysis of thrombi. Pulmonary emboli are an emergent condition that may lead to death if untreated. A blockage occurs in the pulmonary artery preventing blood flow to the lungs. Signs and symptoms vary from patient to patient, but they usually include shortness of breath, rapid breathing, chest pain (sharp, stabbing pain that worsens when you breathe in) and a deep vein thrombosis (DVT) (may occur).

A Pulmonary Embolism Response Team (PERT) Protocol for Diagnostic Radiology will be initiated. (This does not currently occur at all IR sites in LMMI)



Google Image – BUPA

Signs and Symptoms



Indications

Indications for pulmonary thrombolysis include the following: persistent hypotension, or shock due to acute PE (systolic blood pressure < 90mmhg or a decrease in systolic blood pressure by > 40mmhg from baseline).

Complications

General risks of pulmonary thrombolysis include the following: bleeding, cerebral hemorrhage, hematoma, pulmonary artery rupture and massive hemoptysis.

Nursing Considerations

Pre-Procedure:

- Informed consent from patient or designated person
- NPO as per fasting guidelines
- Bloodwork- recent HGB, PLT, INR, PTT, CR, eGFR
- Sedation- Patient may require conscious sedation or may be intubated and sedated. These patients are often in ICU.
- If eGFR < 60, notify MRP for hydration orders if appropriate.
- This will be a right jugular approach. They will require one or two sheaths to be inserted, depending if one or both lungs are affected.
- An In-Patient bed must be arranged prior to start of treatment. The receiving units (PACU/ICU/CCU) must be informed of intent to treat with TPA, so appropriate bed and staffing is available.
- All venous TPA patients must be accompanied by the IR nurse or critical care nurse after the initiation of TPA during transport to the receiving unit. The IR nurse must give report to the receiving nurse.
- Cross-match 2 units Packed Red Blood Cells (PRBCs)
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met? These patients may be on heparin infusions or other recently administered anticoagulants and still be approved for immediate treatment.

- Assess neuro vital signs and document.
- Patient will need a Foley catheter inserted.
- Ensure four channels of Alaris pump are available.
- Shave prep if necessary

Intra Procedure:

- Configure room for right jugular access.
- Full monitoring required (BP, ECG, Resp, O2 Sat, ETCO2).
- Ensure a wide shaved prep area prior to draping. The catheter and sheath will require extra- large Tegaderm dressings post procedure.
- Contrast pump may be used. TPA procedures are usually done with hand injections of contrast.
- Ultrasound is required for access.
- A bolus dose of TPA may be requested. TPA is kept in medication fridge at nursing station. Each 2 mg vial needs to be reconstituted with 2.2mls of sterile water prior to administration.
- If the Angiojet is required, a pre-mixed bag of 10 mg of TPA in 50mls of NS (Normal Saline) or 20 mgs in 100mls of NS must be available.
- At the conclusion of the procedure, there will be 1 to 2 vascular sheaths and 1 to 2 infusion catheters. The vascular sheaths may be hooked up to Heparin or TPA infusions. The infusion catheters may be hooked up to TPA infusions. The infusion rates will be determined by the IR physician.
- TPA appropriate tubing (no ports) should be used for the IV TPA infusions.
- A Steristrip with tabs at each end, should be applied to the infusion catheter where it enters the sheath, to mark the intended location. Further Steristrips should be used to secure the sheath(s) as well as coils of the infusion catheter. Extra- large Tegaderms may be used to secure the sheath and catheters.

- If TPA is being used in the treatment of pulmonary embolus, a three way stop cock must be added and accessible to the ICU staff for pulmonary artery pressure monitoring.

Post Procedure:

- Most of these patients will be on strict bed rest.
- No IM (intramuscular) injections.
- Ensure adequate analgesia as patient will be on prolonged bed rest and may experience increased discomfort due to reperfusion.
- Ensure TPA and heparin infusions are infusing. The infusion catheter may be buried in thrombus and therefore the pressure limits on the Alaris Pump may need to be increased to overcome the resistance. If the pump continues to alarm downstream pressure with maximum pressure limit, notify IR Physician. The Physician may need to pull back the infusion catheter slightly.
- Ensure no kinks in the infusion catheters.
- Check the insertion sites for oozing.
- Neuro vitals should be checked after the administration of TPA and on an on-going basis.
- After completion of documentation, IR RN or Critical Care nurse must accompany patient to ward. Show RN treatment site and explain the tubings and infusions.
- If there is any noticeable change in the patient's NVS, inform IR Physician immediately and discuss stopping the TPA infusion. This systemic TPA administration can lead to cerebral hemorrhage and death.

Pulmonary Thrombolysis Tray Supplies

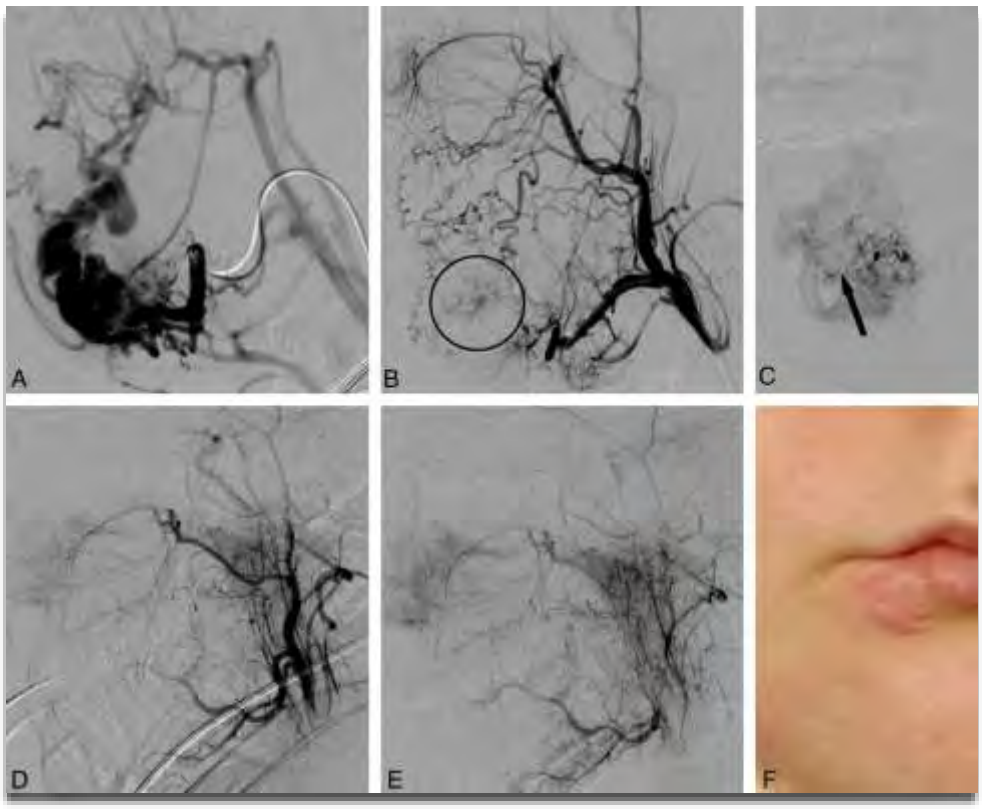
PE TPA – use basic angiogram femoral tray supply list. A pediatric lap drape may be added.

Additional Supplies

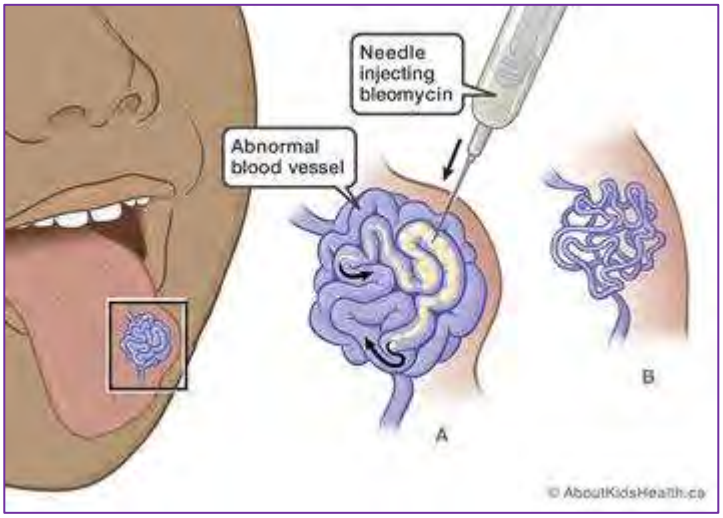
- Micro-puncture sets are often used for access. ACF or single wall needle may also be used.
- Vascular sheath(s)
- Infusion catheter(s) or infusion wire(s)
- Diagnostic catheter
- Wires – Bentson, Terumo, based on physician preference
- Angiojet or other clot retrieval removal systems-
  See IR Device Catalogue for instructions on “how to use”.

Sclerotherapy- Neuro

Sclerotherapy is the injection of a sclerosant agent (glue, onyx, alcohol and bleomycin) into a vascular malformation in the head or neck. Usually this is done through a direct puncture into the lesion but may also be done intra-arterially. Sclerotherapy aims to induce endothelial damage, inflammation and eventually thrombosis of the vessel.



Google Image- American Journal of Neuroradiology



Google Image- About Kids Health

Indications

Indications include head and neck vascular (high and low flow) malformations and lymphangiomas. A vascular malformation that has an arterial blood pressure is called “High Flow” and is usually characterized by pain and a sense of pressure. “Low Flow” malformations, such as venous malformations and lymphatic malformations cause problems such as seeping of blood and lymph through skin, pain, inflict cosmetic annoyance and exposes the patient to infection.

Complications

General risks include- skin blistering and ulceration, infection, bleeding and skin discolouration.

Nursing Considerations

Pre-Procedure:

- Informed consent

- NPO according to fasting guidelines
- IV access is required.
- Preoperative checklist is required, if anaesthesia involved.
- Anaesthesiology may be involved as patient may require a MAC or a general anaesthetic. Transportation home with a responsible adult is required for all short stay sedation patients.
- Bloodwork – recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for in-patients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- These procedures may be done on an outpatient or inpatient basis. Depending on the location of lesion, complexity of lesion and embolic used, the patient may be discharged the same day or require overnight monitoring. Assure appropriate recovery bed is available.
- If Bleomycin is being used, the physician may want to combine with Albumin 25%. If Albumin is required, blood consent must be obtained and must be picked up from Blood Bank.

Intra Procedure:

- Configure room as per neuro setup
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- For skin preparation, use un-tinted chlorohexidine cleaning solution. It is important to visualize the skin to determine if there is any blanching or redness occurring.
- If access is required near the eye or in the mucous membrane (ie. tongue), you may only be able to clean the skin with saline.
- If Bleomycin is being used, cytotoxic precautions should be followed by those handling and disposing of syringe and other materials used for procedure. Chemo bucket must be in room. As the Bleomycin is given intra-lesionally, and not systemically, the patient does not need to be on full cytotoxic precautions post procedure.

Post Procedure:

- Small dry dressing with paper tape may be applied over injection site
- Assess site for blanching, blisters, redness, swelling, bleeding and difficulty swallowing or breathing
- In some cases with small lesions and minimal treatment, the patient may go home 1-2 hours post procedure. Many patients will stay for 4-6 hours for monitoring. Other patients with extensive treatments may require overnight stay in hospital
- **Femoral Procedure**- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.

Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.

Tray Supplies- Sclerotherapy- Neuro

For Direct Punctures

- Small trolley
- 3 pack of gowns
- Fistulogram drape pack
- Depending on location and size of treatment area, drape towels or aperture drape may be sufficient
- 3 way stop cock
- T connector extension tubing
- Ultrasound with small hockey stick probe and cover

Additional Supplies

- Chemo bucket and green adapter pin if Bleomycin used
- Access needles- 30-gauge needle, Insyte #22 or other size
- If intra-arterial access see "Cerebral Angiogram" for tray supplies

Sclerotherapy- Body

Sclerotherapy is the injection of a sclerosant agent (glue, onyx, alcohol and bleomycin) into a vascular malformation. Sclerotherapy aims to induce endothelial damage, inflammation and eventually thrombosis of the vessel. Usually this is done through a direct puncture into the lesion but may also be done intra-arterially.

Google Image- ResearchGate

Indications

Indications for treatment can include hemorrhage and hemodynamic problems such as high output cardiac failure or secondary ischemic complications. A vascular malformation that has an arterial blood pressure is called “High Flow” and is usually characterized by pain and a sense of pressure. “Low Flow” malformations, such as venous malformations and lymphatic malformations cause problems such as seeping of blood and

lymph through skin, pain, inflict cosmetic annoyance and exposes the patient to infection.

Sclerotherapy can also be used to treat patients with pain that limits their everyday activities.

Complications

Sclerotherapy is generally well tolerated but may induce local pain and swelling and in rare cases necrosis of the skin and nerve injury.

Nursing Considerations

Pre-Procedure:

- Informed consent
- NPO according to fasting guidelines
- IV access is required.
- Preoperative checklist is required, if anaesthesia involved.
- Anaesthesiology may be involved as patient may require a MAC or a general anaesthetic. Transportation with a responsible adult is required for short stay sedation patients.
- Bloodwork – recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for in-patients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- These procedures may be done on an outpatient or inpatient basis. Depending on the location of lesion, complexity of lesion and embolic used, the patient may be discharged the same day or require overnight monitoring. Assure appropriate recovery bed is available.

- If Bleomycin is being used, the physician may want to combine with Albumin 25%. If Albumin is required, blood consent must be obtained and must be picked up from Blood Bank.

Intra Procedure:

- Configure room as per body setup
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- For skin preparation, use un-tinted chlorohexidine cleaning solution. It is important to visualize the skin to determine if there is any blanching or redness occurring.
- If Bleomycin is being used, cytotoxic precautions should be followed by those handling and disposing of syringe and other materials used for procedure. Chemo bucket must be in room. As the Bleomycin is given intra-lesionally and not systemically, the patient does not need to be on full cytotoxic precautions post procedure.

Post Procedure:

- Small dry dressing with paper tape may be applied over injection site
- Assess site for blanching, blisters, redness, swelling, bleeding and difficulty swallowing or breathing
- **Femoral Procedure**- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.

Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.

- These patients may be treated on an in-patient or out-patient basis. They will usually require a minimum 4 hour stay but may require an overnight bed.

Tray Supplies- Sclerotherapy- Body

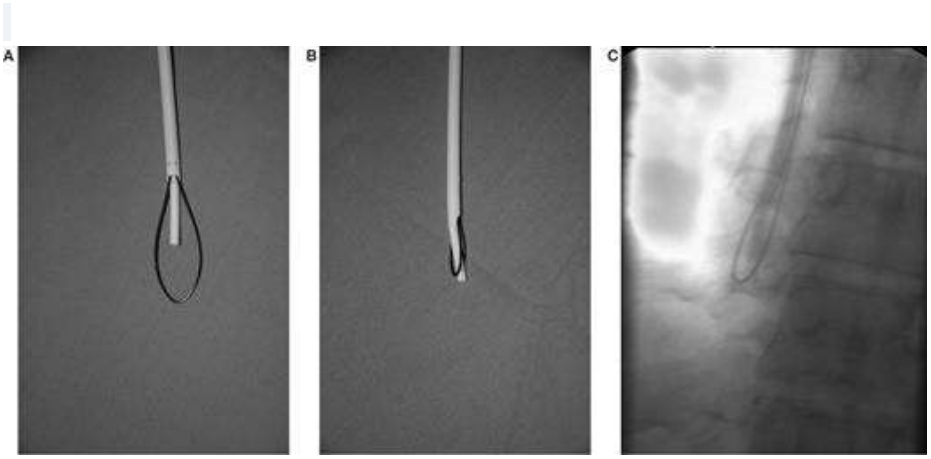
- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover and 1012 drape
- Three-way stopcock (may require multiple)
- 1 Shield Cover
- 2 Shower Caps
- Regular Namic tubing – only if intra-arterial treatment
- 10 ml syringe- approximately 9. Label with coloured sterile stickers.
    - White Label- Lipiodol 10 ml syringe
    - Yellow Labels- 3 -10 ml syringes for Thromboject 3%
    - Green Labels- 2-10 ml syringes for Saline
    - Blue Labels-2-10 ml syringes for Contrast
    - Red Label- 1-10 ml for Dehydrated Alcohol 100%

Additional Supplies

- Access needle- Insyte, butterfly or percutaneous thin-wall entry needle (variety of sizes available).
- T connector extension set
- ACF or single wall needle only if intra-arterial
- Micro-puncture set may be required
- Vial of Lipiodol
- Vial of Dehydrated 100% Alcohol
- Thromboject 3%- usually 3 vials
- Chemo bucket and green transfer pin if Bleomycin is used

Linogram +/- Stripping

A linogram is done to visualize the vena cava for evidence of catheter lumen narrowing and/or formation of a fibrin sheath at the end of central venous catheter tip inserted for long dwelling purposes. A one-way valve effect often forms where the radiologist may be able to flush, but not aspirate due to fibrin sheath formation along the catheter. A stripping of the indwelling catheter may be done using a snare.



(**A**) 0.089 cm glide wire forming an internal snare as it comes out of the proximal port of the haemodialysis catheter, thereby dislodging the fibrin sheath around the proximal catheter. (**B**) As the snare passes the distal port, the snare is tightened, allowing stripping of the posterior surface of the catheter. (**C**) Posterior stripping under fluoroscopy.

Nephrology Dialysis Transplantation, Volume 22, Issue 6, 1 June 2007, Pages 1762–1765

- Reddy AS, Lang EV, Cutts J et-al. Fibrin sheath removal from central venous catheters: an internal snare manoeuvre. Nephrol. Dial. Transplant. 2007;22 (6): 1762-5. doi:10.1093/ndt/gfm154 - Pubmed citation

Indications

A linogram is done to identify when a line is malfunctioning. A linogram can help determine if a line is mal-positioned, kinked, or blocked by a blood clot or fibrin sheath.

A stripping is indicated when there is a fibrin sheath identified along the catheter.

Complications

Linogram have minimal associated risks, other than potential for contrast reaction. If a line stripping is required there is an associated risk of infection, damage to the blood vessel, bleeding and bruising at the site. The line may also become damaged and need to be replaced.

Nursing Considerations

Pre-Procedure:

- **For linogram only**, informed verbal consent is adequate
- As linograms only include an injection of contrast, but no venous puncture, no sedation or accompanied ride home required.
- Bloodwork- Need a CR, eGFR
- **For a line stripping** (femoral access)
- For a line stripping, written informed consent must be obtained
- Sedation – does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate responsible adult, if out-patient (OP).
- Bloodwork – recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for in-patients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Shave prep if necessary
- These procedures can be done with local anaesthesia only. Check with patient to assess need for sedation. IV insertion PRN

Intra Procedure:

- Configure the room for femoral venous access

- Ultrasound is required for venous access
- Patient will be supine on the IR table
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.

Post Procedure:

- Manual pressure for 5 to 10 minutes post sheath removal is usually adequate.
- Band-aid or Stat Seal can be used at insertion site
- Monitor insertion site for hematoma and bleeding q15min x 1 hour
- Bed rest for one hour with affected leg straight
- May go home in one hour if site satisfactory and stable.

Tray Supplies- Linogram+/- Stripping

- Long trolley
- Angiogram tray
- Fistula drape pack OR Femoral drape pack
- Kidney basin/paint tray/sharps cushion (sharps disposal)
- 1 small instrument set
- 3 pack of sterile gown
- 2 packs of radiopaque gauze
- Ultrasound probe cover
- 1 one-way stop cock
- 1 shield cover
- 2 shower caps

Additional Supplies

- Sheath (ensure compatible with chosen snare)
- Catheter
- Wire
- snare

Peritoneal Dialysis Catheter Manipulation (PD Catheter)

Peritoneal dialysis is a form of dialysis that uses a catheter placed in the lining of the abdomen (the peritoneum), and a dialysate to clean the blood. The PD catheter is placed surgically, percutaneously by the Nephrologist on the dialysis unit, or using imaging guidance. After placement the PD catheter may migrate into a less dependent position, making the draining of the dialysate ineffective. Effective dialysis will not be achieved. A peritoneal catheter may need to be manipulated to reposition the catheter, so it may drain the dialysate freely.

FIGURE 3 X-ray of the catheter guide bent to form a slight curve and introduced into the catheter. Its end lies near the tip of the catheter.

FIGURE 4 The catheter guide has been switched and the catheter tip is situated in the lower abdomen.

Google Image – advancesinpd

Indications

PD manipulations may be required to reposition the catheter for effective dialysis. The catheter is inserted surgically, and this procedure may prevent the need for surgical revision.

Complications

There is a risk that the manipulation won't succeed or may not stay in new position and there is a risk of peritonitis.

Nursing Considerations

Pre-Procedure:

- Informed consent
- Patient should have a ride home.
- NPO as per fasting guidelines
- May be done on inpatient or outpatient basis. Many patients will require sedation, as it can be uncomfortable.
- Bloodwork-within a month. No fresh tract or puncture required for this procedure. If patient not on blood thinners, INR and PTT not required. If on blood thinners, follow Management Guidelines for patients having elective procedures in Medical Imaging.
- IV access is usually required for sedation.

Intra Procedure:

- Configure room like a femoral angiogram.
- Patient will be supine on the IR table
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- Remove the dressing and cap from existing PD catheter. Dispose of the cap. A new cap must be placed at the end of the procedure. Clean the skin and catheter with untinted Chlorhexidine solution with 70% ETOH.
- Drape the patient. Contrast pump and ultrasound are not required

Post Procedure:

- Replace with new PD cap at end of procedure and apply dressing.
- Patients will usually go to the Peritoneal Dialysis Unit following the manipulation to receive antibiotics (via the PD Catheter), to prevent peritonitis. The outpatient will be discharged for the PD unit. Inpatients may go directly back to the ward or go to PD unit. Call PD unit to inform them procedure is complete.

Tray Supplies- Linogram+/- Stripping

- Long trolley
- Angiogram tray
- Femoral drape pack
- Kidney basin/paint tray/sharps cushion (sharps disposal)
- 1 small instrument set
- 3 pack of sterile gown
- 2 packs of radiopaque gauze
- 1 shield cover
- 1shower caps
- USE UNTINTED CHLORHEXIDINE with 70% ETOH on catheter

Additional Supplies

- Wire- may use Stiff Terumo, Super Stiff Amplatz, or the PD catheter Manipulator (aka Catheter Guide from MDRD)

Venous Sampling

A venous sampling is a diagnostic procedure that uses imaging guidance to insert a catheter into a specific vein and remove blood samples for laboratory analysis. Abnormal levels of certain substances in the blood may indicate a disease process.

Indications

1. **Adrenal Vein Sampling**- Is a procedure where blood is collected from the adrenal veins to confirm autonomous hormone production unilateral or bilateral. This test is the gold standard to localize sources of excess aldosteronism. It may also be used to detect Cushing Disease or syndromes of androgen excess.
2. **Renal Vein Sampling**- Is a procedure to measure the level of renal renin secretion. The test is used in select hypertensive patients with renal artery blockages who may benefit from renal artery dilation or surgery.
3. **Parathyroid Sampling**- Is a procedure where blood is taken from the area of the parathyroid glands in the neck to help locate abnormally functioning glands or pituitary adenoma. This procedure is often used after an unsuccessful neck exploration.
4. **Petrosal Sinus Sampling**- Is a procedure to test the ACTH-adrenocorticotropic hormone levels from the veins that drain the pituitary gland. Levels are tested to check whether a pituitary tumor is responsible for ACTH dependent Cushing Syndrome. ACTH levels in the inferior petrosal sinus are high compared to an ACTH drawn in the periphery in patients with central ACTH excess. In contrast, in ectopic ACTH conditions, the ACTH in the inferior petrosal sinus and the periphery should be similar because the tumour is located elsewhere.

Complications

General risks include damage to the blood vessel, bruising or bleeding at the puncture site, infection, development of a blood clot, and damage to the surrounding structures.

For adrenal vein sampling, rupture of the adrenal gland is a potential but rare complication.

For petrosal vein sampling, there is a risk of stroke.

Nursing Considerations

Pre-Procedure:

- Informed consent from patient or designated person
- NPO as per fasting guidelines
- Bloodwork- recent HGB, PLT, INR, PTT, CR, eGFR
- If eGFR < 60, notify MRP for hydration orders if appropriate.
- Sedation-Does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- IV access is required
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Petrosal Sinus Sampling is done with bilateral femoral vein access
- Adrenal and Renal Samplings may be done with jugular or femoral access
- These are often done as outpatient procedures with a 2 to 4 hour recovery period.
- It is essential that all specimens are labelled according to sample site. All samples must have date, time, and initials. Notify lab prior to start of sampling procedure.

- Adrenal venous sampling- patient may need to hold their blood pressure medication 24 hours prior and day of procedure. Check with IR physician.
- Petrosal Sinus Sampling- this procedure may require a dose of CRH (Acthrel) which is ordered with approval from Health Canada (Form A). Chemistry labs at VGH and SPH must be notified prior to the day of procedure and again when sampling starts. Samples are sent to VGH lab and processed. VGH lab then sends samples to SPH lab.
- Consider a Foley catheter for Petrosal Sinus Sampling as both groins will be accessed.
- A heparin bolus is often given due to the presence of the two guide catheters in the neck (Petrosal Sinus Sampling).
- These procedures often require a labelling chart.

Intra Procedure:

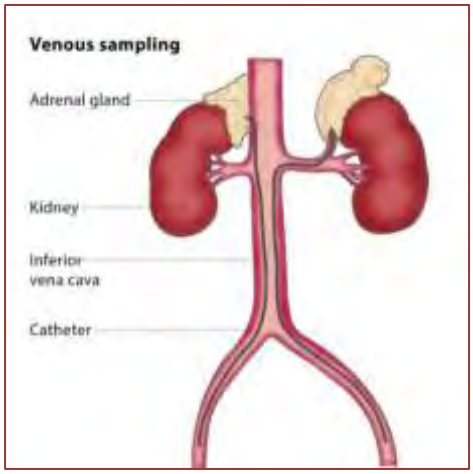
- Configure the room for femoral venous access
- Ultrasound is required for venous access
- Patient will be supine on the IR table
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- Additional staff will be required to be present for sample collection.
- Blood samples must be placed in plastic bag and then placed on ice.
- Attach copy of patient requisition to miscellaneous lab requisition, and attach sampling map if available.

Adrenal & Renal Venous Sampling- All specimens must be labelled accurately and have the location specified. 5ml lavender tubes are used for renin and catecholamines samples. 5 ml gold tubes are used for cortisol and aldosterone samples. Determine from physician, which samples you will require. Ensure you have at least 20 tubes of each colour available.

Samples should be drawn from:

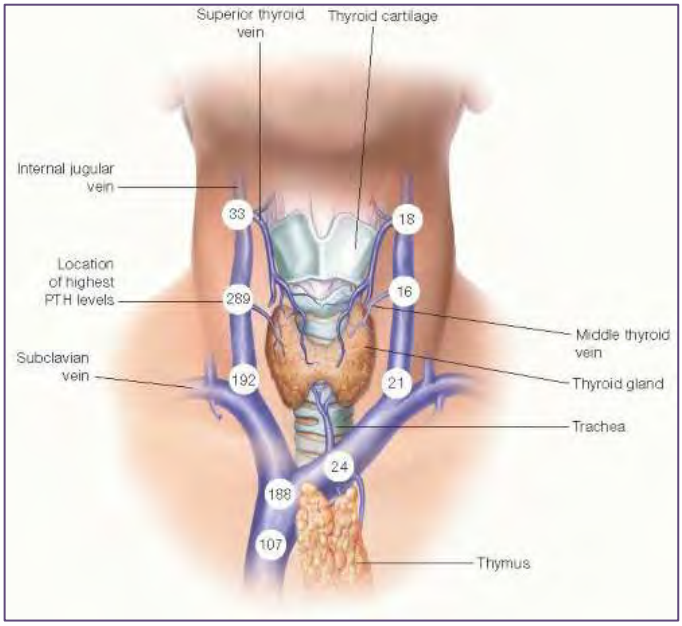
1. IVC above renal veins
2. IVC below renal veins

3. Right renal vein
4. Right adrenal vein
5. Left renal vein
6. Left adrenal vein

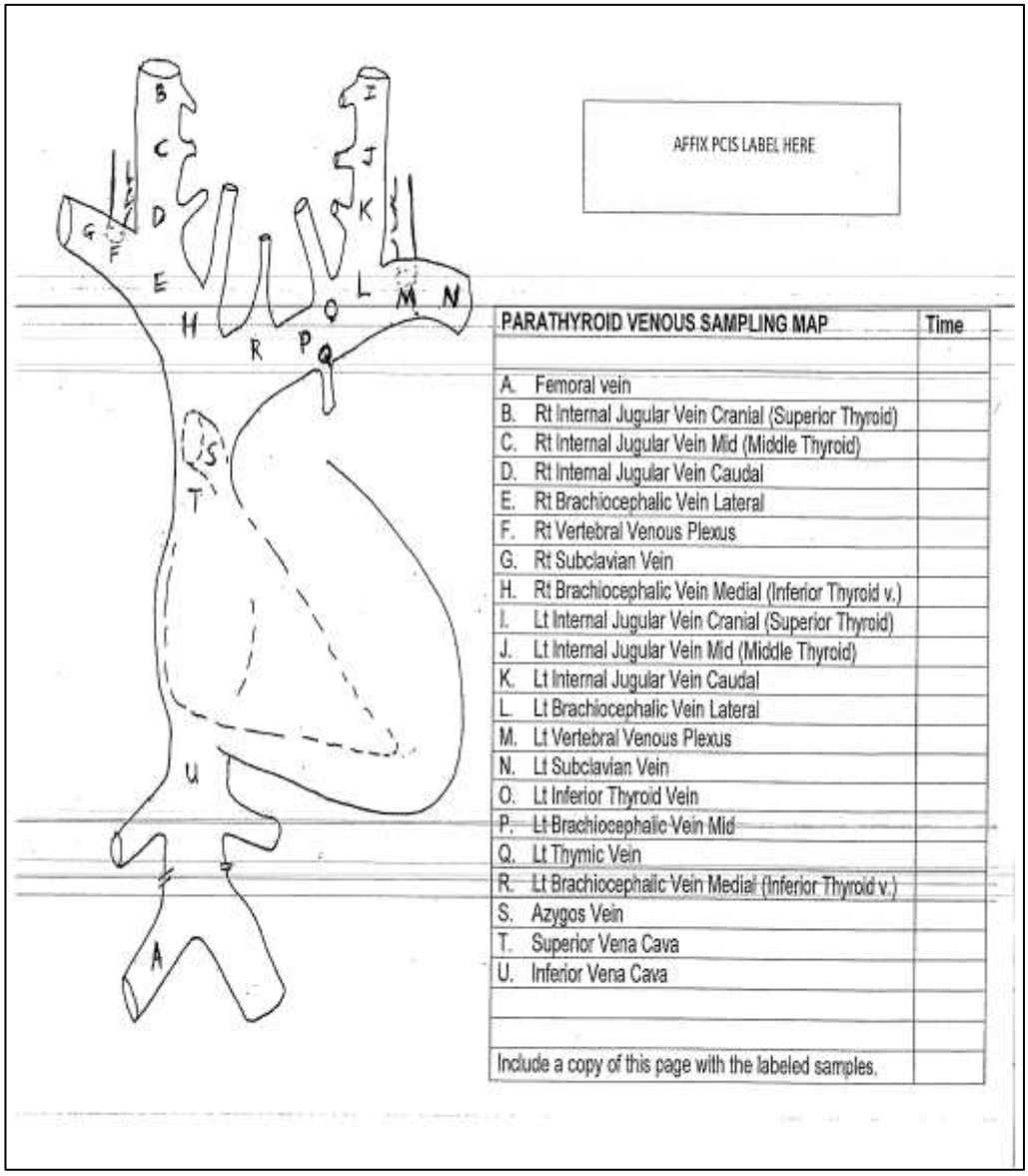


Google Image- CIRSE

Parathyroid Sampling- All specimens must be labelled (A-U) accurately and corresponding to the sampling map below. At least 21, 5ml lavender tubes should be available.



Google Image- Basic Medical Key



Petrosal Sinus Sampling- These procedures are usually performed by a Neuroradiologist. Bilateral groin sheaths are placed and bilateral guide catheters are positioned in the inferior petrosal sinus. A minimum of 18 5ml, lavender tubes will be used. See sample chart below for labelling of specimens.

A 1 mcg/kg dose of Acthrel is given during the procedure . Acthrel is reconstituted with 2 mls of Sodium Chloride using sterile technique. This will give a concentration of 50 mcg/ml. To avoid bubble formation, DO

NOT SHAKE, roll the vial to dissolve the drug. The sterile solution is then ready for injection by the physician. The drug should be administered over 30 seconds.

Suggested to have 3 people scrubbed (Nurse, Fellow, Staff) and 3 people un-scrubbed in room at time of sampling so each sample site has a buddy system to manage tubes. Samples are drawn simultaneously in to 3 cc syringes (inferior petrosal vein and femoral vein via 6 Fr sheath sidearm).

Patient Name:.....

Date: .....

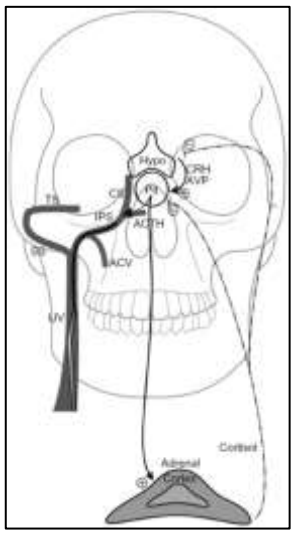
Sample Label Chart

Inferior Petrosal Sinus Sampling

Sample Label	Description	Location	Send For	Actual Time Drawn:
0 (gold tube)	Cortisol pre test	Femoral vein	Cortisol	
1A (lavender tube)	5 minute pre CRH	Right IPS	ACTH	
1B (lavender tube)	5 minute pre CRH	Left IPS	ACTH	
1C (lavender tube)	5 minute pre CRH	Femoral vein	ACTH	
2A (lavender tube)	1 minute pre CRH	Right IPS	ACTH	
2B (lavender tube)	1 minute pre CRH	Left IPS	ACTH	
2C (lavender tube)	1 minute pre CRH	Femoral vein	ACTH	
Give 1ug/ kg CRH IV (Acthrel). Actual dose given = ...ug at .....hrs				
3A (lavender tube)	3 minute post CRH	Right IPS	ACTH	
3B (lavender tube)	3 minute post CRH	Left IPS	ACTH	
3C (lavender tube)	3 minute post CRH	Femoral vein	ACTH	
4A (lavender tube)	5 minute post CRH	Right IPS	ACTH	
4B (lavender tube)	5 minute post CRH	Left IPS	ACTH	
4C (lavender tube)	5 minute post CRH	Femoral vein	ACTH	
5A (lavender tube)	10 minute post CRH	Right IPS	ACTH	
5B (lavender tube)	10 minute post CRH	Left IPS	ACTH	
5C (lavender tube)	10 minute post CRH	Femoral vein	ACTH	
6A (lavender tube)	15 minute post CRH	Right IPS	ACTH	
6B (lavender tube)	15 minute post CRH	Left IPS	ACTH	
6C (lavender tube)	15 minute post CRH	Femoral vein	ACTH	
7 (gold tube)	Cortisol post test	Femoral vein	Cortisol	

End of Test

Petrosal Sampling



Google Image- Dovepress.com

Post Procedure:

- Manual pressure for 5 to 10 minutes post sheath removal is usually adequate.
- Band-aid or Stat Seal can be used at insertion site
- Monitor insertion site for hematoma and bleeding
- Bed rest for one hour with affected leg straight
- May go home in 2-4 hours if site satisfactory and stable.

Basic Tray Supplies- Sampling- Adrenal, Renal, Parathyroid,

- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock

- 1 Shield Cover
- 2 Shower Caps
- Closed Drainage System
- Regular Namic tubing
- 120cm high pressure (1200 psi) pump tubing

Additional Supplies

- ACF or single wall needle
- Vascular sheath – usually 5 Fr
- Wires- Bentson, Terumo
- Catheter – 5 Fr Bern (Parathyroid), 5 Fr Cobra (Renal)
- Statseal (add at end of procedure. Do not get wet)
- If difficult access- micro-puncture set may be required
- Red blunt needles (21) Keep beside ice, do not put on angio tray
- Lab specimen tubes- Lavender and Gold top as per procedure
- Pre label all tubes as per sample map
- 5 ml syringes (21) or 10 ml syringes (21)
- Always have a few extra specimen tubes available
- Ice bucket

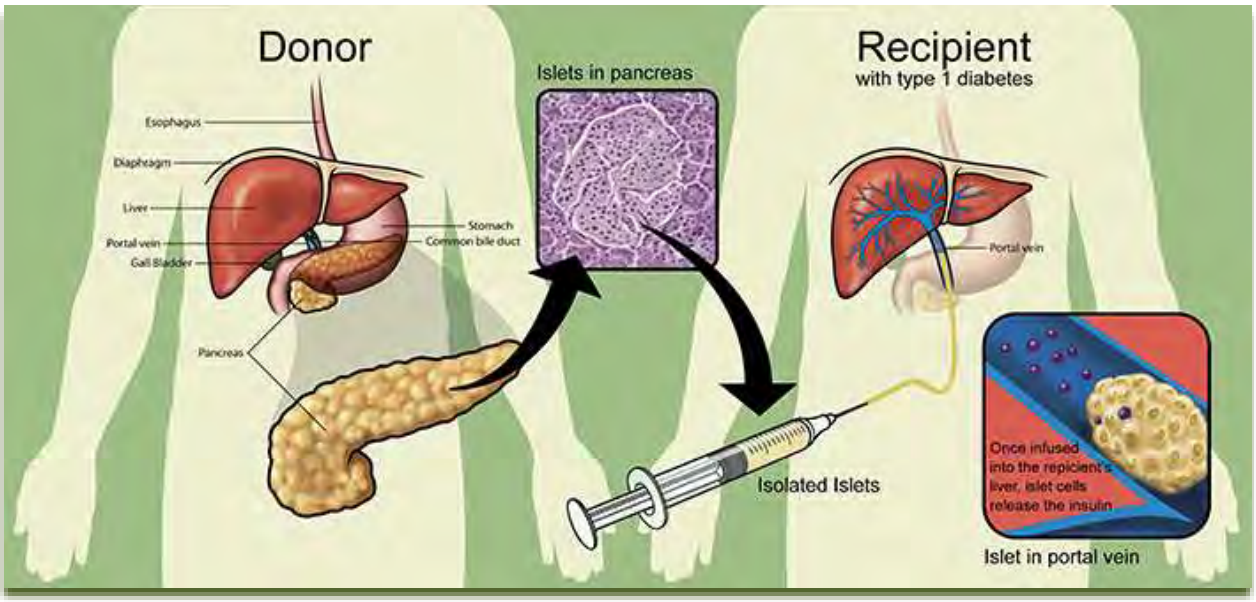
Tray Supplies- Sampling- Petrosal

See above for **Basic** Tray Supplies.

- Petrosal sampling requires 6 Namic tubings
- 2- 5 Fr Guider Soft tip Catheters
- 2- 1 Tip Renegade microcatheter
- Transend 0.014 Wire
- 1 ml medallion syringes (blue x2, white x2)
- 3 ml syringes (21)
- 5 Fr sheath in left femoral vein and 6 Fr sheath in right femoral vein
- 2 Gold top tubes for cortisol pre and post procedure
- 18 lavender top tubes for ACTH on ice

Islet Cell Transplant

Islet cell is the transplantation of isolated islets from a donor pancreas into another person. This is a treatment for Type 1 diabetes patients. Once transplanted, the islets begin to produce insulin, actively regulating the level of glucose in the blood. Although being free from insulin injections, may only last several months or a year, islet cell transplantation reduces episodes of low blood sugar for a longer time.



Google Image- McGill University Health Centre

Indications

Type 1 diabetes

Complications

Some risks of the islet cell transplant include bleeding in and around the liver, clotting of the portal vein, pain after the procedure, infection in the

portal vein and worsening liver function. Also, more than one treatment of islet cell transplant is often needed thus increasing the risks.

Side effects of the anti-rejection medication, known as immunosuppressants may also occur. Rejection of the islet cells may occur. Side effects of the immunosuppressants include higher risk of infection, cancer, vomiting, nausea & diarrhea, high blood pressure, high blood glucose levels, high levels of cholesterol and triglycerides in the blood and kidney damage.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. Will need two sites. One site will be utilized for the insulin infusion. The other site can be used for sedation and other medications. These patients will often come to radiology the day before the transplant for insertion of a PICC line. Patients who are having a second transplant, may already have a PICC line insitu.
- Sedation-Will require sedation. Are fasting guidelines met (NPO)?
- Prophylactic antibiotics are routine
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- Baseline glucometer at the beginning of the case and Q15 min. Call endocrinology if there is an increase or decrease in blood sugar level.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Islet Cell Transplant patients will be admitted the day before, or morning of procedure to the transplant unit. The patient will require hospitalization for a few days to monitor and adjust insulin requirements.

- The patient will require pre-medication to prevent rejection and will also receive a dose of antibiotics prior to procedure. Ensure Etanercept has been given or been brought down with patient.
- Ensure there is an Islet Infusion Summary form and Insulin Infusion Protocol with the paperwork.
- Insulin infusion 250 units in 250 ml normal saline (1 unit/ml) must be available and primed with Alaris Pump.

Intra Procedure:

- Patient will be supine on the IR table
- A second RN or LPN will be present for Q15min glucometers, sedation, and for administration of subcutaneous heparin when portal vein access is achieved.
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- The Radiologist will need access to the full-size ultrasound machine and mark the access site for skin preparation
- A wide skin prep is required. The drape may need to be cut to accommodate the prep area. Drape tape may be used to seal the edges of the drape.
- Dose of subcutaneous heparin 5000iu is usually required after portal vein access is achieved.
- When the portal vein access is ready, 3-way stopcock and 2 extension tubings are attached to the catheter. A half sheet and sterile gown are used to cover the sterile field. A small cut can be made in the half sheet to pass the extension tubings through to the transplant physician. The transplant physician will infuse the islets over 15-30 minutes and flush. It is the nurse's responsibility to maintain the sterile field. Once the transplant is complete, the sterile gown and half sheet can be disposed of, revealing the sterile field below.
- Glucometers need to continue Q15 min. A second RN is usually present for the ongoing glucometer checks and sedation.
- An arterial pressure set up is required

- Contrast pump may be required. (check with physician)
- Glue/Gelfoam supplies need to be available
- DAV style catheter should be accessible

Post Procedure:

- Apply manual pressure to site for 5 minutes. A band-aid or Statseal may be applied.
- These patients may have pain and a feeling of fullness. Adequate analgesia should be provided.
- Assess site for signs of bleeding
- Glucometers should be done Q15 min until transfer to Transplant Unit. Follow the insulin infusion protocol to titrate insulin infusion.

Tray Supplies- Islet Cell Transplant

- Long Trolley and Small Trolley (for the transplant team to use)
- Angiogram Tray
- Femoral Drape Pack
- Back table cover (for transplant table)
- Half sheet drape for transplant physician
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 10 count tray
- 1 small instrument set
- 3 pack sterile gowns plus an additional single gown
- 2 packs radiopaque gauze
- Ultrasound probe cover, 1012 Drape
- 1 One-way stopcock
- 1 Three-way stopcock
- 2 extension tubings
- 1 Shield Cover

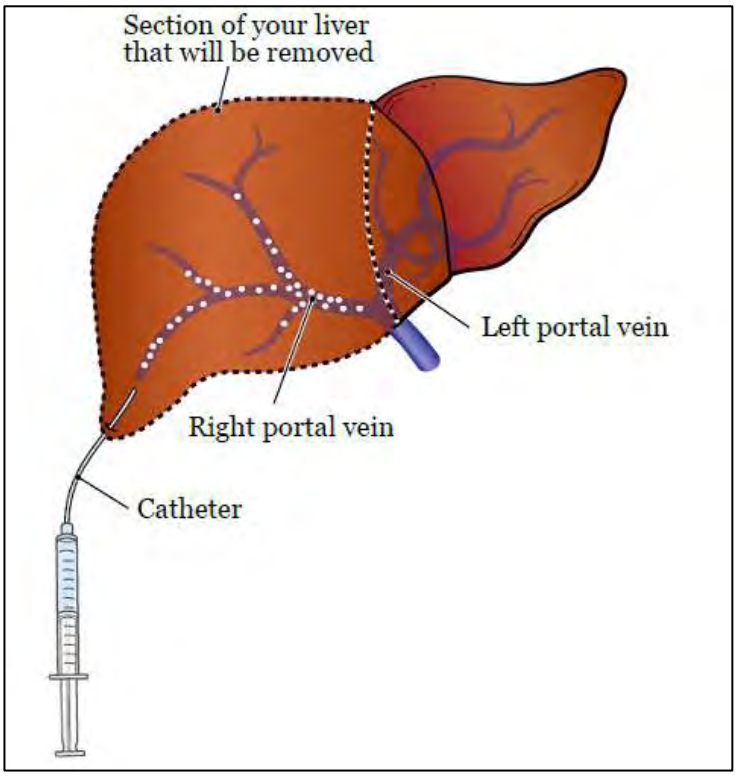
- 2 Shower Caps
- 120cm high pressure (1200 psi) pump tubing (may not be required)
- Arterial pressure set up

Additional Supplies

- Stiffened micro-puncture set
- Vascular sheath
- Wires– Terumo, Bentson etc
- Catheter – DAV
- Statseal or band-aid (add at end of procedure. Do not get wet)
- Glue supplies to close the tract
    - Sterile shot glass
    - Red #18-gauge needle
    - Lipiodol
    - 3 ml syringe
    - Glustitch
- Gelfoam may also be used to close the tract

Portal Vein Embolization (PVE)

Portal vein embolization (PVE) is a procedure that induces regrowth on one side of the liver in advance of a planned liver resection on the other side. This procedure is frequently performed in patients with primary liver cancer (hepatocellular carcinoma) and colorectal cancer with liver metastases.



Google Image- Memorial Sloan Kettering Cancer Centre

Indications

This percutaneous procedure is performed to prepare the patient's liver for eventual resection. Patient's with liver cancer can safely have up to 70% of their liver removed and expect full regeneration as long as the patient does not have substantial underlying liver disease such as cirrhosis. If the remaining liver reserve is insufficient to support liver regeneration, portal vein embolization may jump start the regrowth of the liver before the surgery.

Complications

These may include portal vein thrombosis, liver infarction, necrosis and portal hypertension. Other associated risks include, bleeding and infection, and accelerated tumour growth due to compensatory hepatic artery flow when the tumour was not properly embolized.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Sedation-Does the patient want or require sedation? Are fasting guidelines met (NPO)?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Portal vein embolization patients will require an overnight bed
- Pre-medication with anti-emetics (Decadron and Ondansetron), as well as Morphine and Ativan are common.

Intra Procedure:

- Patient will be supine on the IR table
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- The Radiologist will need access to the full size ultrasound machine and mark the access site for skin preparation
- A wide skin prep is required. The drape may need to be cut to accommodate the prep area. Drape tape may be used to seal the edges of the drape.

- An arterial pressure set up is required
- Contrast pump should be prepared
- Glue supplies need to be available
- Multiple DAV style catheters should be accessible

Post Procedure:

- Apply manual pressure to site for 5 minutes. A band-aid or Statseal may be applied.
- These patients may have pain due to post embolic syndrome, and adequate analgesia should be provided
- Assess site for signs of bleeding
- Follow up CT is usually done 1month post procedure

Tray Supplies- Portal Vein Embolization

- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 10 count tray
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover, 1012 Drape
- 1 One-way stopcock
- 1 Three-way stopcock
- 1 Shield Cover
- 2 Shower Caps
- Closed Drainage System

- Regular Namic tubing
- 120cm high pressure (1200 psi) pump tubing
- Arterial pressure set up

Additional Supplies

- Stiffened micro-puncture set
- Vascular sheath
- Wires– Terumo, Bentson etc
- Catheter – DAV multiple required
- Statseal or band-aid (add at end of procedure. Do not get wet)
- Glue supplies
    - Sterile shot glass
    - Red #18-gauge needle
    - Lipiodol
    - 3 ml syringe
    - Glustitch
- Onyx may also be used. Onyx shaker & adapter are required

Fallopian Tube Recanalization (FTR)

A fallopian tube recanalization clears blocked fallopian tubes which improves the chance of pregnancy. Fertilization of the egg with sperm in the fallopian tubes cannot occur if the tubes are blocked.

Google Image- YouTube

Indications

Female infertility caused by a blockage of the fallopian tubes. This may occur as a result of debris that has built up, scarring from surgery or from serious infection.

Complications

Tubal perforation, ectopic pregnancy and pelvic infection are the most common complications.

Nursing Considerations

Pre-Procedure:

- HSG prior to procedure

- Patient is on an antibiotic evening pre procedure and will usually continue for 5 days post procedure
- This procedure is usually scheduled during the first 5 days after menstrual bleeding has stopped.
- Informed consent
- IV access is required
- Sedation-requires sedation. Are fasting guidelines met (NPO)? Patient will need a ride home post procedure

Intra Procedure:

- Full monitoring required
- Patient will be placed in lithotomy position with appropriate padding for knees and to elevate patient pelvis
- Chlorohexidine scrub of perineum required

Post Procedure:

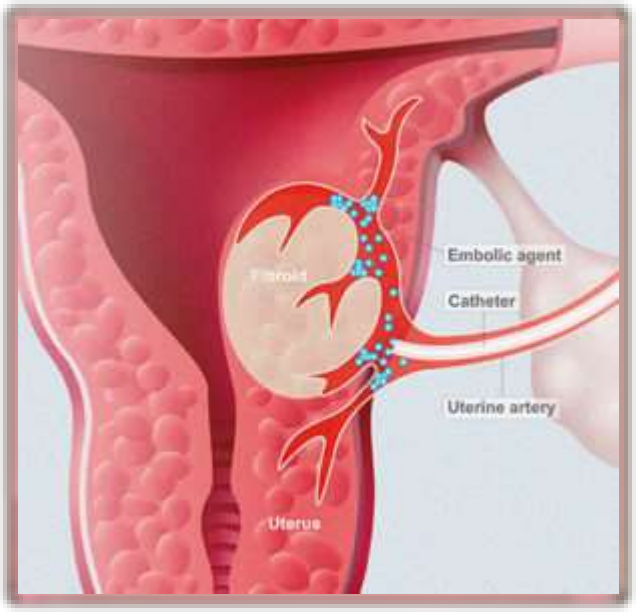
- Observe patient for 1 hour, post procedure and discharge if stable
- Advise patient that vaginal spotting and cramping are normal for 1 to 2 days
- Patients to use pads only during next cycle and avoid intercourse for 1 day.

Tray Supplies- FTR

- Speculum
- HSG catheter
- Multipurpose 4 or 5 Fr catheter
- .035 angled Terumo wire
- 3 Fr straight catheter
- .018 guidewire coaxial with the multipurpose catheter
- 4 or 5 selective salpinography
- Contrast- Omnipaque 300

Uterine Fibroid Embolization (UFE)

Uterine fibroid embolization is the treatment of fibroid tumors of the uterus which may cause heavy menstrual bleeding, pain, and pressure on the bladder or bowel. Through the delivery of embolic agents via catheter, to the uterus and fibroid, arteries are blocked that provide blood to the fibroids, causing them to shrink**. Uterine artery embolization** is also done for post-partum hemorrhages.



Google Image- Interventionalnews.com

Indications

Heavy menstrual bleeding, pelvic pressure, pelvic pain and urinary urgency caused by fibroids.

Complications

Fibroid passage associated with severe menstrual cramping, tissue passage or heavy bleeding, pulmonary embolus, myometrial injury and loss of ovarian reserve/ovarian failure and injury to other organs secondary to mis-embolization.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. If radial access is anticipated, place IV in opposite arm (usually right arm).
- Sedation- Patient will require sedation. Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- The patient will need a patient controlled analgesia (PCA) pump. This is ordered by anaesthesia perioperative pain service (POPS).
- Patient requires a serum pregnancy test before procedure
- Foley catheter required
- May require a prophylactic dose of antibiotics
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- **For femoral access**- assess CWSM of both feet, including femoral, DP and PT pulses.
- **For radial access**- assess CWSM of arm including brachial, radial and ulnar pulses.
- Ensure Barbeau test is done prior to radial procedure.
- **For radial procedures**, medications are prepared for sterile injection after arterial access. These medications prevent vasospasm and thrombosis. The three medications are:

  Heparin 50 units per kg for 4 or 5Fr sheath; 75 units per kg for 6Fr or greater. Heparin boluses are given every 60 minutes during the procedure to prevent thrombosis.

  Verapamil 2.5 mg

  Nitroglycerine 200 mcg

- These medications will be drawn up onto the sterile field by the RN at the time of the procedure and will be administered by the IR Physician.
- If the patient has an allergy to any of the above medication, they should not be given. Discuss with IR Physician.
- Shave prep if necessary

Intra Procedure:

- Configure room according to access site.
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if applicable.
- For distal radial access use the First Radial Drape pack as it provides coverage.
- For regular radial access use the extremity drape.
- Draw up the radial cocktail (Heparin, NTG, Verapamil) into 20ml syringe and label syringe immediately.
- The contrast pump is often required.
- Ultrasound is required for femoral and radial access.
- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).
- **Radial procedure**-a Transradial Band (TR Band) with a Statseal will be used. Once the sheath is removed, the band is applied and approximately 3-7mls of air is injected into the cuff. Within 10-15 minutes, 2-3 ml of air is usually removed at 10-15 minutes intervals until all the air is removed from the band. The TR Band is then left in place for another 15-30 minutes before removal.

Post Procedure:

Femoral Procedure- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.

Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.

Radial procedure-Assess site for signs of hematoma/bleeding. Assess CWSM and pulses of affected arm and inform IR physician of any change from baseline.

Patient may mobilize immediately if safe post sedation. Patient to avoid putting pressure/pushing on affected arm.

Femoral and Radial-A Band-aid or Statseal with transparent dressing may be used. Discharge teaching for the patient should include Band-aid/ Statseal removal in 24 hours. IF a Statseal is used, the patient should allow the brownish powder residue to fall off on its own, rather than scrub it off.

Patient is to avoid heavy lifting and strenuous activity for 48 hours.

Patient can shower in 24 hours.

The day after the procedure the patient is transitioned to oral medication or in the early evening for same day discharge.

The patient will go home with regular dosing of non-steroidal anti-inflammatory (NSAID) as well as a narcotic PRN

Most patients will take 7 to 10 days to resume full activities. They may experience intermittent cramping, fatigue, and malaise with low grade fever for several days.

They may also require on-going management of nausea.

Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given (including radial cocktail and sedation). These patients will usually go to a recovery area after hemostasis (PCC) of be admitted to a ward.

Tray Supplies- UFE

- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover
- 2 Shower Caps
- Closed Drainage System
- Regular Namic tubing (not required for radial procedures)
- 120cm high pressure (1200 psi) pump tubing
- Omnipaque 300

Additional Supplies

- ACF or single wall needle if femoral approach
- Vascular sheath – depends if femoral or radial
- Wires– depends if femoral or radial
- Catheter s- Cobra, Rim, Mikaelsson, Microcatheter
- Statseal (add at end of procedure. Do not get wet)
- If difficult access- micro-puncture set may be required
- Embospheres or Contour

Basic Radial Supplies

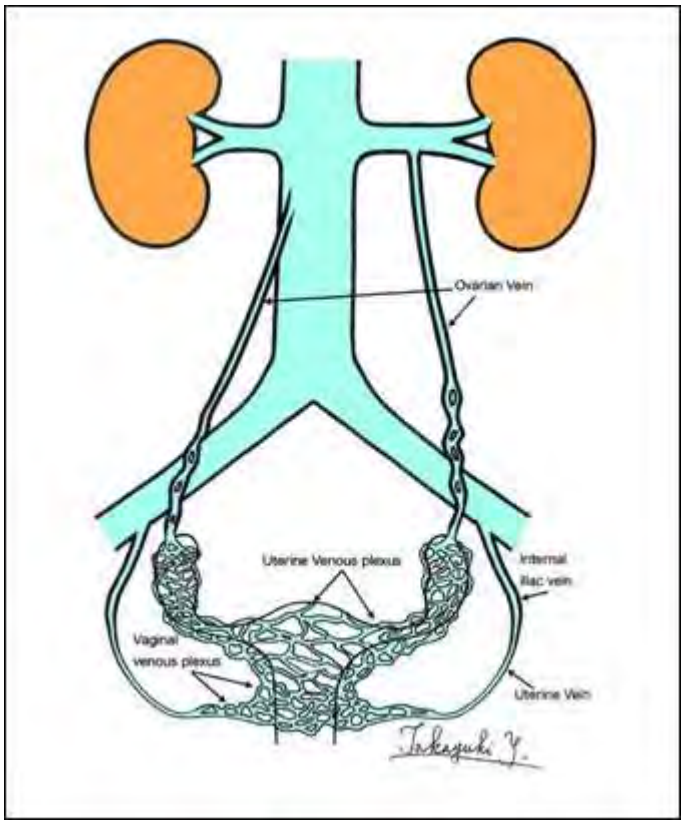
- As above, the femoral basic tray plus:
- 1 extra shield cover
- 1 extra 20 ml syringe and one 5ml syringe for the TR Band
- 1 green transfer pin

- Extremity Drape or Radial First Drape
- 1 large and 2 small transparent dressings
- 1 pack drape towels

Additional supplies: TR band and Red Statseal (at end of procedure

Ovarian Vein Embolization (OVE)

It is a minimally invasive treatment for pelvic congestion syndrome, a painful condition resulting from the presence of enlarged varicose veins in the pelvis. This procedure relieves pain by using imaging guidance, and a catheter to close off faulty veins so they can no longer fill with blood.



Google Image- Virclinic.com

Indications

This procedure treats unexplained chronic pelvic pain, pelvic variscocities, lower extremity varicose veins and symptomatic labial/perineal variscocities.

Complications

Includes post embolization syndrome characterized by bleeding, infection, pain, fever and nausea lasting from a few hours to several days.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Sedation- Patient will require sedation. Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?

Intra Procedure:

- Patient will be supine on the table with head tilted to the left for right jugular access. Femoral vein access is also an option.
- Full monitoring is required (BP, ECG, Resp, O2Sat and ETCO2)

Post Procedure:

- Assess right neck or groin for bleeding and hematoma
- Patient will be on bedrest for 1 hour
- May be discharged home in 1 hour if stable
- Analgesic requirements vary greatly.
- Tylenol #3 for 3 days is usually adequate.

Tray Supplies- OVE

- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)

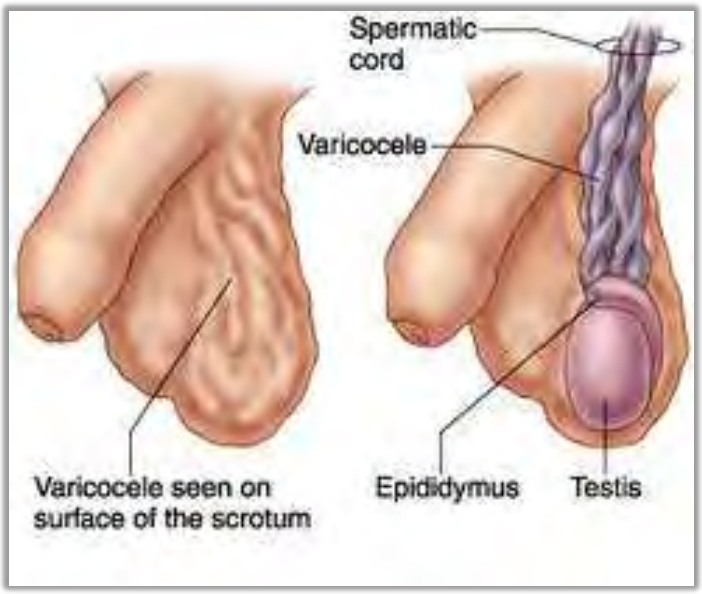
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover
- 2 Shower Caps
- Closed Drainage System
- Regular Namic tubing
- Omnipaque 300

Additional Supplies

- Single wall needle
- 5-7 Fr sheath
- MPA catheter
- Glue supplies
- Thromboject 3% or coils may be used
- If femoral approach Cobra catheter and Simmons II may be required

Varicocele Embolization

A varicocele is an enlarged vein in the male scrotum that may cause pain, swelling or infertility. A varicocele embolization is the placement of coils or embolic fluid into a blood vessel, using a catheter to divert blood away from varicocele.



Google image- www.noinsurancesurgery.com

Indications

These may include scrotal pain and edema, infertility and varicocele, recurrent varicocele after surgical treatment and failure of semen analysis to improve 3 months after therapy, and testicular atrophy in a pediatric patient with a large varicocele.

Complications

These include coil migration, phlebitis, pain, bleeding and infection.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Sedation- Patient will require sedation. Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?

Intra Procedure:

- Access will be obtained via right jugular or common femoral vein. The patient will be supine on the table.
- Full monitoring required (BP, ECG, Resp, O2Sat and ETCO2)

Post Procedure:

- Assess procedure site for bleeding and hematoma
- Patient may be discharged after 1- 4 hours
- Patient may need a prescription for anti-inflammatory (Toradol) for 3 to 4 days
- Patient may have mild scrotal swelling and discomfort that may be treated with NSAID.
- Patient to avoid heavy lifting for 24-48 hours. He can usually return to work next day.

Tray Supplies- Varicocele Embolization

- Long Trolley
- Angiogram Tray

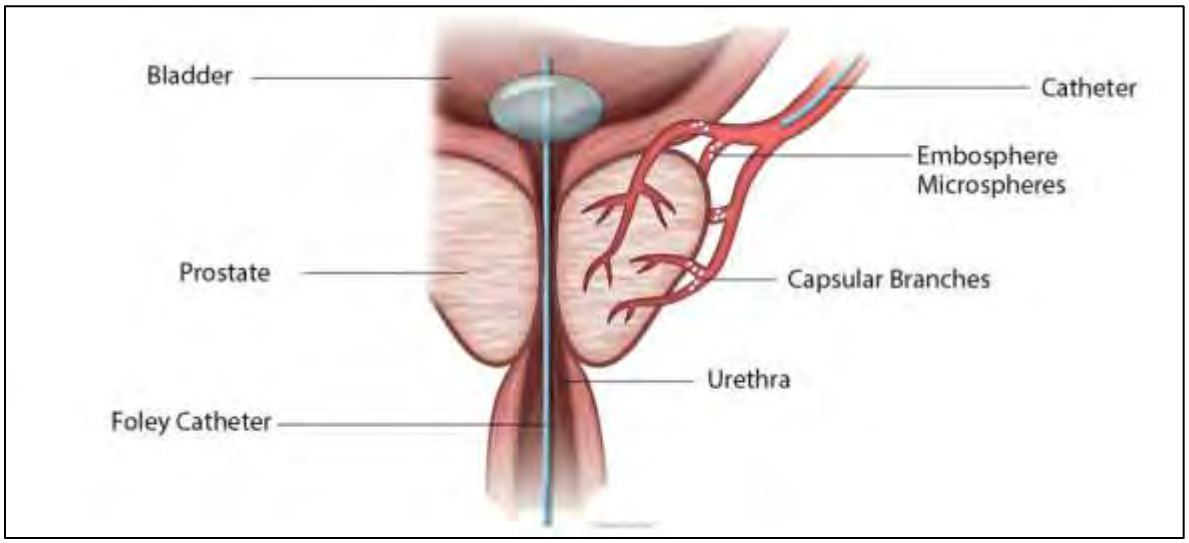
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover
- 2 Shower Caps
- Closed Drainage System
- Regular Namic tubing
- Omnipaque 300

Additional Supplies

- Single wall needle
- 5-7 Fr sheath
- If jugular approach MPA catheter
- Glue supplies
- If femoral approach- Simmons I sidewinder
- Gonadal catheter
- 4 or 5 Fr Berenstein catheter
- 3 Fr Microcatheter
- Combination of metallic coils and Thromboject 3%

Prostatic Artery Embolization (PAE)

PAE is a non-surgical technique for the treatment of benign prostatic hypertrophy (BPH). PAE shrinks the prostate by decreasing blood flow to its blood vessels. In the weeks and months following PAE, the prostate relaxes and shrinks resulting in symptom relief for most men.



Google image- tgh.org

Indications

PAE is used to treat BPH, a common condition in older men that causes symptoms such as poor urinary flow, frequent urination day and night, incomplete bladder emptying and urinary urgency. This procedure may also be used for patients who prefer a minimally invasive procedure over a surgical option (TURP), have prostate enlargement too great for surgery, or have had previous surgery without symptom improvement.

Complications

Risks or complications may include the following: bleeding, pain, infection, UTI (secondary to Foley catheter placement), painful or frequent urination and low-grade fever.

There may be blood in the urine, semen or stool, bladder spasm or prostatitis.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation.
- Sedation-Does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- May be done using femoral or radial approach
- **For femoral access**- assess and document CWSM of both feet, including femoral, DP and PT pulses.
- Shave prep if necessary
- Pre embolization meds include:
    - Ciprofloxacin 500mg PO
    - Pyridium 100mg PO
    - Oxybutynin 5mg PO

Intra Procedure:

- Configure room according to access site.
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if applicable.
- The contrast pump is required.
- A Foley catheter is required
- Ultrasound is required for femoral access.

- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).
- **Radial procedure**- follow Radial Sheath and band removal procedure

Post Procedure:

- **Femoral procedure:** If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.
- **Radial procedure**-a Transradial Band (TR Band) with a Statseal will be used. Once the sheath is removed, the band is applied and approximately 3-7mls of air is injected into the cuff. Within 10-15 minutes, 2-3mls of air is usually removed at 10-15 minutes intervals until all the air is removed from the band. The TR Band is then left in place for another 15-30 minutes before removal.
-
- Post prostate embolization prescription must be given to patients. The prescription is for:
  - Ibuprofen 800mg TID x 7 days
  - Ciprofloxacin 500mg PO BID x 7 days
  - Pyridium 200mg PO TID x 2 days, then 100mg PO TID x 1 day
  - Solifenacin (Vesicare) 5mg PO OD x 7 days
  - Dulcolax 20mg PO OD x 7 days
- Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.
- Patient is to avoid heavy lifting and strenuous activity for 48 hours.
- Patient can shower in 24 hours.
- Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given. These patients will usually be admitted overnight.

Basic Angiogram Femoral Tray Supplies

- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover
- 2 Shower Caps
- Closed Drainage System
- Regular Namic tubing (not required for radial procedures)
- 120cm high pressure (1200 psi) pump tubing

Basic Radial Supplies

- As above, the femoral basic tray plus:
- 1 extra shield cover
- 1 extra 20 ml syringe and one 5ml syringe for the TR Band
- 1 green transfer pin
- Extremity Drape or Radial First Drape
- 1 large and 2 small transparent dressings
- 1 pack drape towels

Additional supplies: TR band and Red Statseal (at end of procedure)

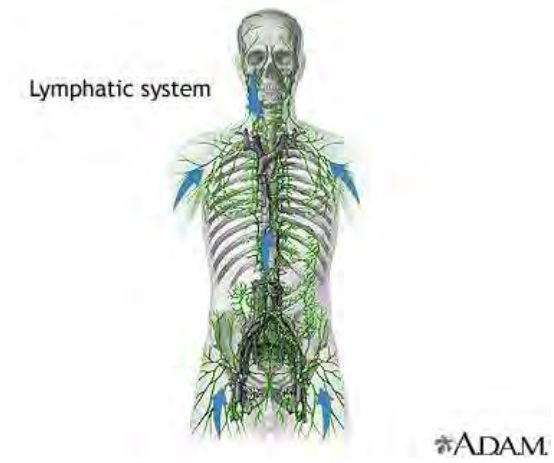
Additional Supplies

- ACF or single wall needle if femoral approach

- Vascular sheath – depends if femoral or radial
- Wires– depends if femoral or radial
- Catheter – – depends if femoral or radial
- Statseal (add at end of procedure. Do not get wet)
- If difficult access- micro-puncture set may be required
- Embospheres
- Micro-catheter and micro-wire
- Flo 30 hemostasis valve
- Foley catheter supplies (usually #14 Fr)

Lymphangiogram

A lymphangiogram or lymphangiography is an imaging technique used to provide precise information on the extent and location of lymph vessels and lymph nodes. These may be done on an inpatient or outpatient basis.



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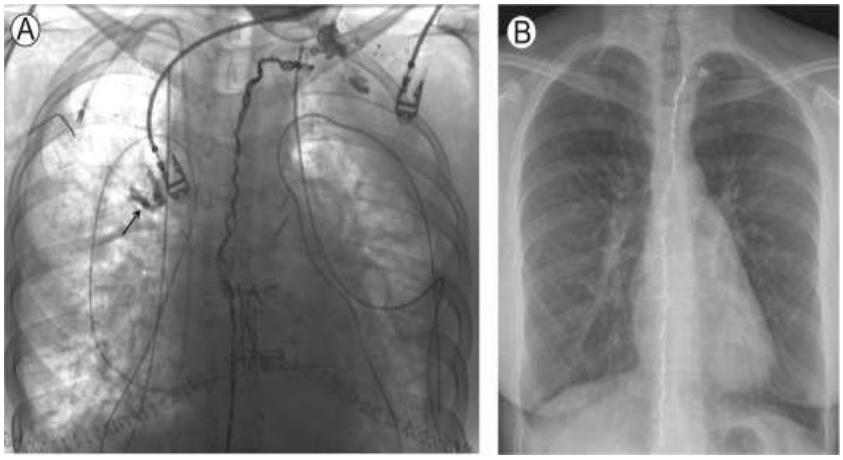

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Indications

Lympghangiography can be used to diagnose a variety of cancers and the extent of metastasis. Lymphangiography to can determine the effectiveness of chemotherapy and radiation therapy. It can also be used to determine the reason for lymphoedema. This study may be done preoperatively to plan and map the lymphatic system. The most common areas of the study are the chest and abdomen.

Complications

These include infection, bleeding, allergic reaction to contrast, Lidocaine or Lipiodol. There is also a risk of the contrast medium seeping into the venous system causing vessel obstruction. Rarely, patients may have bleeding from the lungs or develop thyroid problems.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. Saline lock if no sedation required.
- Sedation- Patient will require sedation. Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- There is no venous or arterial access, no peripheral pulse checks required.

- The Lymphatic system moves very slowly. CT Scan(s) is done several hours after the Lipiodol injection, to see how far it has travelled and if a leak has been identified. Once leak is identified, re-access of the lymphatic system and the injection of glue may be required.

Intra Procedure:

- Ultrasound guided access will usually be obtained via the groin or neck. The patient may require bilateral access. Check if Sonosite machine is adequate.
- The patient will be supine on the table.
- Full monitoring required (BP, ECG, Resp, O2Sat and ETCO2) if patient is sedated.
- RN drapes the patient, usually does not need to stay scrubbed into procedure.

Post Procedure:

- Assess procedure site for bleeding and hematoma
- Patient may be discharged usually 1- 4 hours post procedure, after completion of CT Scan(s), to determine if procedure was successful.
- No monitoring required unless patient has been sedated.

Tray Supplies- Lymphangiogram

- Short or Long Trolley
- Angiogram Tray
- Femoral Drape Pack (groin) or Fistula drape pack (neck)
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover

- 2 Shower Caps
- Lidocaine 1% for local anesthesia
- Lipiodol 10 ml vial

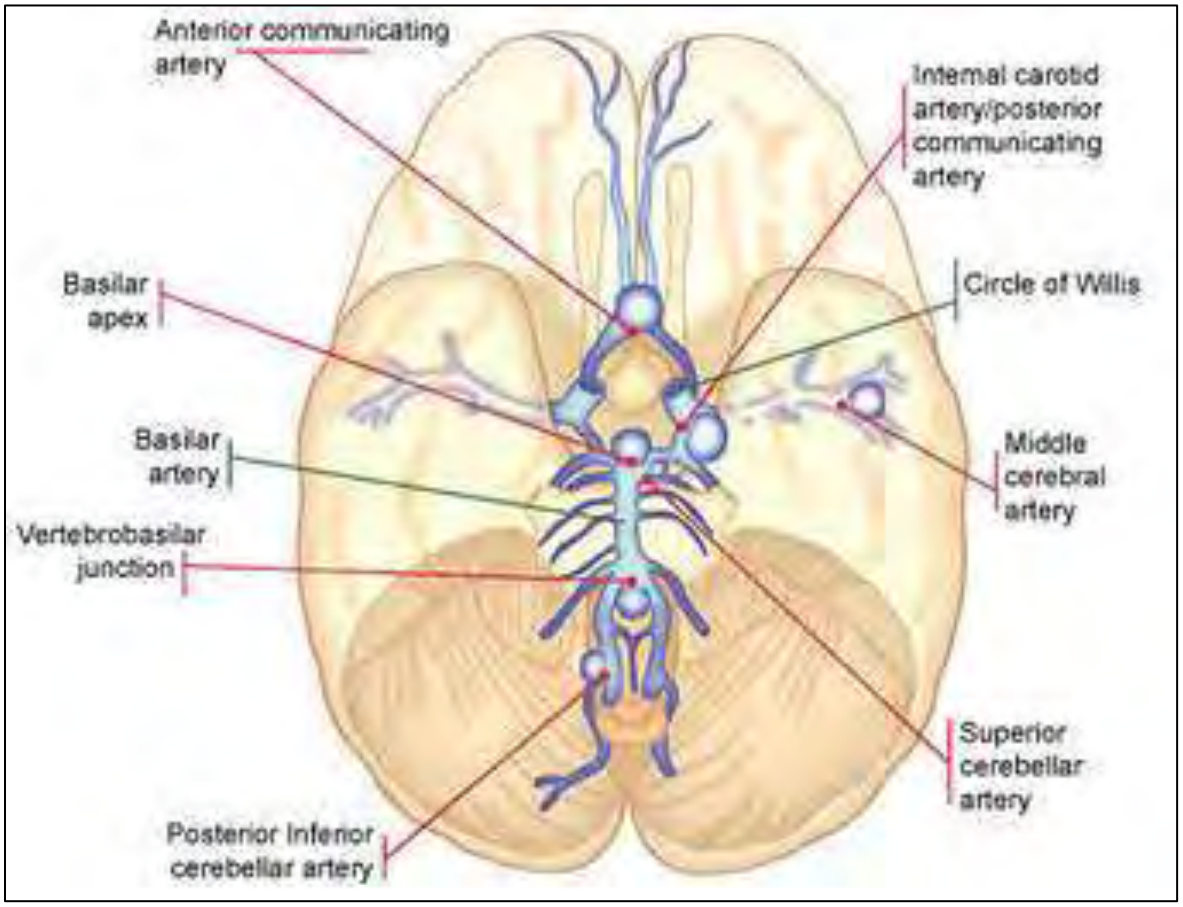
Additional Supplies

- Inflation Device
- Minimal volume connecting tubing T connector extension set 6” (Baxter 2N3328)
- 22 Gauge spinal needles x2
- Glue supplies: 250 ml D5W bag, pour spout, 1-3ml. 5ml, and 20 ml syringes, 18 Gauge 1.5” blunt filter needle x1, 18 Gauge 1.5” regular blunt needle, sterile shot glass x1. Glu-stitch from fridge.
- Chiba 15 and 22 Gauge

Order Code: Venogram Jugular- for inpatient order entry

Cerebral Angiogram

Cerebral angiograms use a catheter, fluoroscopy and an injection of contrast to examine blood vessels in the brain for abnormalities, such as aneurysms, AVMs, and strokes. This produces very detailed and accurate pictures of the blood vessels in the brain.



Google Image- www.Daviddarling.info

Indications

This procedure is done to confirm abnormalities such as: aneurysms, atherosclerosis, AVM, vasculitis, blood clot, dissection, or stroke. This can be done to evaluate arteries before head and neck surgery and to plan surgical resection of brain tumors and seizure centers. This procedure can help to diagnose the cause of symptoms such as: severe headaches, slurred speech, dizziness, blurred or double vision, weakness or numbness and loss of coordination or balance.

Complications

The risks of a cerebral angiogram include the following: damage to the blood vessel, bruising or bleeding at the puncture site, infection and stroke.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation.
- Sedation-Does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- **For femoral access**- assess and document CWSM of both feet, including femoral, DP and PT pulses.
- Neurovital signs must be completed and documented pre procedure

- Shave prep if necessary

Intra Procedure:

- Configure room according to access site. Femoral access is usually preferred.
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- The contrast pump is required.
- Ultrasound is required for femoral access.
- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).

Post Procedure:

- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.
- Neuro-vital signs must be checked. Inform neuro radiologist of any change from baseline.
- Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.
- Patient is to avoid heavy lifting and strenuous activity for 48 hours.
- Patient can shower in 24 hours.
- Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given. These patients will usually go to a recovery area after hemostasis (PCC) or be admitted to a ward.
- Patients may be discharged same day of procedure.

Basic Cerebral Tray Supplies

- Medium trolley
- Angiogram tray
- Femoral drape pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield cover
- Closed Drainage System
- Regular Namic tubing
- #16-gauge IV Cannula
- 120cm high pressure (1200 psi) pump tubing

Additional Supplies

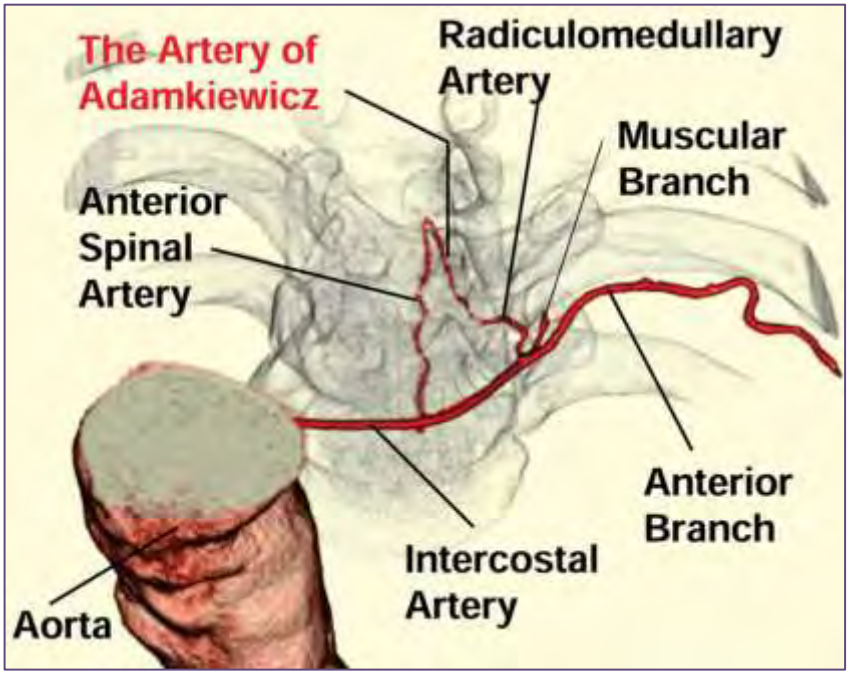
- ACF or single wall needle if femoral approach
- Vascular sheath – usually 4 or 5 French
- Wires– Wide J, Bentson, Terumo
- Catheter – – Bern
- Statseal (add at end of procedure. Do not get wet)

If difficult access- micro-puncture kit may be required

Spinal Angiogram- Embolization

Spinal Angiogram is a diagnostic procedure to take extremely detailed images of spinal vessels (veins and arteries). The vessels of the spinal cord and surrounding tissues can be seen in exquisite detail, and blood flow from arteries to veins may be viewed in sequence.

Spinal Embolization is an interventional procedure where imaging is used to guide a catheter to an area that is problematic (bleeding or tumor/AVM).



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Indications

Spinal Angiogram is done to determine if there is a problem with the arteries and veins of the spinal cord. The most common problem is the spinal dural arteriovenous fistula. Patients with tumors within or adjacent to the spine may need surgery to remove the tumor. The spinal angiogram can identify the anatomy, in particular the artery of Adamkiewicz, to ensure the surgeon can safely resect the tumor. Damage to the artery of Adamkiewicz will cause paralysis.

Spinal Embolization is often performed to block blood flow preoperatively to a spinal tumor. This procedure is often done within 48 hours of a surgical resection, to reduce blood loss associated with the surgery.

Complications

Spinal Angiogram & Embolization both have a small risk of the following:

- Clot formation around the tip of the catheter resulting in a stroke
- Injury to the vessel wall
- Bleeding at the site
- Hematoma at the site
- Paralysis if artery of Adamkiewicz is injured

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation.
- Sedation-Anaesthesiology is usually required and a general anaesthetic is common. Are fasting guidelines met (NPO)? Some spinal angiograms with limited number of levels may be done without Anesthesia present.
- Preoperative checklist required if anaesthesia involved.
- They can be potentially long procedures with a high volume of contrast administered. Discuss with Radiologist and Anaesthesiologist the need for a Foley catheter
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?

- **For femoral access**- assess and document CWSM of both feet, including femoral, DP and PT pulses.
- Neuro-vital signs must be completed and documented pre procedure
- For spinal embolization procedures the Radiologist is responsible for a spinal nerve assessment. The RN must document the neuro-vital signs including any deficits. It is common for this patient population to have sensory and functional deficits (bladder and bowel dysfunction, mobility issues).
- Ensure gas machine and Omnicell are in angiogram suite if anaesthesia involved.
- Shave prep if necessary

Intra Procedure:

- Configure room according to access site (femoral). Patient will be supine for this procedure. Depending on the level involved the patient's arms may need to be positioned above their head or on their chest.
- Full monitoring required (BP, ECG, Resp, O2 Sat, ETCO2)
- The contrast pump is not usually required. Hand injections are the preferred method.
- Ultrasound is required for femoral access.
- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).
- The MRT will record on a worksheet to denote which run corresponds to which vessel. It is extremely important to have an accurate record for reporting the images.

Post Procedure:

- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.
- Neuro-vital signs must be checked. Inform neuro radiologist of any change from baseline.
- Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.
- Patient is to avoid heavy lifting and strenuous activity for 48 hours.
- Patient can shower in 24 hours.
- Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given. Spinal angiogram patients may go to PCC if no anaesthesia involvement. Spinal embolization patients go to PACU after extubation in radiology.
- Spinal angiogram patients may go home the same day if no surgery planned.
- Spinal embolization patients usually remain in hospital until their surgical date, usually 24-48 hours later.

Spinal Angiogram Tray Supplies

- Long Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover

- #16-gauge IV Cannula
- Closed Drainage System
- Regular Namic tubing (Usually add a second Namic tubing to tray. It is helpful to hook up second tubing to catheter while radiologists review images. This prevents the need for frequent double flushing).

Embolization Supplies

- Embolization set up:
  - Y-adapter
  - One-way stopcock
  - Three-way stopcock
  - 30 cm pump tubing
  - Additional Namic tubing

Additional Supplies

- ACF or single wall needle if femoral approach
- Vascular sheath – usually 4 or 5 French
- Wires– Wide J, Bentson, Terumo
- Catheter – – Bern
- Statseal (add at end of procedure. Do not get wet)

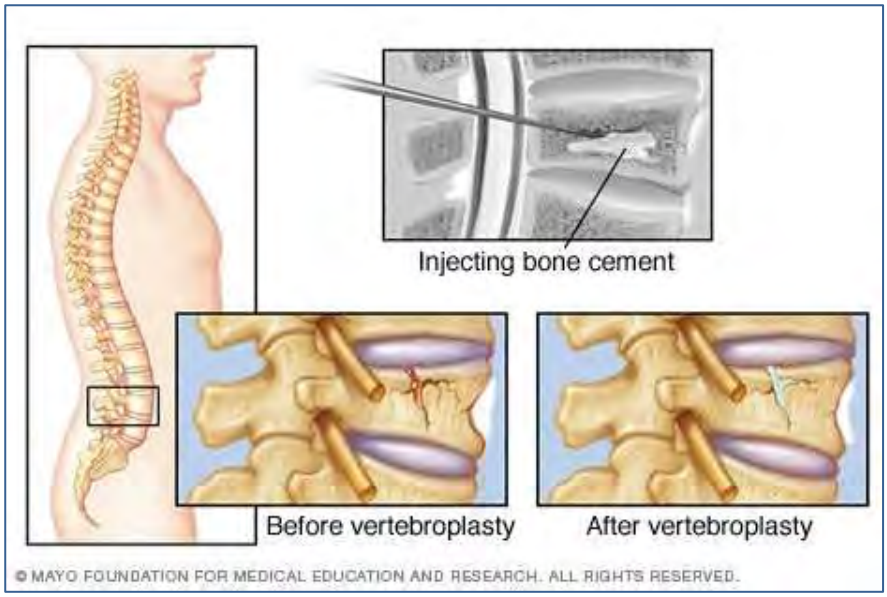
If difficult access- micro-puncture kit may be required

For Spinal Embolization

- Microcatheters and microwires
- Micro-coils- coil cart can be brought into procedure room
- Glue (Glu-stitch), D5W 250 ml bag, Lipiodol 10 ml vial, shot glass, red 1ml embo syringe, 3ml clear syringe, 18-gauge red blunt needle
- Onyx, onyx shaker, DMSO (Dimethyl Sulfoxide with tantalum powder), syringe kit for onyx, syringe adapter, 18-gauge red blunt needle (x2)

Vertebroplasty

Vertebroplasty is a procedure for stabilizing compression fractures in the spine. Special bone cement is injected into selected vertebrae that have cracked or broken, often due to osteoporosis. The cement once injected, hardens, thus stabilizing the fractures and supporting the spine.



Mayoclinic.org

Indications

Vertebroplasty can help people with severe, disabling pain caused by compression fractures, by relieving the pain, increasing mobility and reducing the use of pain medication. Compression fractures are commonly caused by osteoporosis, cancer (metastasis and multiple myeloma), and trauma.

Complications

Most common moderate complications include infection and cement leak into the epidural space. Increased back pain and neurological symptoms such as numbness or tingling may occur. Approximately 10% of patients develop additional compression fractures. When this occurs, patients usually have relief from the procedure for a few days but develop recurrent

pain thereafter. Severe complications include leak into paravertebral veins, leading to pulmonary embolism.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. All pre-operative patients should have IV access to address complications and administer hydration/sedation.
- Sedation- Anaesthesia will provide MAC or General Anesthesia. Transportation home with appropriate supervision?
- Pre-op checklist must be completed
- Bloodwork-recent results for HGB, PLT, INR and PTT, usually within one week for inpatients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Prophylactic antibiotics are usually given.
- Gas machine and anaesthesia Omnicell must be in room.
- Patient will go to PCC/PACU post procedure and then to ward or may be discharged home.
- CWSM and pain assessment must be documented.
- Shave prep if necessary

Intra Procedure:

- Configure room and table for prone position. Ensure bolsters and gel pad/sponges available for positioning of patient.
- The anaesthesiologist will often provide analgesics prior to rolling the patient prone.
- Full monitoring required (BP, ECG, Resp, O2 Sat, ETCO2).
- The vertebroplasty kit includes an access needle, bone cement, barium (radiopaque) and delivery system components.

- There are usually one to two needles per vertebrae level required.
- For local anaesthesia, use lidocaine 1%, 5mls and bupivacaine 0.5%, 5mls in a control syringe

Post Procedure:

- A 3D spin is performed immediately post procedure prior to removal of the needles.
- Band-aid can be used at insertion site.
- Monitor the injection sites for bleeding and hematoma
- Patient is rolled supine onto a stretcher. They may have their head of the bed elevated. Patient is on bedrest for one to two hours post procedure to ensure cement is solidified.
- If patient had general anaesthetic, proceed to PACU.
- If sedation only- hold in IR Nursing area for 30 minutes and transfer to PCC or ward bed if stable.
- If not an in-patient, may be discharged home the same day.

Vertebroplasty- Tray Supplies

- Small trolley
- Angiogram tray
- Pediatric lap drape or fistula drape pack
- Kidney basin/paint tray (sharps disposal)
- One small instrument set
- Two packs of radiopaque gauze
- Two shower caps
- If fistula drape pack not used, add control syringe, 18 & 25-gauge needles, scalpel, and Telfa.

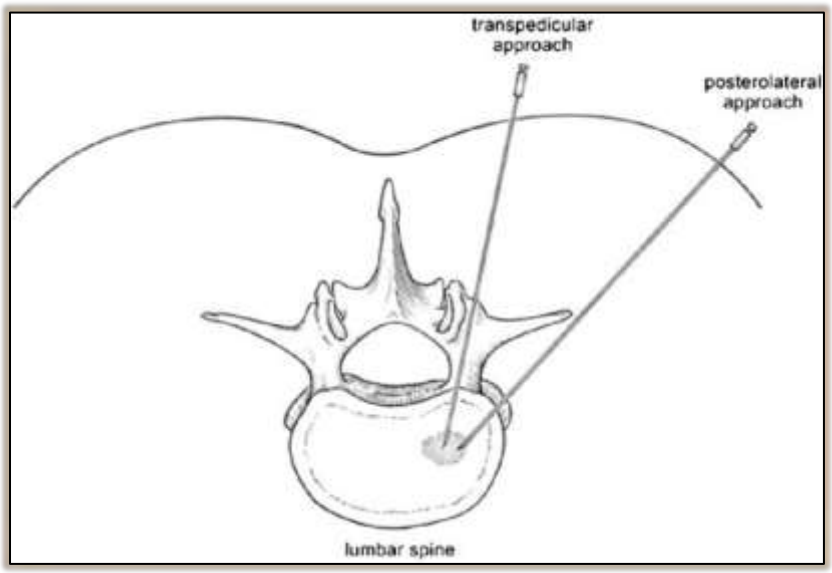
Additional Supplies

- Spinal needle
- Vertebroplasty kit

Bone needles- 11, 13 or 15 gauge and a variety of lengths

Spine Biopsy

A spine biopsy is performed to determine what disease process may be occurring in the spine. The Radiologist will obtain a sample (s) of bone to be analyzed in the laboratory. This procedure may be done with CT guidance or with fluoroscopy guidance.



Google Image- Research Gate

Indications

A spine biopsy is performed to determine the disease process of the spine. Most commonly done to identify infection, osteomyelitis, and to identify benign and malignant tumours.

Complications

These include bleeding, infection, nerve damage and bruising and discomfort at biopsy site.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation.
- Sedation-Does the patient want or require sedation? If embolization performed anaesthesiology is required and a general anaesthetic is common. Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Preoperative checklist required if anaesthesia involved
- Bloodwork-recent results for HGB, PLT, INR and PTT, usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Assess and document pain and CWSM to both extremities pre and post procedure
- These are generally done on in-patients that will stay overnight. These procedures may be done with RN sedation, anaesthesia, MAC, or under general anaesthetic.

Intra Procedure:

- Full monitoring required (BP, ECG, Resp, O2 Sat, ETCO2)
- Patient will be prone for procedure. Ensure adequate bolsters and head support.
- For local anaesthesia, use 5mls Lidocaine 1%, 5mls Bupivacaine 0.5% in control syringe
- Have specimen containers available- orange top for culture; formalin for pathology

Post Procedure:

- Apply manual pressure to site for 5 minutes. A Band-aid or Statseal may be applied.
- Assess and document pain and CWSM.
- Ensure specimens are labelled and requisition attached and completed by Radiologist for laboratory. Photocopy requisition and attach to laboratory form

Tray Supplies- Spine Biopsy

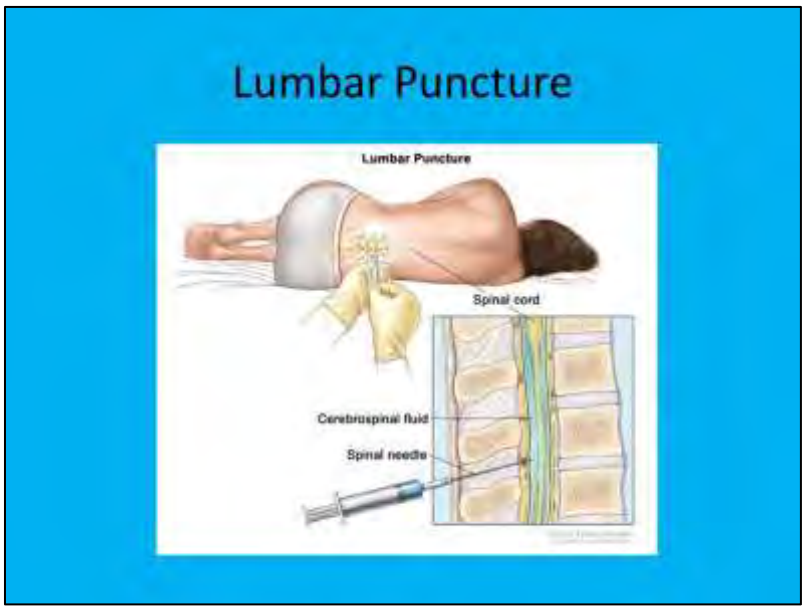
- Small trolley
- Fistulogram drape pack
- Kidney basin/sharps container
- Small instrument set
- Lidocaine 1%
- Bupivicaine 0.5%
- 2 shower caps (if in angiogram suite)
- 1 shield cover (if in angiogram suite)

Additional Supplies

- #22-gauge spinal needle
- #11 or #13-gauge bone biopsy needle
- Drill if bone is really hard

Lumbar Puncture

A lumbar puncture is a procedure where a needle is inserted between two lumbar vertebrae to remove a sample of cerebrospinal fluid (CSF). CSF is the fluid that surrounds the brain and spinal cord to protect them from injury.



Google Image- Slideplayer.com

Indications

Lumbar puncture can be used to help diagnose serious infections, such as meningitis; other disorders of the central nervous system, such as Guillain-Barre Syndrome and Multiple Sclerosis (MS); bleeding around the brain (subarachnoid hemorrhage (SAH); or cancers of the brain or spinal cord. Lumbar punctures can also be done to inject anaesthetic medications or chemotherapy drugs into the CSF.

A lumbar puncture may be done to collect CSF for laboratory analysis, measure the pressure of the CSF, or inject dye (myelography) or radioactive substances (cisternography) into CSF to make diagnostic images of the fluids flow.

Complications

Lumbar punctures are generally safe, but some risks include the following: post lumbar puncture headache in about 25% of patients, related to the leak of fluid into nearby tissues. The headache typically starts several hours afterwards and may last for several days. These headaches may be accompanied by nausea, vomiting and dizziness. The headaches are usually present when sitting or standing but resolve when lying down. Other risks include back discomfort or pain, which may radiate down the back of the legs, bleeding near the puncture site, or rarely into the epidural space and brainstem herniation.

Nursing Considerations

Pre-Procedure:

- These procedures are usually done without nursing
- Informed consent required
- Bloodwork-recent results for HGB, PLT, INR, PTT
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Lumbar punctures rarely require sedation. If required, the patient would need to meet fasting guidelines.

Intra Procedure:

- Patient is prone on procedure table
- MRT will gather sample containers and label specimens. Lab forms to be filled out by Radiologist/MRT.
- Specimen labels must be numbered when history is query for SAH
- If chemotherapy agent is used, cytotoxic precautions and chemo bucket will be required.
- If for Creutzfeldt-Jakob Disease (CJD) is suspected follow protocol http://ipac.vch.ca/Documents/Additional%20Precautions/Online/Guidelines%20for%20CJD%20and%20other%20Prion%20Diseases.pdf

Post Procedure:

- Ensure specimens go to laboratory
- Patient must remain on a stretcher for 1hr post procedure
- Outpatient must be discharged by neuroradiologist after 1 hr
- These patients usually return to their ward immediately post procedure without being seen by interventional radiology nurses.

Tray Supplies- Lumbar Puncture

- Disposable tray or myelogram tray
- #22-gauge 3.5” spinal needle
- #18-gauge blunt needle
- #25-gauge needle
- 10 ml syringes x 2

Additional Supplies

- Regular and short extension tubing
- 3 way stop cock
- 3 ml syringe
- 3 CSF specimen tubes
- Band-aid

Carotid Occlusion Tolerance Test (COTT)

A carotid occlusion tolerance test is performed to assess the ischemic tolerance among pre-operative patients. The treatment of skull base lesions such as tumours, aneurysms, and traumatic lesions may require internal carotid artery sacrifice. The COTT evaluates the ischemic tolerance prior to permanent occlusion.

Google Image- American Journal of Neuroradiology

Indications

COTT is used as a pre-operative planning procedure, prior to ligation of the internal carotid artery. These patients have underlying tumours, aneurysms or traumatic lesions.

Complications

COTT procedures have the same risks as cerebral angiogram procedures as well as thrombosis, dissection and infarction.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation.

- Sedation-Does the patient want or require sedation? Are fasting guidelines met (NPO)?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- **For femoral access**- assess and document CWSM of both feet, including femoral, DP and PT pulses.
- Neuro-vital signs must be completed and documented pre procedure
- Shave prep both groins
- Require overnight bed
- These procedures are usually done in conjunction with nuclear medicine. During the procedure, a nuclear medicine technologist will deliver a dose of radioactive tracer for the neuroradiologist to inject. Post procedure, the patient will have a nuclear medicine SPECT (Single-photon emission computed tomography scan.

Intra Procedure:

- Configure room like a cerebral angiogram.
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- Both femoral arteries are usually accessed
- The patient remains awake for ongoing neurological testing to determine if they will tolerate the occlusion of the internal carotid artery.
- Consider if Foley catheter is required. These procedures can be lengthy and both groins may have arterial punctures.
- The radiologist assesses the patient while the balloon is inflated by checking cognitive and motor functions.

- A dose of heparin IV or IA is administered prior to balloon inflation. The balloon is left inflated for 30 minutes. Angiograms are repeated after balloon deflation.
- The contrast pump is required.
- Ultrasound is required for femoral access.
- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).

Post Procedure:

- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.
- Neuro-vital signs must be checked. Inform neuro radiologist of any change from baseline.
- Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.
- Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given. These patients will usually go to neurology ward after hemostasis and scan complete.
- Patient will require an RN/LPN escort to nuclear medicine to monitor vital signs, neuro vital signs and groin puncture sites.

Tray Supplies- COTT

- Medium Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze

- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover
- Closed Drainage System
- 6- Regular Namic tubing (If both groins accessed)
- #16-gauge IV Cannula
- 120cm high pressure (1200 psi) pump tubing

Additional Supplies

- ACF or single wall needle
- Vascular sheath – 5 French
- Wires– Wide J, Bentson, Terumo
- Catheter – – Bern, Guidecath
- Occlusion Balloon
- Statseal (add at end of procedure. Do not get wet)

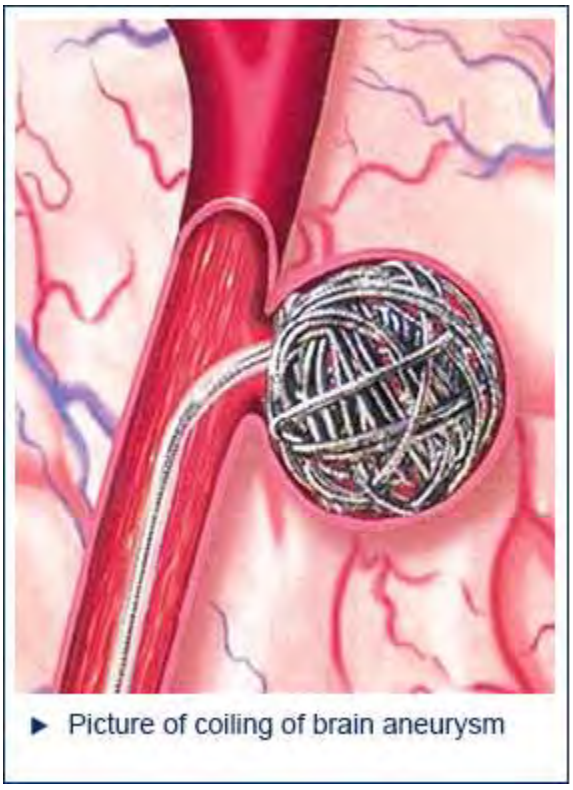
If difficult access- micro-puncture kit may be required

Neuro Endovascular Coil Embolization

Endovascular coiling is a procedure performed to block blood flow into an aneurysm (a weakened area in the wall of an artery). Endovascular coiling in minimally invasive and avoids a surgical craniotomy. A catheter is passed through the femoral artery into the artery in the brain that contains the aneurysm. Platinum coils are deployed that induce clotting (embolization) of the aneurysm, and thus prevent blood from getting into it and causing rupture. Some endovascular coiling procedures are done in conjunction with a stent, to ensure the coil pack stays within the aneurysm. These are called stent assisted coiling procedures.

These procedures may be referred to as GDC coiling which is Guglielmi detachable coils.

For wide neck aneurysms, a flow diverter device (Pipeline Stent) may be used



▶ Picture of coiling of brain aneurysm

▶ Picture of stent assisted coiling of brain aneurysm

Google Image- Dr Manish Taneja

Indications

A coiling procedure is done to treat brain aneurysms, usually unruptured but may also be able to treat some ruptured brain aneurysms.

Complications

The main complications of endovascular coiling are procedural, aneurysmal, perforations (rupture) by the micro-catheter, micro-guidewire, or coil and thromboembolic events. Such situations are unexpected, complex and can have devastating consequences. Other complications may include vasospasm (may be treated with verapamil), coil pack dislodgement, and incomplete occlusion (may cause regrowth of the aneurysm).

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation.
- Sedation-Does the patient want or require sedation? If embolization performed anaesthesiology is required and a general anaesthetic is common. Are fasting guidelines met (NPO)?
- Preoperative checklist
- Usually requires a Foley catheter as is a long procedure
- Need to prep both groins
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?

- **For femoral access**- assess and document CWSM of both feet, including femoral, DP and PT pulses.
- Neuro-vital signs must be completed and documented pre procedure
- Ensure gas machine and Omnicell are in IR suite if anaesthesia involved.

Intra Procedure:

- Configure room according to access site (femoral). Patient will be supine for this procedure.
- Prepare 3 pressure bags if planned for single groin access. Prepare 5 pressure bags if planned for dual groin access.
- Full monitoring required (BP, ECG, Resp, O2 Sat, ETCO2)
- The contrast pump is usually required.
- Ultrasound is required for femoral access.
- Secure endotracheal (ET) tubing and monitoring lines on the right arm holder. Ensure all lines are out of the way for the 3D spin.
- Bair hugger to keep patient warm
- EVD (external ventricular drain) needs to be levelled when patient is positioned on radiology table. The EVD drain should be closed when moving the patient and should remain open during the procedure.
- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).

Post Procedure:

- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.
- Neuro-vital signs must be checked. Inform neuro radiologist of any change from baseline.
- Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.

- Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given.
- These patients will go to PACU immediately post procedure. They are often extubated in radiology and then transported to recovery. Following their PACU stay, they will be admitted to neuro ICU

Endovascular Neuro Coiling Tray Supplies

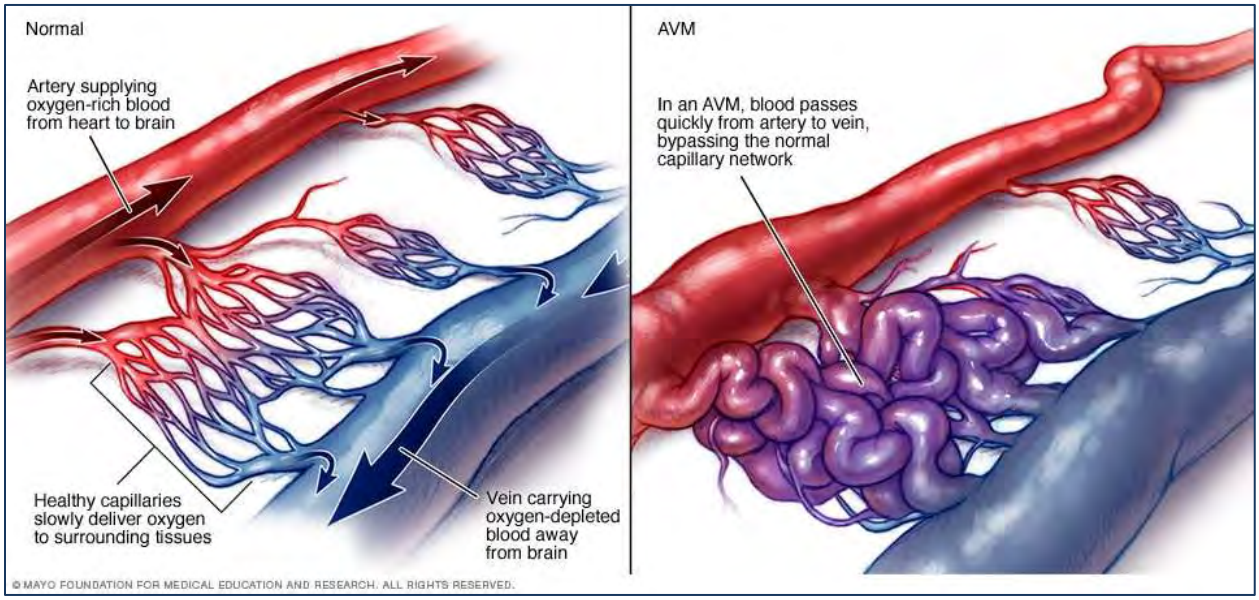
- Medium Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 2- one-way stopcock
- 1 Shield Cover
- #16-gauge IV Cannula
- 2- three-way stopcocks
- 2- Tuohy Borst Y-adapter
- Closed Drainage System
- For single groin punctures: 2 regular Namic tubing and 1 micro Namic tubing
- For double groin punctures: 4 regular Namic tubing and 1 micro Namic tubing
- 120 cm contrast pump tubing
- 2- 30 cm contrast pump tubing

Additional Supplies

- ACF or single wall needle or micro-puncture
- Vascular sheath – usually 6 French
- Wires– Wide J, Bentson, Terumo, Transend 14, Fathom, Terumo double angle
- Catheter – – Bern, Guider, Envoy, Renegade,
- Angioseal
- Statseal (add at end of procedure. Do not get wet)
- Coil Cart may be wheeled into room

Neuro Arteriovenous Malformation Embolization (AVM)

An AVM or arteriovenous malformation is a tangle of abnormal and poorly formed blood vessels (arteries and veins). They have a higher rate of bleeding than normal vessels. Brain AVMs occur in less than 1% of the general population. AVMs that occur in the covering of the brain are called Dural AVMs. Brain AVMs are treated to prevent bleeding resulting in a stroke with possible permanent disability or death. Endovascular treatment of AVMs may be done with coils and Onyx.



Google Image- Mayo Foundation for Medical Education and Research

Indications

Treatment is offered to prevent bleeding from an AVM. AVMs may also produce headaches, seizures, and progressive paralysis.

Complications

AVM embolization is associated with the risk of minor to major complications. These include the following: risks associated with all angiogram procedures such as groin hematomas, as well as transient neurological complications (resolve within 1 week), and permanent disabling deficits and death. Major complications are associated with ischemic and hemorrhagic events.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation.
- Sedation. Anaesthesia with a general anaesthetic is required. Are fasting guidelines met (NPO)?
- Preoperative checklist
- Usually requires a Foley catheter as is a long procedure
- Need to prep both groins
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- **For femoral access**- assess and document CWSM of both feet, including femoral, DP and PT pulses.
- Neuro-vital signs must be completed and documented pre procedure
- Ensure gas machine and Omnicell are in IR suite if anaesthesia involved.

Intra Procedure:

- Configure room according to access site (femoral). Patient will be supine for this procedure.
- Prepare 5 pressure bags for planned dual groin access. These procedures use one groin for venous access and the other groin for arterial access.
- Full monitoring required (BP, ECG, Resp, O2 Sat, ETCO2)
- The contrast pump is usually required.
- Ultrasound is required for femoral access.
- Secure endotracheal (ET) tubing and monitoring lines on the right arm holder.
- Bair hugger to keep patient warm
- EVD (external ventricular drain) needs to be levelled when patient is positioned on radiology table. The EVD drain should be closed when moving the patient and should remain open during the procedure.
- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).

Post Procedure:

- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.
- Neuro-vital signs must be checked. Inform neuro radiologist of any change from baseline.
- Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.
- Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given.
- These patients will go to PACU immediately post procedure. They are often extubated in radiology and then transported to recovery. Following their PACU stay, they will be admitted to neuro ICU

AVM Tray Supplies

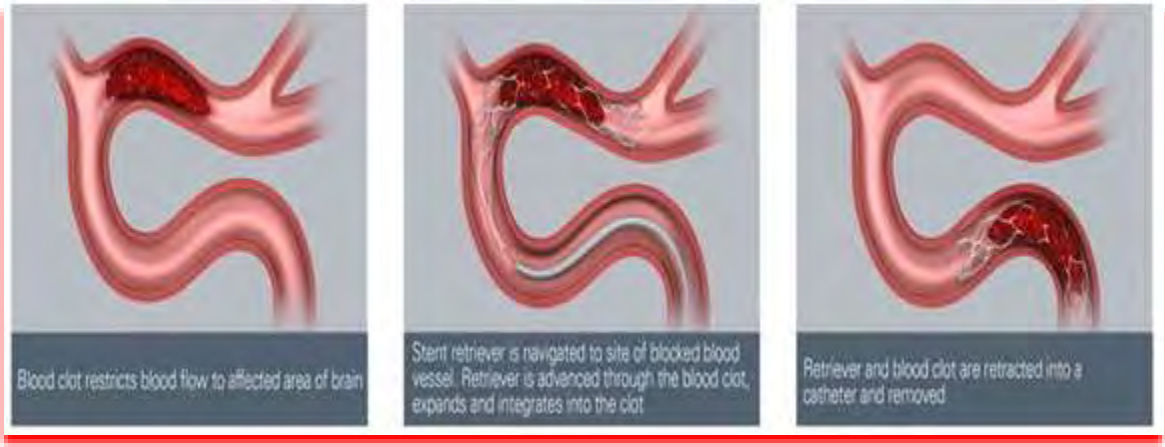
- Medium Trolley
- Angiogram Tray
- Femoral Drape Pack
- Kidney Basin/ Paint Tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 2- one-way stopcock
- 1 Shield Cover
- #16-gauge IV Cannula
- 2- three-way stopcocks
- 2- Tuohy Borst Y-adapter
- Closed Drainage System
- For double groin punctures: 4 regular Namic tubing and 1 micro Namic tubing
- 120 cm contrast pump tubing
- 2- 30 cm contrast pump tubing

Additional Supplies

- ACF or single wall needle or micro-puncture
- Vascular sheath – usually 6 French
- Wires– Wide J, Bentson, Terumo, Transend 14, Fathom, Terumo double angle
- Catheter – – Bern, Guider, Envoy, Renegade,
- Onyx with shaker.
- Coil cart in room
- Angioseal
- Statseal (add at end of procedure. Do not get wet)

Acute Stroke - Cerebral Thrombolysis

Acute ischemic stroke should be considered for endovascular therapy. Intravenous thrombolysis is the first line of therapy followed by endovascular therapy, ideally within 6 hours of onset of symptoms.



Google Image- California Institute of Neuroscience

Google Image- casemed.case.edu

Indications

Patients with an acute ischemic stroke identified within 6 hours of onset of symptoms.

Complications

Complications may include symptomatic intracranial hemorrhage, vessel dissection, emboli to new territory and vasospasm. Other complications relate to all angiogram procedures.

Nursing Considerations

Pre-Procedure:

- SPEED is of the essence.
- The stroke team will activate the IR team through hospital locating service if after hours.
- Following the CT scan, and approval for endovascular treatment, the patient is moved directly to the IR suite.
- The patient will be accompanied by a stroke team nurse who will monitor and assess the patient until anaesthesia arrives.
- The IR nurse priority is preparing the tray and assisting the transfer of patient to the angiography table. The IR nurse also ensures patient is hooked up to the gas machine monitor.
- The stroke nurse will usually have inserted a Foley catheter and completed pedal pulse checks in emergency.
- Ensure anaesthesia Omnicell is in the IR room

Intra Procedure:

- Patient will be supine on angiography table
- Drape patient
- Prime Namic tubing when time allows (not an immediate priority)
- Inform stroke nurse of “time of groin” puncture and “first pass” of thrombectomy
- Closure device is usually used (Angioseal)

Post Procedure:

- Assess CWSM, pedal pulses, and groin site
- Ensure neuro vital signs are being documented by stroke nurse
- Assist stroke nurse to transfer patient to stretcher to go to CT scan
- Leave patient on slider board for CT scan

Tray Supplies- Acute Stroke Cerebral Thrombolysis

- Medium trolley
- Angiogram tray
- Femoral drape pack
- Kidney basin/ Paint tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1- one-way stopcock
- 1 Shield Cover
- #16-gauge IV Cannula
- Closed Drainage System
- 2-3 regular Namic tubing

IR Neuroradiologist tray

- 2- three-way stopcocks
- 2- Tuohy Borst Y-adapter
- 2- one-way stopcocks
- 20 ml syringe
- 60 ml luer lock syringe
- Penumbra aspiration tubing

Additional Supplies-

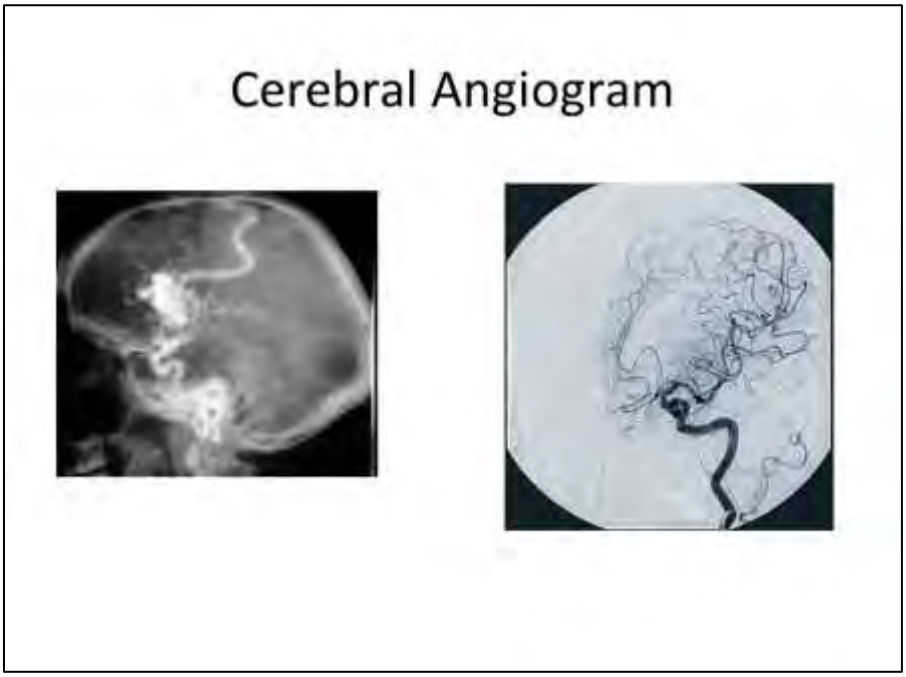
- Penumbra canister and unit
- Penumbra Neuron Max 6F088 (80cm)
- Penumbra 3MAX/5MAX ACE
- Penumbra velocity catheter
- TPA (Tissue Plasminogen Activator) 2 mg vials in fridge
- Solitaire Stent

WADA TEST (Cerebral Angio)

This test is used for epilepsy patients considering surgery. The nickname WADA Test comes from the physician who first performed it, Dr. Juhn Wada. This test looks at language and memory on one side of the brain at a time.

- Language (Speech) is controlled by one side of the brain (in most people the left side), and the WADA will inform the doctors which side controls language in your brain.
- Memory can be controlled by both sides of the brain. The WADA test tells which side of the brain has better memory.

If the side that controls language or has better memory is the same as where the seizures may be coming from, the surgeon may consider performing a functional MRI or brain mapping before surgery.



Google Image

Indications

This test is indicated for part of the pre surgical evaluation for people requiring epilepsy surgery.

Complications

The risks include the following: damage to the blood vessel, bruising or bleeding at the puncture site, infection and stroke.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation.
- Transportation home is required with appropriate supervision
- For this procedure the patient will not receive procedural sedation. The patient will be given an IV dose of Propofol by the Radiologist as part of the test.
- The patient will arrive early for their procedure, to allow time to go to EEG and have leads placed on their head.
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- **For femoral access**- assess and document CWSM of both feet, including femoral, DP and PT pulses.
- Neuro-vital signs must be completed and documented pre procedure
- Shave prep if necessary

Intra Procedure:

- Configure room according to access site (Femoral access). Patient is supine.
- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- The contrast pump is required.
- Ultrasound is required for femoral access.
- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).
- The white extension board must be added to the table to support the electrodes placed for the test.
- An EEG tech will be present for the procedure and be in charge of the EEG machine. The referring neurologist will enter the room once the medication is given and begin showing the patient memory cards.
- During the test, it is important to cover the sterile field with a gown, including the site of the sheath. The patient may become restless and disinhibited during the procedure. You may need to remove the O2 Sat probe and disconnect the blood pressure cuff during the test.
- Two doses of the medication is usually administered. This means the memory testing with the cards is done twice during the procedure.
- You may wish to attach the catheter to a heparnized saline flush while the testing is occurring. If a second flush isn't used, the catheter must be double flushed every minute.

Post Procedure:

- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.
- Neuro-vital signs must be checked. Inform neuro radiologist of any change from baseline.
- Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.

- Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given. These patients will usually go to a recovery area after hemostasis (PCC) or be admitted to a ward.
- Patients may be discharged same day of procedure.
- The EEG tech can remove the leads from the patient's head in the angiogram area or in PCC.

WADA Test Tray Supplies

- Long trolley
- Angiogram tray
- Femoral drape pack
- Kidney basin/ Paint tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover
- Closed Drainage System
- Regular Namic tubing (x2)
- #16-gauge IV Cannula
- 120cm high pressure (1200 psi) pump tubing

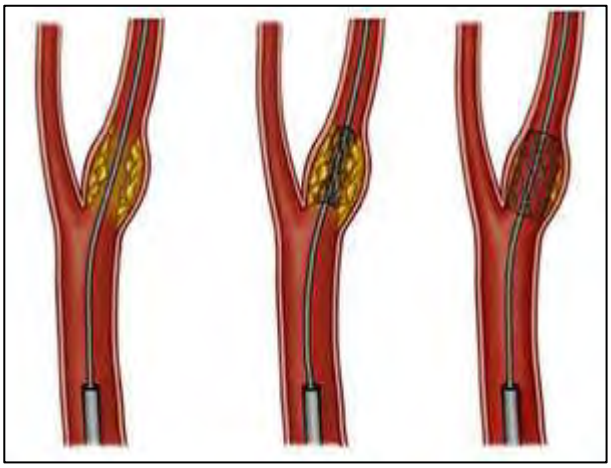
Additional Supplies

- ACF or single wall needle if femoral approach
- Vascular sheath – usually 4 or 5 French
- Wires– Wide J, Bentson, Terumo
- Catheter – – Bern
- Statseal (add at end of procedure. Do not get wet)

- Medication- Propofol 30 mg (3ml) added to 27mls normal saline (total of 30mls) = 1 mg/ml Propofol. First dose of medication = 10 mg (10 ml). The radiologist may give 15 mg if 10 mg is not effective. Use 60 ml syringe to draw up medication.

Carotid Stenting

Carotid artery stenting is an endovascular procedure, where a stent is deployed within the lumen of the carotid artery to treat narrowing of the carotid artery and decrease the risk of stroke.



Google Image- www.shawltechnique.com

Indications

Carotid artery stenting is performed on patients with a blockage of 70% or more, especially if they have had a stroke or TIA (transient ischemic attack). This is preferred in high risk surgical patients who may not tolerate an endarterectomy. This is also performed on patients who have had a previous endarterectomy and are now experiencing restenosis. Carotid stenting is also chosen if the stenosis is in a location that would be difficult to access with endarterectomy.

Complications

Complications specific to carotid stenting that may occur include:

- Stroke or mini stroke (TIA)
- Restenosis of the carotid artery (within the new stent)
- Blood clots
- Bleeding

- Other complications related to all angiograms may occur – see Angiogram.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. All arterial procedure patients should have IV access to address complications and administer hydration/sedation.
- Most carotid stentings are done with the presence of anaesthesia, however some emergent procedures have been done without.
- Sedation-Does the patient want or require sedation? Are fasting guidelines met (NPO)? Transportation home with appropriate supervision?
- Preoperative checklist required if anaesthesia involved.
- Carotid stents are often short interventional procedures. Patients may require only light sedation.
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- **For femoral access**- assess and document CWSM of both feet, including femoral, DP and PT pulses.
- Neuro-vital signs must be completed and documented pre procedure
- Ensure gas machine and Omnicell are in IR suite if anaesthesia involved.
- Shave prep if necessary
- Foley catheter generally not required
- **Carotid stent patients are usually loaded with Plavix and ASA pre procedure. Confirm that patient has had their medication on the day of procedure. Inform Neuro-radiologist or Neurosurgeon if patient has not yet received Plavix/ASA.**

Intra Procedure:

- Configure room according to access site (femoral). Patient will be supine for this procedure.
- Full monitoring required (BP, ECG, Resp, O2 Sat, ETCO2)
- The contrast pump is not usually required. Hand injections are the preferred method.
- Ultrasound is required for femoral access.
- During this procedure, when the stent is inserted and a balloon is used to inflate the stent, the patient may experience profound bradycardia or asystole. This is usually a transient episode that recovers spontaneously. The anaesthesiologist, if present, should be notified that the stent is being deployed and when the balloon is to be inflated.
- **Femoral procedure**- manual pressure (Statseal), compression from external device (Femostop) or closure device may be used (Angioseal, Perclose, Starclose, Exoseal).

Post Procedure:

- If a successful closure device is deployed, the patient is on bedrest for 2 hours with the affected leg straight. If no or an unsuccessful closure device is deployed, 4-6 hours of bedrest is required.
- Neuro-vital signs must be checked. Inform neuro radiologist of any change from baseline.
- Watch site closely for signs of hematoma /bleeding. Assess CWSM and pulses and inform IR physician of any change from baseline.
- Paperwork: Complete Patient Care Record including type and volume of contrast, access site and time of hemostasis, vital signs and CWSM/pulses, medications given.
- Carotid stent patients will be admitted to a neurology ward or neuro ICU post procedure. They will remain in hospital overnight.

Carotid Stent Tray Supplies

- Long Trolley
- Angiogram tray
- Femoral drape pack
- Kidney basin/ Paint tray (Sharps Disposal)
- 1 small instrument set
- 3 pack sterile gowns
- 2 packs radiopaque gauze
- Ultrasound probe cover
- 1 One-way stopcock
- 1 Shield Cover
- Closed Drainage System
- Regular Namic tubing (x2)
- Y-adapter
- One-way stopcock
- Three-way stopcock
- 30 cm pump tubing
- #16-gauge IV Cannula

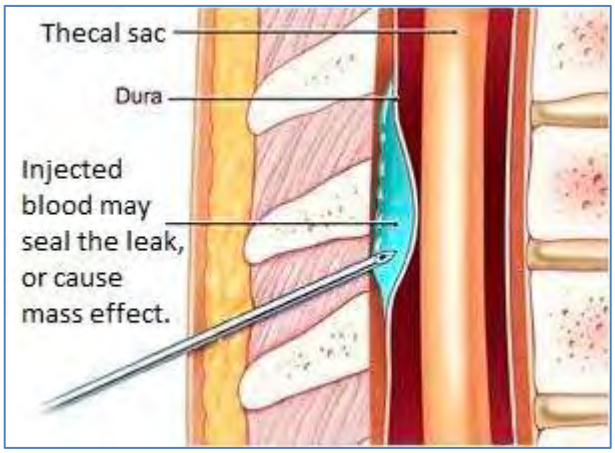
Additional Supplies

- ACF or single wall needle if femoral approach
- Vascular sheath – usually 4 or 5 French
- Wires– Wide J, Bentson, Terumo
- Catheter – – Bern
- Statseal (add at end of procedure. Do not get wet)
- Guider or Envoy catheter
- Distal Protection Device- Filterwire EZ
- Carotid Stent
- Angioplasty Balloon

If difficult access- micro-puncture kit may be required

Epidural Blood Patch

An epidural blood patch is a procedure that uses autologous blood in order to close one or more holes in the dura mater of the spinal cord, usually the result of a previous lumbar puncture.



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Indications

This procedure can be used to relieve post dural puncture headaches caused by lumbar punctures (CSF Leak).

Complications

These patients are at risk for developing increase ICP (Intracranial Pressure) when a mass effect is produced in the spinal epidural space. Other complications include failure of the procedure, back pain, infection, and inadvertent creation of additional dural leaks.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- These patients require insertion of a sterile, large IV (#18 gauge preferred). To insert the IV, sterile gloves, sterile towel or drape needs to be placed on the arm. A sterile extension tube and sterile

saline are used to flush and access the IV. The skin prep area needs to be large before starting the IV. Cover the IV site with a large Tegaderm and wrap in sterile towel. It is critical that this IV is sterile as the blood removed from the IV will be injected into the patient's epidural space.

- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?

Intra Procedure:

- Patient will be positioned prone on CT scan or fluoroscopy table.
- No vital signs monitoring is required
- No sedation is required
- The neuro-radiologist will access the epidural space with a needle. They will instruct the RN to withdraw blood from IV, usually into 20 ml syringes. The RN wears sterile gloves to aspirate and discard 3-5mls and then aspirate blood in 20 ml syringe. RN passes blood filled syringe to neuro-radiologist for injection. On average 30-50mls are injected. The end point for this procedure is when the patient cannot tolerate any more pressure in their spine.
- Band-aid to access site

Post Procedure:

- Patient needs to lie flat for 1-2 hours post procedure

Tray Supplies- Epidural Blood Patch

- Myelogram tray
- 2- #18-gauge needles
- 1- #25-gauge needle
- 10 ml syringe

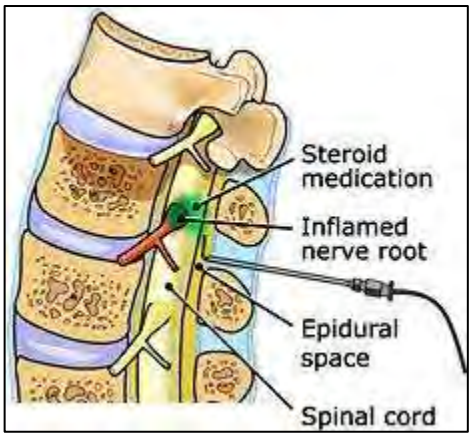
- 5 ml syringe
- Extension tubing
- Omnipaque 180
- Lidocaine 1%
- Tuohy needle
- Pediatric drape
- 10 count tray
- Sterile saline syringe
- Sterile gauze
- Marking pen
- Pre-filled sterile saline syringes

Additional Supplies

- Sterile saline syringes x3 for RN
- 3 x 20 ml syringes
- 1x 5ml syringe
- 1 x 10ml syringe
- Tisseel

Nerve Root Block (SNRB or NRB)

A selective nerve root block (SNRB or NRB), sometimes called a nerve block, is a procedure used to find out the cause of nerve root pain in the lower back, leg, neck or upper back and to also provide relief of pain. Imaging guidance is used during procedure and is performed with fluoroscopy or CT scan. This maximizes accuracy in needle placement while minimizing potential complications.



Google

Indications

A SNRB is a diagnostic only procedure. It tests to see if a specific nerve is causing pain by blocking it with a strong anaesthetic. No steroid is used. The anaesthetic may cause temporary numbness, tingling, and or mild weakness in the affected leg. These effects are temporary.

A NRB is a diagnostic and therapeutic injection. Both a strong anaesthetic and steroid are used and injected around the nerve and into the epidural space.

NRBs can be used to treat pain associated with cervical or lumbar radiculopathy, failed back surgery syndrome, spinal stenosis, bulging intervertebral discs, herniated discs and arthritis.

Complications

SNRB and NRB are generally safe and complications are rare. The risks include:

- Bleeding may occur, but is usually self-limited
- Accidental delivery of medication into the blood stream
- Unexpected spread of medication to other nerves
- Hitting the “wrong” nerve in an attempt to block the targeted nerve, due to their close proximity to one another.
- Prolonged effect of the local anaesthetic, causing weakness, numbness or other symptoms

Nursing Considerations

Pre-Procedure:

- Informed consent
- No IV access is required unless rare patient requires sedation or has history of fainting
- Transportation home with appropriate supervision required
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- No routine bloodwork required, unless on blood thinners or known medical co-morbidity

Intra Procedure:

An RN does not need to be present during the procedure.

- Configure room and table for patient in prone position.
- MRT/Nurse will prepare the sterile tray

- No monitoring required unless sedation provided, or patient known to faint.
- Radiologist will prep and drape the patient
- Radiologist will draw up and administer local anaesthetic and steroid (triamcinolone) as needed.
- Stretcher available for patient recovery post procedure

Post Procedure:

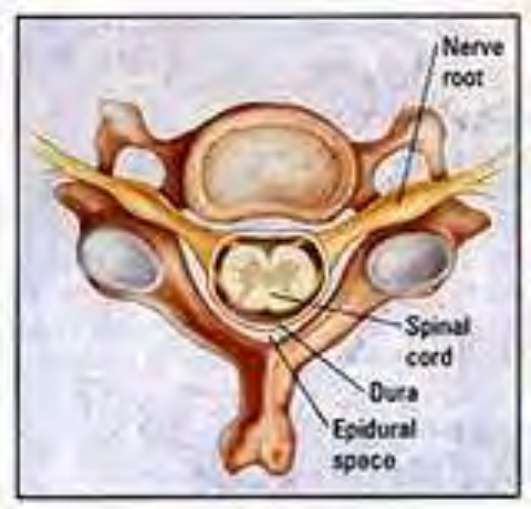
- Patient to recover on stretcher for approximately 30 minutes.
- Radiologist will reassess patient prior to discharge
- When ambulating for the first time, it is important to be aware that patient may not have the strength or sensation from baseline.
- These patients are at risk of a fall with first ambulation

Tray Supplies- Nerve Root Block

- Mylelogram tray
- #18-gauge needles (x3)
- #25-gauge needle
- 10 cc syringe (x2)
- 5 cc syringe
- Extension tubing
- Omnipaque 180
- 1% lidocaine for local anaesthetic
- 0.5% bupivacaine
- Kenalog (triamcinolone) 40 mg/ml
- #22-gauge spinal needle
- Band-aid

Epidural Spinal Injection (ESI)

An ESI is an injection of corticosteroid (anti-inflammatory medication) and local anaesthetic directly into the epidural space, around the spinal cord. This helps reduce inflammation that may be irritating the nerve root and causing pain. It is a common treatment for many forms of low back pain and leg pain.



Google Image- www.realpages.com

Indications

An epidural steroid injection is a therapeutic procedure aimed at relieving pain when the physician knows which nerve is affected. A lighter anaesthetic and steroid are injected around the nerve and epidural space. Indications include the following: pain in the neck, arm, low back, or leg (sciatica), spinal stenosis, spondylolysis, herniated disc, and degenerative disc.

Complications

ESIs are generally a safe procedure. Complications can include:

- Bleeding, usually stops on its own

- Accidental delivery of medication into the blood stream
- Unexpected spread of medication to other nerves
- Hitting the 'wrong' nerve because it is very close to the target nerve
- Long lasting effect of the strong numbing medication around the nerve, causing weakness and numbness
- Infection

Nursing Considerations

Pre-Procedure:

- Informed consent
- No IV access is required unless rare patient requires sedation or has history of fainting
- Transportation home with appropriate supervision required
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- No routine bloodwork required, unless on blood thinners or known medical co-morbidity

Intra Procedure:

An RN does not need to be present during the procedure.

- Configure room and table for patient in prone position.
- MRT/Nurse will prepare the sterile tray
- No monitoring required unless sedation provided, or patient known to faint.
- Radiologist will prep and drape the patient
- Radiologist will draw up and administer local anaesthetic and steroid (triamcinolone) as needed.
- Stretcher available for patient recovery post procedure

Post Procedure:

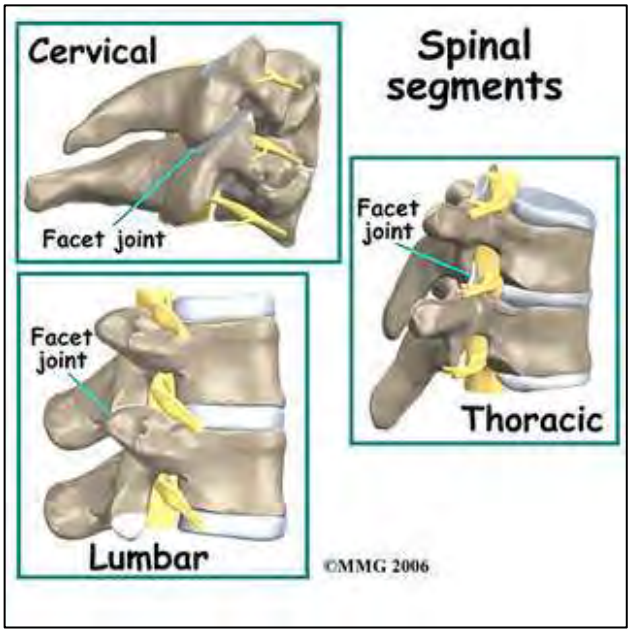
- Patient to recover on stretcher for approximately 30 minutes.
- Radiologist will reassess patient prior to discharge
- When ambulating for the first time, it is important to be aware that patient may not have the strength or sensation from baseline.
- These patients are at risk of a fall with first ambulation

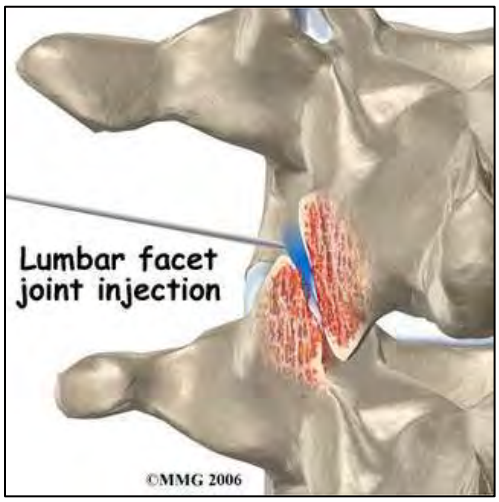
Tray Supplies- Epidural Spinal Injection

- Mylelogram tray
- #18-gauge needles (x3)
- #25-gauge needle
- 10 cc syringe (x2)
- 5 cc syringe
- Extension tubing
- Omnipaque 180
- 1% lidocaine for local anaesthetic
- 0.5% bupivacaine
- Kenalog (triamcinolone) 40 mg/ml (x2)
- Tuohy needle
- Band-aid

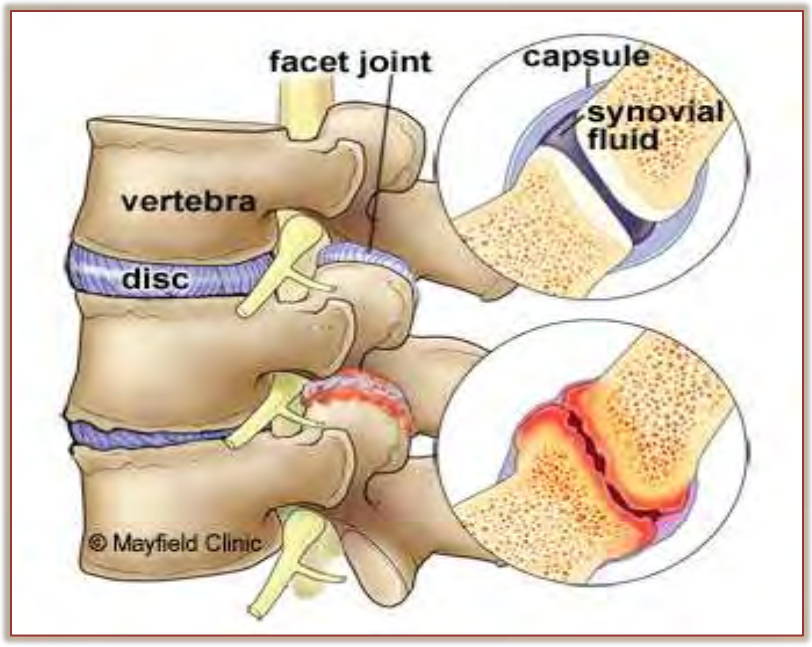
Facet Injection

Facet injections are performed for facet joint syndrome which is an arthritis-like condition of the spine causing a source of neck and back pain. There are degenerative changes to the joints between the vertebrae. The cartilage inside the facet joint breaks down and becomes inflamed, triggering pain signals in nearby nerve endings. This procedure involves injecting a small amount of local anaesthetic and/or steroid medication, which can anaesthetize the facet joints and block the pain.





Google Images: www.eorthopod.com



Mayfieldclinic.com

Indications

Facet injections are done for focal tenderness over facet joints, low back pain with or without sciatica, post laminectomy syndrome with no evidence of disc disease and persistent low back pain after a stable posterolateral spine fusion.

Complications

A facet joint injection is generally safe. Complications are rare. Complications may include:

- risk of infection- redness around injection site
- increased or worsening pain for first day or two after injection

Nursing Considerations

Pre-Procedure:

- Informed consent
- No IV access is required unless rare patient requires sedation or has history of fainting
- No ride or escort home required
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- No routine bloodwork required, unless on blood thinners or known medical co-morbidity

Intra Procedure:

An RN does not need to be present during the procedure.

- Configure room and table for patient in prone position.
- MRT/Nurse will prepare the sterile tray
- No monitoring required unless sedation provided or patient known to faint.
- Radiologist will prep and drape the patient
- Radiologist will draw up and administer local anaesthetic and steroid (triamcinolone) as needed.

Post Procedure:

- Patient may require stretcher or walk out of room (Physician preference)
- Radiologist will reassess patient prior to discharge

Tray Supplies- Facet Injection

- Mylelogram tray
- #18-gauge needles (x3)
- #25-gauge needle
- 10 cc syringe
- 5 cc syringe
- Extension tubing
- 1% lidocaine for local anaesthetic
- 0.5% bupivacaine
- Kenalog (triamcinolone) 40 mg/ml
- #22-gauge spinal needle
- Band-aid

Sacroiliac Joint Injection (SI)

SI joint injections are the injection of local anesthetic and a steroid medication into the sacroiliac joint. The SI joint can be a source of lower back pain. Temporary relief of the steroid starts to work after 24-48 hours. The duration of this relief is different for all patients.

Google Image- National Spine and Pain Centers

Indications

SI joint injections can be used for the diagnosis and treatment of SI joint pain.

Complications

Most common complication is an increased level of pain. SI joint injections may also be associated with transient reactions, such as vasovagal reactions. More rare but serious complications include:

- Trauma to the nerves
- Accidental intervertebral foraminal injection
- Hematoma
- Sciatic palsy
- Meningitis
- Abscess
- Systemic infection

Nursing Considerations

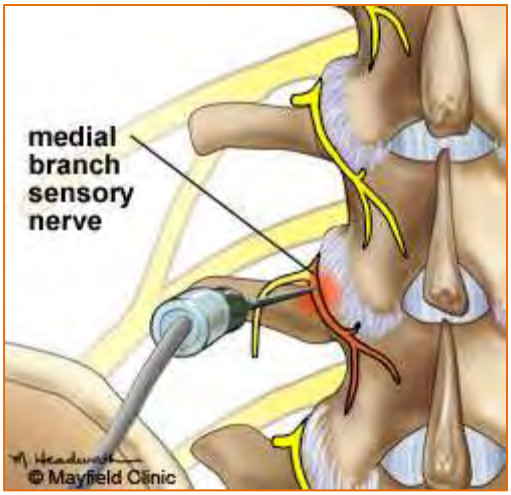
These procedures do not require an RN to be present. Patient would still need to meet Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging.

Tray Supplies- SI Injection

- Mylelogram tray
- #18-gauge needles (x3)
- #25-gauge needle
- 10 cc syringe
- 5 cc syringe
- Extension tubing
- 1% lidocaine for local anaesthetic
- 0.5% bupivacaine (if diagnostic only)
- Combination of 0.5% bupivacaine and Kenalog for therapeutic block
- Kenalog (triamcinolone) 40 mg/ml
- #22-gauge 3.5” spinal needle (may need longer needle if bariatric patient
- Band-aid

Medial Branch Block

Medial branch block is an injection of local and steroid combination into the small nerves which connect to a specific facet joint. Medial Branch nerves extend out from the facet joint in the spine and carry pain signals from the facet joints to the brain. Typically, several levels of the spine are injected in one procedure. The block is primarily diagnostic, meaning that if there is an appropriate duration of pain relief after the medial branch nerve block, then the patient may be a candidate for a rhizotomy, for longer term or permanent pain relief.



Google Image- Mayfield Clinic

Indications

Medial branch blocks are indicated in patients with chronic (greater than 6 months) axial spine pain that is inadequately explained and poorly controlled.

Complications

Potential complications include:

- Bleeding

- Infection
- Pain at the injection site
- Nerve damage

Nursing Considerations

Pre-Procedure:

- Informed consent
- No IV access is required unless rare patient requires sedation or has history of fainting
- Transportation home with appropriate supervision required
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- No routine bloodwork required, unless on blood thinners or known medical co-morbidity

Intra Procedure:

An RN does not need to be present during the procedure.

- Configure room and table for patient in prone position.
- MRT/Nurse will prepare the sterile tray
- No monitoring required unless sedation provided, or patient known to faint.
- Radiologist will prep and drape the patient
- Radiologist will draw up and administer local anaesthetic and steroid (triamcinolone) as needed.
- Stretcher available for patient recovery post procedure

Post Procedure:

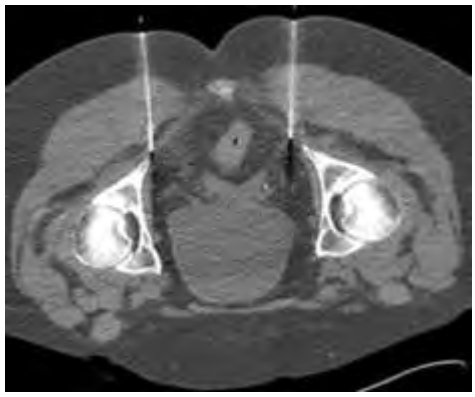
- Patient to recover on stretcher for approximately 30 minutes.
- Radiologist will reassess patient prior to discharge
- When ambulating for the first time, it is important to be aware that patient may not have the strength or sensation from baseline.
- These patients are at risk of a fall with first ambulation

Tray Supplies- Medial Branch Block

- Mylelogram tray
- #18-gauge needles (x3)
- #25-gauge needle
- 10 cc syringe (x2)
- 5 cc syringe
- Extension tubing
- Omnipaque 180
- 1% Lidocaine for local anaesthetic
- 0.5% Bupivacaine
- Kenalog (Triamcinolone) 40 mg/ml (x2)
- #22-gauge spinal needle
- Band-aid

Pudendal Block

The pudendal nerve provides the majority of sensations and functions of the external genitals, urethra, anus and perineum. It also controls the external anal sphincter and the sphincter muscles of the bladder. Pudendal blocks are done for patients who have a history or are suspected of having pudendal neuralgia. The most common symptom is pain when sitting. The nerve is blocked with local anesthetic to see if symptoms disappear with the numbing of the nerve.



URMC- University of Rochester

Indications

Pudendal blocks are indicated for pain, precipitated by prolonged sitting or trauma. Frequently there is also urinary, anal, or sexual dysfunction.

Complications

Pudendal blocks are generally a safe procedure. Complications can include:

- Bleeding and nerve damage
- Bruising at the injection site
- Infection
- Temporary pain at the injection site

Nursing Considerations

Pre-Procedure:

- Informed consent
- IV access is required
- Transportation home with appropriate supervision required
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Routine bloodwork required

Intra Procedure:

- Configure CT table- patient prone
- CT Tech will prepare the sterile tray
- Full monitoring required (BP, ECG, O2Sat, Resp), EtCO2 if sedation required.
- Sedation may be required
- Radiologist will prep and drape the patient
- Radiologist will draw up and administer local anaesthetic. Steroid medication may also be required.
- Stretcher available for patient recovery post procedure

Post Procedure:

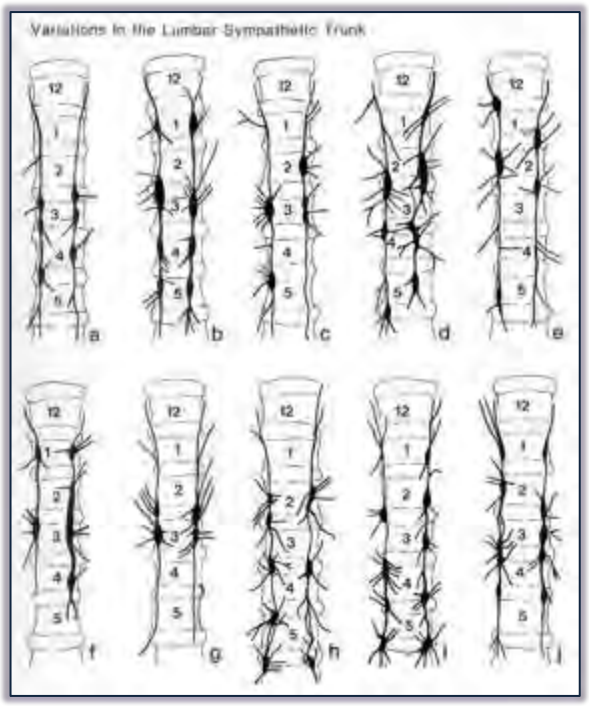
- Patient to recover on stretcher for approximately 1 hour
- Radiologist will reassess patient prior to discharge

Tray Supplies- Pudendal Block

This procedure is done in CT Scan.

Lumbar Sympathetic Block

It is a procedure in which the sympathetic nerves are blocked by a local anesthetic to see if symptoms of lower limb ischemia (decreased blood flow) and complex pain can be alleviated. This may be done in two sessions. In the first session, a local (numbing) anesthetic is injected. If there are good results, a second session will be done and a permanent block performed involving an alcohol injection.



www.anatomyatlases.org

Indications

Lumbar sympathetic block can be used to treat the following: reflux sympathetic dystrophy, complex regional pain syndrome, herpes zoster infection (shingles) involving the legs and more commonly vascular insufficiency and peripheral neuropathy.

Complications

A lumbar sympathetic block is generally a safe procedure. Complications include:

- Bleeding and nerve damage
- Bruising at the injection site
- Infection
- Temporary pain at the injection site

Nursing Considerations

Pre-Procedure:

- Informed consent
- IV access is required
- Transportation home with appropriate supervision required
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Routine bloodwork required

Intra Procedure:

- Configure CT table- patient prone
- CT Tech will prepare the sterile tray
- Full monitoring required (BP, ECG, O2Sat, Resp), EtCO2 if sedation required. Lumbar sympathetic blocks may cause a precipitous drop in blood pressure. RN must be aware and prepared to act.
- Temperature probes must be placed on each foot prior to procedure. It is very important to document baseline temperatures of each foot pre, intra and post procedure (Q15 min). The radiologist will require a copy of the temperature for reporting.
- Sedation may be required. Sedation may only be required for permanent lumbar sympathetic block

- Radiologist will prep and drape the patient
- Radiologist will draw up and administer local anaesthetic (temporary).
- Radiologist will draw up dehydrated alcohol 100% (permanent). Alcohol injections can be very painful. Confirm with radiologist when to sedate patient.
- Stretcher available for patient recovery post procedure

Post Procedure:

- Patient to recover on stretcher for approximately 1 hour
- Radiologist will reassess patient prior to discharge

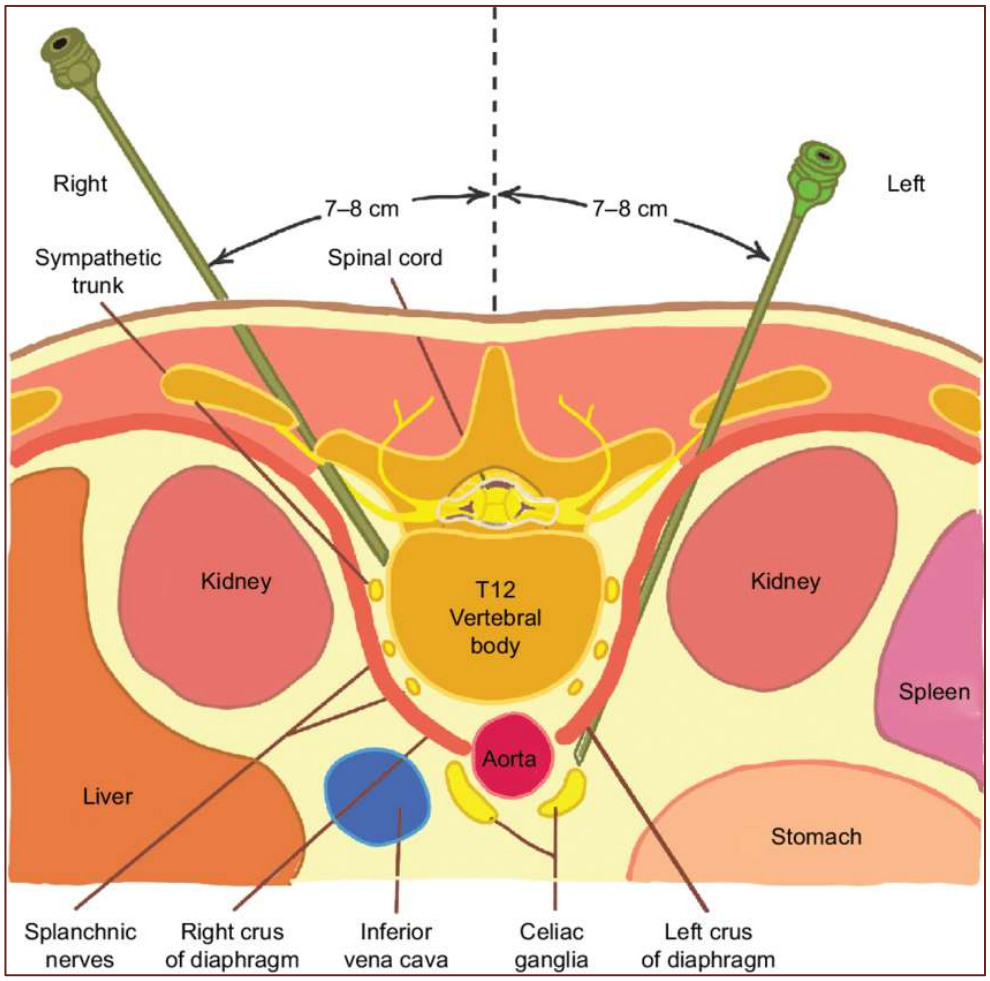
Tray Supplies- Lumbar Sympathetic Block

This procedure is done in CT Scan

- Myelogram tray
- Pediatric drape
- Control syringe
- #18-gauge needle
- #25-gauge needle
- Scalpel
- Small instrument set
- 1% Lidocaine
- 0.5% Bupivacaine
- #22-gauge, 15 cm Chiba needle (3X)
- Extension tubing
- Omnipaque 180 available
- 10cc syringes (x2)
- Dehydrated alcohol 100% in a 10 ml vial (if permanent only)

Celiac Plexus Block

Celiac plexus block is used for pain palliation in patients who have chronic abdominal pain related to the celiac ganglia. The celiac plexus is a bundle of nerves that surrounds the aorta.



Google Image- Researchgate.net

Indications

Celiac plexus block can help people with persistent, intractable abdominal or localized back pain due to malignant disease in the upper abdomen. It is

used when other standard pain control therapies fail to relieve patient's pain. It is also commonly used to alleviate pain, related to chronic pancreatitis.

Complications

A celiac plexus block is generally a safe procedure. Complications are rare. Complications can include:

- Bleeding and nerve damage
- Bruising at the injection site
- Infection
- Low blood pressure
- Collapsed Lung
- Diarrhea

Nursing Considerations

Pre-Procedure:

- Informed consent
- Check with Radiologist if IV access will be required. May be done with or without sedation.
- Transportation home with appropriate supervision required
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- No routine bloodwork required, unless on blood thinners or known medical co-morbidity
- RN should document pain assessment prior to procedure

Intra Procedure:

- Configure room and table for prone position
- Full monitoring required (BP, ECG, Resp, O2 Sat)
- Radiologist will prep and drape patient

Post Procedure:

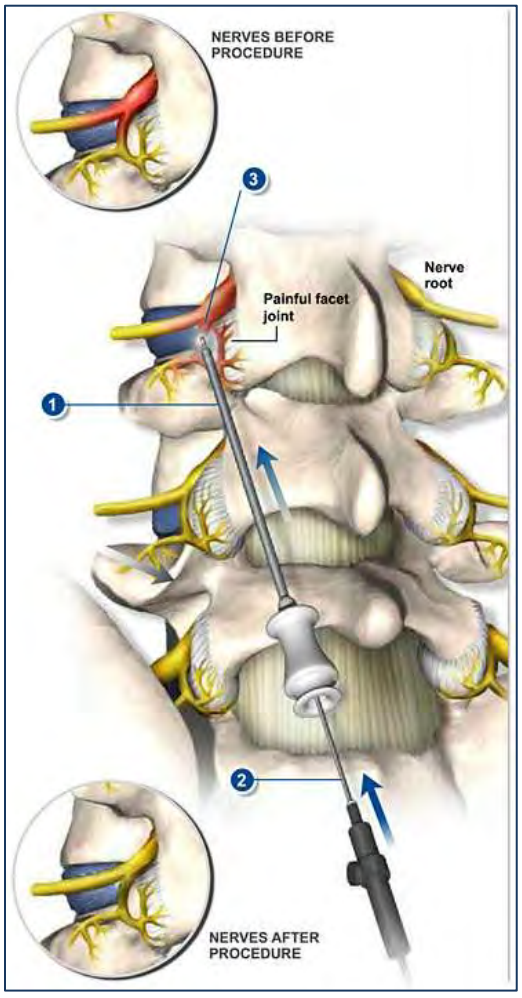
- Patient will require a stretcher for recovery. They will need to stay approximately 1hour post procedure.
- Motor function and sensation must be assessed and documented

Tray Supplies- Celiac Plexus Block

This procedure is done in CT Scan

Rhizotomy

A rhizotomy involves destroying the nerves that innervate the facet joints with highly localized heat generated with radiofrequency. The goal is to reduce pain without reducing nerve function. This is a treatment option for patients who have had successful pain relief after facet block and medial branch block injections.



Google Image- The Southeastern Spine Institute

Google Image- Baylis Medical

Indications

For many patients facet joint injections provide adequate relief. For others however, the pain relief is too short lived. For these patients, facet rhizotomy (also called radiofrequency rhizotomy) will be indicated.

Complications

Rhizotomy is generally a safe procedure. Complications are rare. Complications may include:

- Bleeding
- Infection
- Pain at the injection site
- Worsening pain due to muscle spasm
- Leg weakness or numbness

Nursing Considerations

Pre-Procedure:

- Informed consent
- No IV access is required unless rare patient requires sedation or has history of fainting
- Transportation home with appropriate supervision required
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- No routine bloodwork required, unless on blood thinners or known medical co-morbidity
- Patients will usually receive pre procedure Tylenol and Ativan, if appropriate
- RN should document pain assessment prior to procedure
- A rhizotomy can be an uncomfortable procedure but the patient must be fully aware and not sedated, for the radiologist to identify the target nerve.

Intra Procedure:

An RN is to apply grounding pad to posterior thigh of patient.

An RN does not need to be present during the procedure

- Configure room and table for patient in prone position.
- MRT will prepare the sterile tray
- No monitoring required unless sedation provided, or patient known to faint.
- Radiologist will prep and drape the patient
- Radiologist will draw up and administer local anaesthetic

Post Procedure:

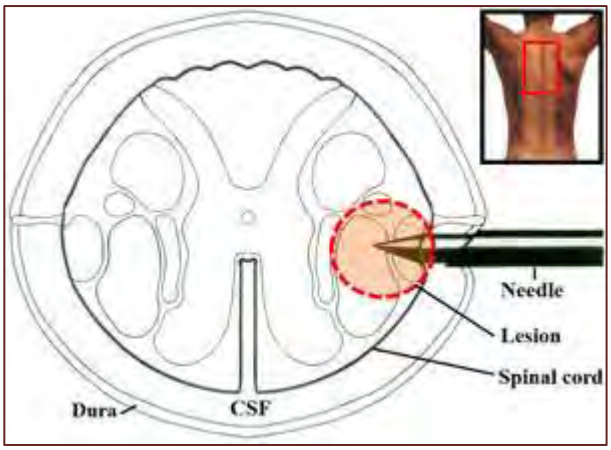
- Patient will require stretcher
- Radiologist will reassess patient and pain level prior to discharge

Tray Supplies- Rhizotomy

- Mylelogram tray
- #18-gauge needles (x2)
- #25-gauge needle
- 1% lidocaine for local anaesthetic
- Baylis Rhizotomy Machine
- Rhizotomy Needle (100 or 145 mm)
- Rhizotomy Probe Kit (100 or 145 mm)
- Grounding Pad
- Shower Cap (x2)
- Band-aid

Cordotomy

A cordotomy is a procedure that disables selected pain conducting tracts in the spinal cord, in order to achieve loss of pain and temperature perception. Not being able to feel pain is the goal of the procedure. Not being able to feel temperature is a known side effect of the procedure. The benefit has been reported to typically last a year and therefore patients are selected if their expected life span is less than a year.



Google Image- Clinica Neuros

Indications

This procedure is commonly performed on patients experiencing severe, intractable pain due to cancer and other incurable diseases. These patients are usually referred to radiology from palliative care. The patients are usually on the highest possible narcotic doses and have continued to have severe pain.

Complications

Cordotomy can be highly effective in relieving pain, but there are significant side effects. These include the following: dysesthesia (abnormal sensation), urinary retention and (for bilateral cervical cordotomy) apnea

during sleep (acquired central hypoventilation syndrome) caused by inadvertent division of the reticulospinal tracts. Also, spinal cord injury is rare, but may occur.

Nursing Considerations

Pre-Procedure:

- Informed consent
- NPO according to fasting guidelines
- IV access is required.
- Anaesthesiology will be involved as patient will likely require procedural sedation.
- Dr Honey (Neurosurgeon) does these procedures in conjunction with Dr. Heran
- Preoperative checklist is required
- Bloodwork – recent results for HGB, PLT, INR, PTT. Usually within one week for in-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Gas machine and anaesthesia Omnicell/ Blue drug cart must be in room.
- Patient will return to Palliative Care Unit post procedure
- Patient will often be on a high dose fentanyl infusion. Once the treatment is complete the fentanyl infusion dose is reduced (anaesthesiologist is responsible for reducing dose).

Intra Procedure:

- Configure CT Scan table for supine or prone position, confirm with radiologist. Patient is head-first into scanner. Ensure adequate bolsters available for patient comfort.
- Patient will be prepped and draped by Radiologist

- Dr Honey brings own Rhizotomy machine to CT Scan

Post Procedure:

- Band-aid can be used at insertion site.
- Monitor neck for bleeding and hematoma
- Patient may have head of bed elevated 30˚ or more
- Communicate with neurosurgeon and anaesthesiologist regarding the weaning of the narcotic infusion (usually fentanyl).
- Patient may return to Palliative Care Unit when cleared by anaesthesiologist
- Document pain level and sensation post procedure. Following the treatment, the patient will no longer be able to feel pain or temperature on the opposite side of the body.
- After treatment completed, Neurosurgeon will test affected side for pain and temperature stimulus.

Tray Supplies- Cordotomy

- Mylelogram tray
- #22 gauge 3 ½" spinal needle
- 1% Lidocaine for local anaesthetic
- 10 cc syringes (x3)
- 20 cc syringe
- Omnipaque 180 (x2)
- Short extension tubing
- Clear aperture drape
- Small Tegaderms (x2)

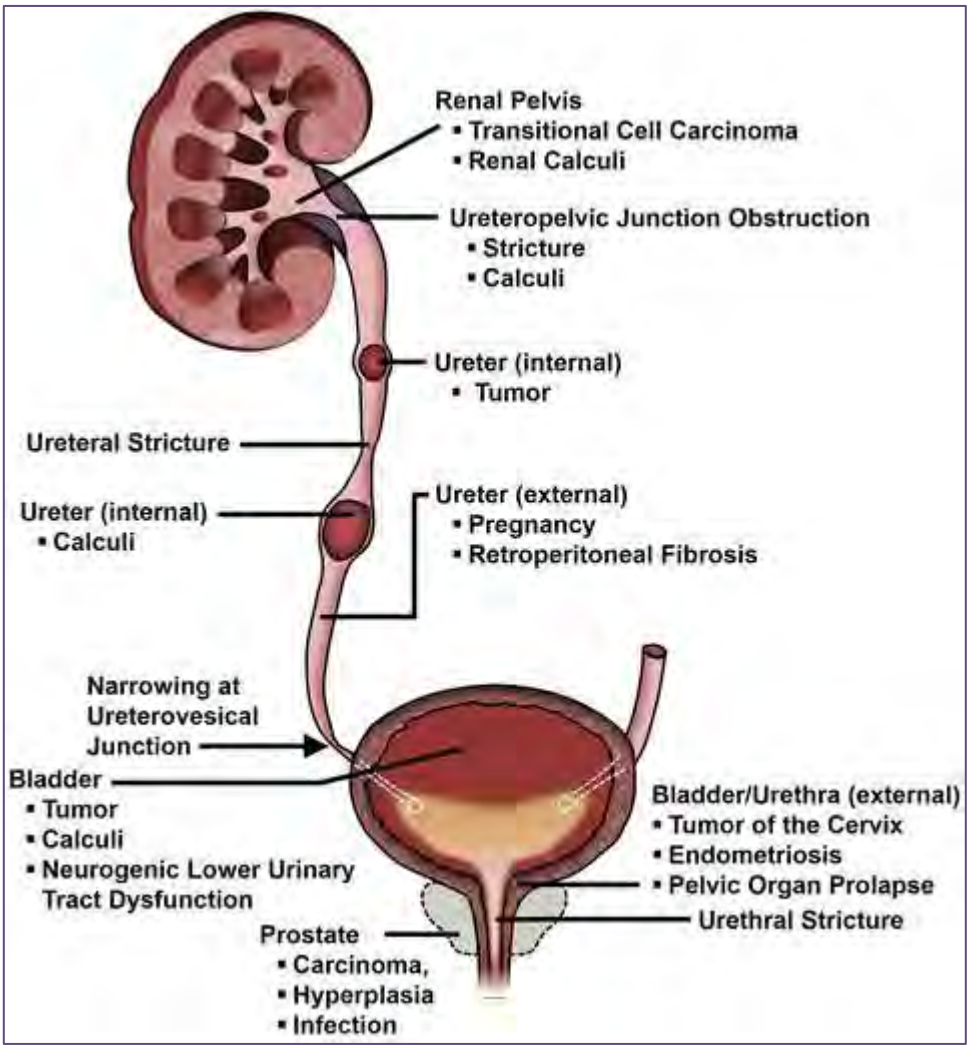
Dr Honey Treatment Side Table

- #18 gauge 3 ½" spinal needle
- Ice in orange top container for patient test at the end of treatment

Urethral/Ureteral Dilatation

Urethral dilatation is a common procedure for the treatment of urethral strictures. The goal is to stretch the scar tissue without injuring the lining of the urethra.

Ureteral dilatations are used to treat a narrowing within the ureter.



Google Image- link.springer.com

Indications

Urethral strictures can result from scarring within the urethra. Mechanical narrowing of the urethra without scar formation (prostate enlargement) can

also result in a narrowing of the urethra. Strictures may also occur in association with cancer, radiation treatment, congenital malformations, sexually transmitted infections (STIs) and associated surgeries (pelvic trauma, hypospadias).

Ureteral strictures can be congenital or the result of scar tissue from previous surgery, renal stones or other causes.

Complications

These may include bleeding, pain, urinary tract infection, recurrent stricture, and for male patients, difficulty with erection.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- Sedation – most patients will require sedation. Are the fasting guidelines met (NPO)? Transportation home with appropriate supervision or going to hospital unit post procedure?
- Bloodwork – Platelets, INR, PTT
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- IV access will be required for sedation
- Pre procedure oral antibiotic is commonly given, check with IR radiologist

Intra Procedure:

- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if applicable.
- **Urethral Dilatation**- Lidocaine jelly is used for local anaesthetic
- **Ureteral Dilatation**- may be done via access from nephrostomy tube
- **Urethral Dilatation**- Patient will be supine on fluoroscopy table

- **Ureteral Dilatation**- Patient may be prone if nephrostomy tube accessed
- If the genital area is prepped, a sterile green towel can be used to preserve modesty until physician is ready to begin procedure
- The stricture is crossed with a wire and then a balloon catheter is inflated. This may cause discomfort, and the nurse should prepare patient with sedation.
- A Foley catheter may be left in place by the radiologist at the completion of the procedure.

Post Procedure:

- The Foley catheter is attached to a leg bag. The patient or family member is instructed on how to empty and convert bag to an overnight, large bag. Ensure patient is given a large overnight drainage bag.
- Patient must be instructed on how to perform pericare with Foley catheter in situ.
- The patient will follow up with their urologist.
- These procedures may need to be repeated periodically.
- The patient needs to know what the signs and symptoms of a urinary tract infection (UTI) are, and to seek medical treatment.

Tray Supplies- Urethral/Ureteral Dilatation

- Digital myelogram tray
- 20 ml syringe
- 60 ml syringe
- Scalpel
- Extension tubing
- Angiogram drape (femoral)
- Shower cap
- Shield cover
- Lidocaine jelly

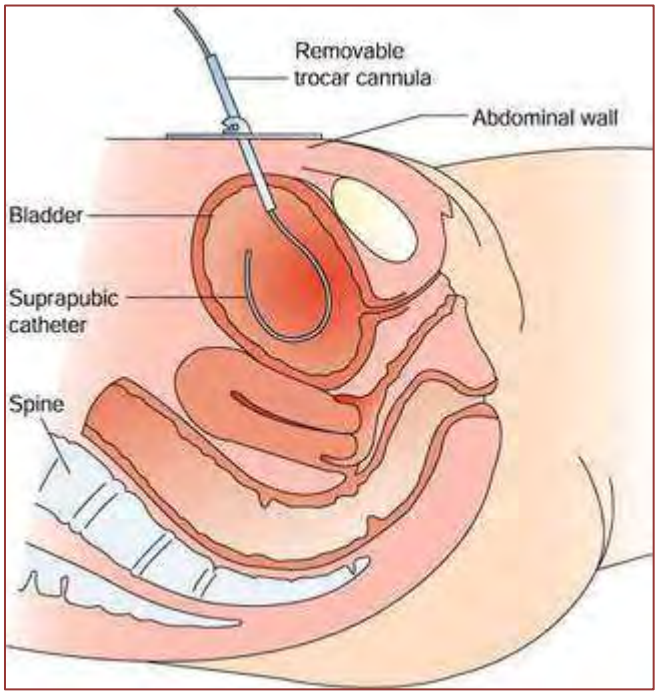
- Urethral Dilatation- Penile clamp (male)
- Blue female Foley adapter
- Baxedin (clear prep solution)

Additional Supplies

- 50 ml bottle Conray 60%
- Balloon catheter
- Inflation device
- Ureteral connecting tube
- Bile bag
- Large urine bag
- Assortment of Coude Foley catheters
- .035 stiff angled Terumo
- 5 Fr dilator
- Tuohy Borst
- 7 Fr straight catheter

Suprapubic Catheter Insertion

Suprapubic catheter is used to drain urine from the bladder, for patients who are unable to empty their bladder.



Google Image- www.spinal-injury.net

Indications

These catheters are used for patients with urethral trauma, long term catheterizations in patients who are sexually active, after gynecological surgery, long term incontinence, and for some patients in wheel-chairs who cannot self catheterize.

Complications

These may include pain, fever, abdominal discomfort, urine leaking around the catheter, skin irritation around insertion site and bleeding (should resolve in 24 hours). If urine stops draining out of the catheter, the patient or support person should be instructed to check for kinks. If the catheter is still not draining they should seek medical attention.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- Sedation – most patients will require sedation. Are the fasting guidelines met (NPO)? Transportation home with appropriate supervision or going to hospital unit post procedure?
- Bloodwork – Platelets, INR, PTT
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- IV access will be required for sedation
- Pre procedure oral antibiotic is commonly given, check with IR radiologist
- The patient population with spinal cord injuries may be at risk for autonomic dysreflexia. Nurses should screen all spinal cord injury patients for history of this disorder. All patients with autonomic dysreflexia should be referred to anaesthesia for management of sedation.
- Most patients will have an indwelling Foley catheter on arrival. This Foley catheter is clamped to ensure a full bladder (facilitates bladder puncture). If bladder is empty, sterile water may be infused via Foley catheter.

Intra Procedure:

- Full monitoring required (BP, ECG, Resp, O2 Sat). ETCO2 if sedation required.
- Lidocaine 1% is used for local anaesthetic
- Patient will be supine on fluoroscopy table
- Shave prep

Post Procedure:

- The suprapubic catheter is attached to a leg bag. The patient or support person is instructed on how to empty and convert bag to an overnight, large bag. Ensure patient is given a large overnight drainage bag.
- The urethral Foley catheter may be removed at end of procedure or be left in situ for removal by urologist.
- The patient will follow up with their urologist.
- For out-patients ensure “Home Care” is arranged prior to patient departure.
- The supra pubic catheter will need to be changed every 6 to 8 weeks
- The patient needs to know what the signs and symptoms of a urinary tract infection (UTI) are, and to seek medical treatment.

Tray Supplies- Suprapubic Catheter Insertion

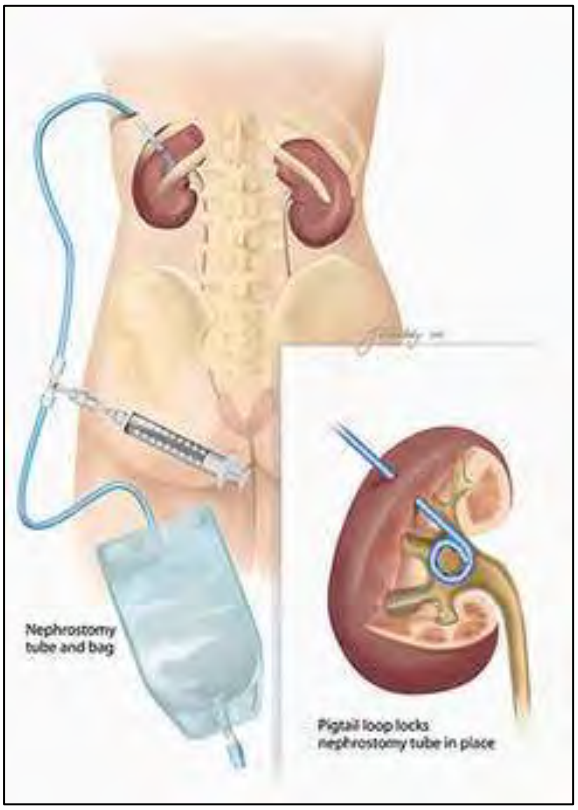
- Digital myelogram tray
- Lidocaine 1% and Marcaine
- 20 ml syringe
- 10 ml control syringe
- #18 & #25-gauge needles
- Instrument pack
- Red end cap
- Scalpel
- Purple felt marker
- Extension tubing
- Angiogram drape (femoral)
- Shower cap
- Shield cover
- Blue female Foley adapter
- Baxedin (clear prep solution)

Additional Supplies

- 50 ml bottle Conray 60%
- Ultrasound machine and probe cover (1012 drape)
- Balloon catheter
- Inflation device
- Ureteral connecting tube
- Bile bag
- Large urine bag
- 8.5 Fr MCL catheter
- .038 floppy J wire and .038 stiff angled Terumo wire
- 5, 7, 9 Fr dilators

Nephrostomy Tube Insertion

A nephrostomy tube is a catheter that is placed percutaneously to drain urine from the kidney when there is an obstruction.



Google image- www.zina-studio.com

Indications

A nephrostomy tube is required to bypass a blocked kidney. A kidney may be unable to drain due to renal stone, stenosis, enlarged prostate, pregnancy, urinary tract infections and tumour. Urine backs up in the kidney causing hydronephrosis. Hydronephrosis creates high pressure in the kidney and causes the renal pelvis to become enlarged.

Complications

The risks include severe bleeding, tube dislodgement, infection and injury to the kidney, ureter or bladder

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Sedation-requires sedation. Are fasting guidelines met (NPO)?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Out-patients will require a ride home.
- Check with radiologist regarding prophylactic antibiotic

Intra Procedure:

- Patient is positioned prone, unless they have a transplanted kidney, then they are supine
- Full monitoring is required- O2 Sat, ECG, BP, Resp and EtCO2

Post Procedure:

- Nephrostomy tube is usually connected to straight drainage.
- Assess drainage for bleeding
- Dressing and securement device (ex. Statlock) applied
- Ensure specimens are labelled and sent to Lab
- For out-patients ensure “Home Care” is arranged prior to patient departure.

- Show patient or support person how to empty and change “leg” bag to “night-time” bag.
- RN to photocopy patient care record and history for blue chart.

Tray Supplies- Nephrostomy Tube Insertion

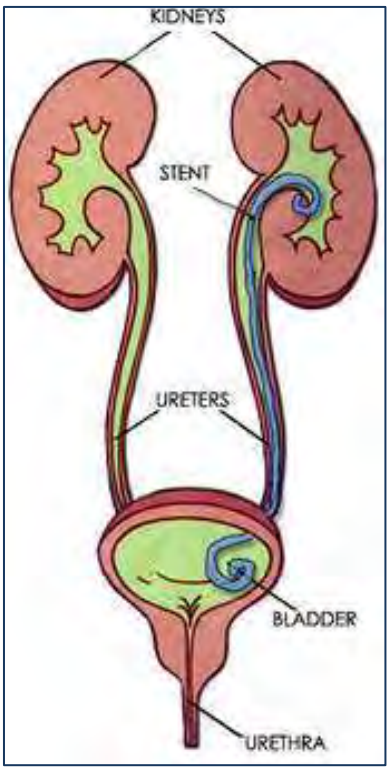
- Digital myelogram tray
- 20 ml syringe
- 10 ml control syringe
- Scalpel
- #18 & #25-gauge needles
- Angiogram drape (femoral)
- Shower cap
- Shield cover
- Lidocaine 1%
- Blue female Foley adapter
- Baxedin (clear prep solution)
- Purple marker

Additional Supplies

- 50 ml bottle Conray 60%
- Ultrasound machine and probe cover (1012 drape)
- #18-gauge Chiba needle
- Neff set with radiopaque band
- Ureteral connecting tube
- Bile bag
- Large urine bag
- 0.038 floppy J wire and .038 stiff angled Terumo wire
- 7 and 9 Fr dilators
- 8.5 Fr MCL catheter
- 5.0 Fr DAV catheter
- Stat-Lock
- Gauze and Mepore tape

Stent Insertions/ Conversions

There are a variety of urologic stents that may be placed in radiology. These include ureteric stents, internal stents and internal/external stents. Ureteric stents may be inserted by urology during a cystoscopy procedure. Many patients will have existing nephrostomy tubes, which may be converted to internal/ external (int/ext) stents.



Google image- www.nyurological.com

Indications

Ureteric, Internal and Internal/External stents are used to ensure the openness of the ureter which may be compromised by a kidney stone, tumour, or a previous procedure.

Complications

These include pain, fever, bleeding (usually resolves within 24 hours), blockage or displacement, urinary frequency and leakage of urine.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Sedation-requires sedation. Are fasting guidelines met (NPO)?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Out-patients will require a ride home.
- Check with radiologist regarding prophylactic antibiotic

Intra Procedure:

- Patient is positioned prone, unless they have a transplanted kidney, then they are supine
- Full monitoring is required- O2 Sat, ECG, BP, Resp and EtCO2

Post Procedure:

- Some stents will be fully internalized, while others like int/ext stents will be capped or attached to a drainage bag.
- Fully internalized stents may have a suture string that hangs out of the urethra and should be taped to just above patient's pubic bone. This suture string allows the stent to be removed in a doctor's office or by the patient themselves.
- Int/ext Stent- Assess drainage for bleeding

- Int/ext Stent- Dressing and securement device (ex. Statlock) applied
- Ensure specimens are labelled and sent to Lab
- For out-patients with Int/Ext Stents - ensure “Home Care” is arranged prior to patient departure.
- These Int/Ext Stents require routine changes every 6 to 8 weeks.
- Int/ext Stent- Show patient or support person how to empty and change “leg” bag to “night-time” bag.
- RN to photocopy patient care record and history for blue chart.

Tray Supplies- Int/Ext Stent Insertions

- Digital myelogram tray
- 20 ml syringe
- 60 ml syringe
- Scalpel
- #18 & #25-gauge needles
- Extension tubing
- Angioram drape (femoral)
- Shower cap
- Shield cover
- Lidocaine 1%
- Female Luer lock cap

Tray Supplies- Stent Change

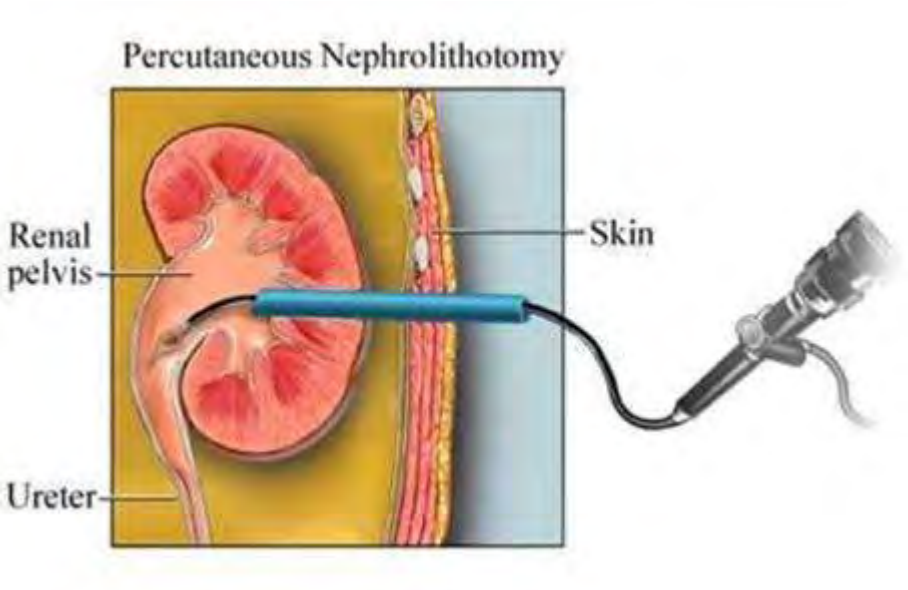
- Digital myelogram tray
- 20 ml syringe
- 60 ml syringe
- Extension tubing
- Angiogram drape (femoral)
- Shower cap
- Shield cover
- Female Luer lock cap

Additional Supplies- Int/Ext Stent Insertion Only (if no pre-existing nephrostomy tube for access).

- 50 ml bottle Conray 60%
- Ultrasound machine and probe cover (1012 drape)
- #18-gauge Chiba needle
- Neff set with radiopaque band
- Ureteral connecting tube
- Bile bag
- Large urine bag
- .038 floppy J wire and .038 stiff angled Terumo wire
- 7 and 9 Fr dilators
- Int/Ext Stent
- 5.0 Fr DAV catheter
- Stat-Lock
- Gauze and Mepore tape

Percutaneous Nephrolithonomy (PCNL)

PCNL is a minimally invasive procedure to remove large kidney stones in a percutaneous manner.



Google Image- Practo

Indications

These procedures are indicated when traditional Extracorporeal Shockwave Lithotripsy (ESWL) is unsuccessful or not possible. PCNL is recommended for large stones blocking more than one branch of the collecting system, kidney stones larger than 2 centimeters, large stones in the ureter, and when other therapies have failed.

Complications

These include bleeding (may require blood transfusion or angiographic embolization), infection, injury to the kidney or other organs, and incomplete stone removal.

Nursing Considerations

Pre-Procedure:

- Informed consent and blood transfusion consent
- NPO according to fasting guidelines
- IV access is required. A minimum #20-gauge IV cannula is required.
- Preoperative checklist is required
- Anaesthesiology will be involved as patient will require a general anaesthetic. An arterial line/CVC may be required.
- Bloodwork – recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for in-patients and one month for out-patients. crossmatch must be completed.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Configure room and table for prone anaesthetic procedure
- Foley catheter will be required
- If the urology team is inserting a retrograde catheter, they will insert the Foley catheter for the procedure. If no retrograde catheter is required, the RN is responsible for the insertion of the Foley catheter (#16 or #18 Fr as the patient may pass blood clots). The Foley catheter must be attached to urometer bag for PACU.
- Gas machine and anaesthesia Omnicell must be in room.
- Patient will go to PACU post procedure and then to ward.
- Shave prep if necessary
- Pre-operative antibiotics will be ordered, and RN/Anaesthesiologist to start within 1 hour of procedure
- Calf compressors are usually required and should accompany the patient from PCC
- 2X – 3 litre irrigation bags to gravity and 2X- 3 litre irrigation bags to pressure must be available. Carousel suction X2 must be available. One of the carousel suctions will be used to drain the bags on the side of the drape, and have maximum suction. The other carousel suction

will be connected to the scope and should be set at approximately 120 psi. Confirm with urology team if scope suction needs adjusting.

Intra Procedure:

- After the Time-Out is complete and patient is intubated, urology will often place a retrograde catheter via the urethra. Urology will use a scope to position the catheter. If the PCNL is scheduled as a bilateral procedure, a retrograde catheter must be inserted into each ureter. A Foley catheter is then placed. The retrograde and Foley catheter are secured with 1" orange plastic tape to the inside/back of thighs. The MRT will attach the retrograde catheter to extension tubing filled with contrast.
- Once patient intubated, they will be rolled prone onto the IR table. The nurse must ensure safe positioning and bolstering for the patient. Apply Bair Hugger warming blanket.
- RN will assist MRT with draping. The RN will be responsible for ensuring adequate suction and irrigation throughout the procedure.
- The radiologist creates the tract and then urology will remove the stone(s).
- At the end of the procedure, a stent or safety catheter may be left in situ. An ostomy appliance may be placed to contain the catheter and collect drainage. The urology team is responsible for applying a suitable dressing. If no tubes are left in situ, a dry gauze dressing is applied. The ostomy appliance must be attached to a urine drainage bag prior to transfer to PACU.
- The patient is rolled back onto their stretcher to prepare for extubation.

Post Procedure:

- There are no restrictions with positioning
- Ensure any unused blood products get returned to the Blood Bank

- Make sure any samples get sent to the Lab and are appropriately labelled.
- All soiled suction canisters must be emptied using the wall suction. The empty canisters are then placed in large, yellow biohazard bins.

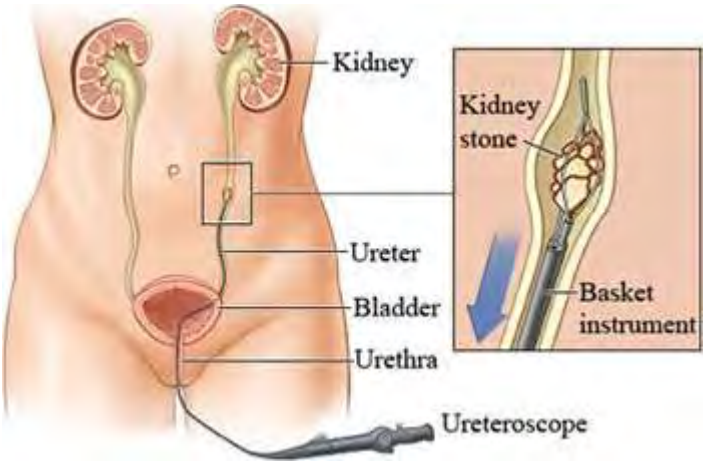
Tray Supplies- PCNL (Radiology Tray)

- PCNL pre-made pack
- Trolley
- Conray 60%
- Shower cap
- Purple marker
- Kelly clamp
- Balloon dilating kit (includes short sheath)
- .038 stiff angled Terumo wire
- Large urine bag
- .038 floppy J wire
- KMP catheter
- 8 Fr Arrow sheath
- #18 & #22-gauge Chiba needles
- Yellow bolsters X2
- Orange top container
- Stoma bag and connector or dry dressing
- Stoma adhesive (Mastisol)
- Large Steri-drape
- 2.0 silk suture
- #16 or #18 Fr Foley catheter with urometer bag

Urology makes their own tray and pulls their own supplies for their part of the procedure.

Ureteroscopy

Ureteroscopy is an examination of the upper urinary tract using an ureteroscope, that is passed from the urethra and into the bladder and then into the lower two/thirds of the ureter. This procedure may be done in conjunction with stent insertion and removal or stone removal with a basket or laser.



Google Image- IndiaMART

Indications

Ureteroscopy is usually done when you have kidney stones in your ureter. They can also be done if there is a suspected polyp, tumour, or abnormal tissue in your urinary tract.

Complications

These include slight chance of bleeding or injury to the ureter, pain with urination and infection.

Nursing Considerations

Pre-Procedure:

- Informed consent

- NPO according to fasting guidelines
- IV access is required.
- Preoperative checklist is required
- Anaesthesiology will be involved as patient will require a general anaesthetic.
- Bloodwork – recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for in-patients and one month for out-patients. cross-match must be completed.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Configure room and table for supine anaesthetic procedure
- Gas machine and anaesthesia Omnicell must be in room.
- Patient will go to PACU post procedure and then to ward.
- Pre-operative antibiotics will be ordered, and RN/Anaesthesiologist to start within 1 hour of procedure.
- Prepare 1X 3 litre irrigation bag to gravity, and 1X 3 litre bag for pressure.

Intra Procedure:

- After the Time-Out is complete and patient is intubated. Urology will use a scope to identify the stones.
- The patient's legs will be placed in stirrups
- The nurse must ensure safe positioning. Apply Bair Hugger warming blanket or warm flannels as per anaesthesia.
- The RN will be responsible for ensuring adequate irrigation throughout the procedure. The irrigation fluids will be drained into the floor.
- Urology may use the laser to break down the stone. Laser precautions must be followed for patient and all staff.
- Urology may leave a stent in situ.
- Urology will either drain the bladder at the end of the procedure or leave a Foley catheter in situ.

Post Procedure:

- Patient is usually extubated prior to transfer to PACU
- There are no restrictions with positioning
- Make sure any samples get sent to the Lab and are appropriately labelled.

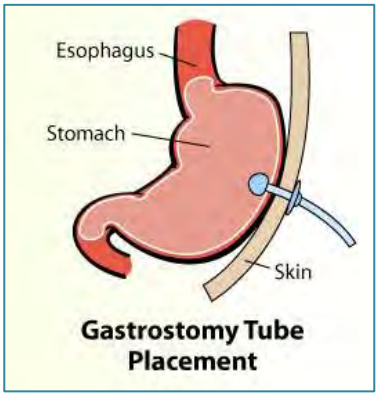
Tray Supplies- Ureteroscopy- Urology makes their own tray and pulls their own supplies.

Percutaneous Gastrostomy/Gastrojejunostomy/Jejunostomy

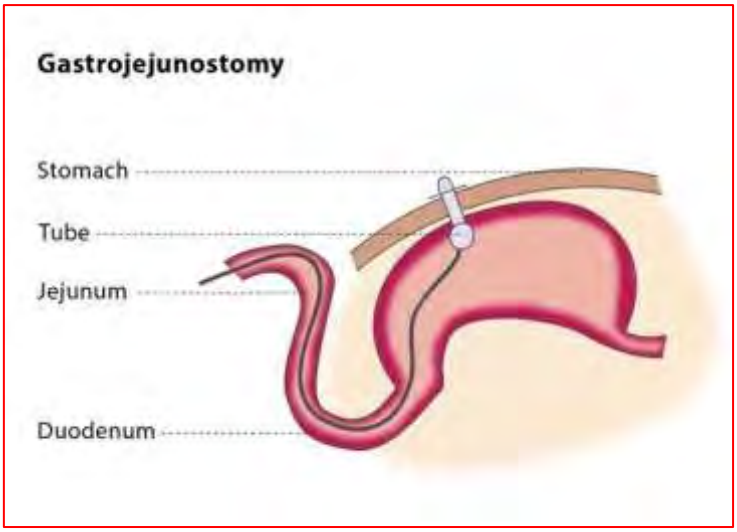
Percutaneous Gastrostomy or Percutaneous (perc) Flow Tube: Is a procedure where a feeding tube is passed through the abdominal wall and into the stomach to provide adequate nutritional intake. They have 2 ports. The gastric port is used for feeding and medication and the balloon port which is used to keep the tube in position. The perc flow tube or PEG tube are placed using the "push" method. A guidewire is fed from the stomach, up the esophagus, and exits via the mouth or nose. Enough length of the wire is passed so the g tube can be placed and pushed through the mouth or nose into the stomach. If the patient has had recent surgery to the face, nose, mouth or esophagus, inform the Radiologist, as this may not be a suitable approach.

Percutaneous Gastrojejunostomy: Is a procedure where a feeding tube is passed through the abdominal wall and threaded into the small intestine to provide adequate nutritional intake. They have 3 ports. The gastric port is used to vent air, drain fluids and give medication as needed. The jejunal port is used for feeding. The balloon port is used to keep the tube in position.

Percutaneous Jejunostomy: Is a procedure where a feeding tube is passed through the abdominal wall and into the jejunum to provide adequate nutritional intake. They have 2 ports. The gastric port is used for feeding and medications and the balloon port which is used to keep the tube in position.



Google Image- surgery.ucsf.edu



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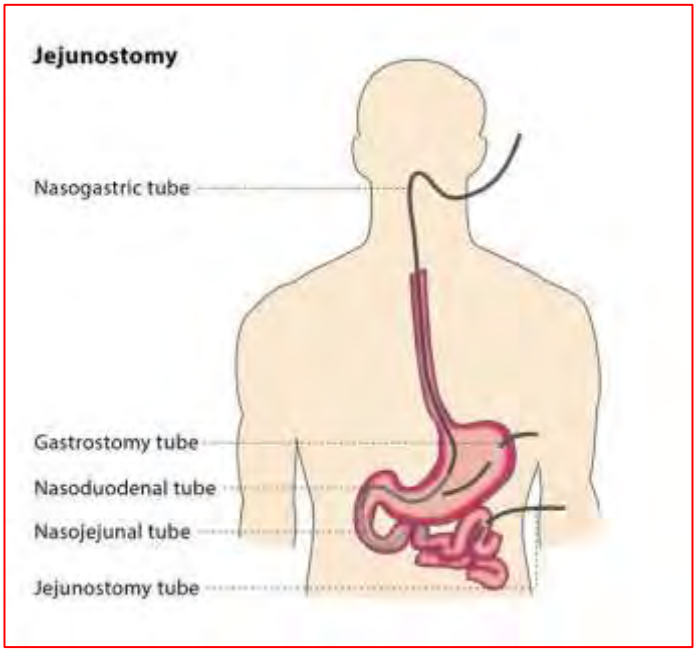

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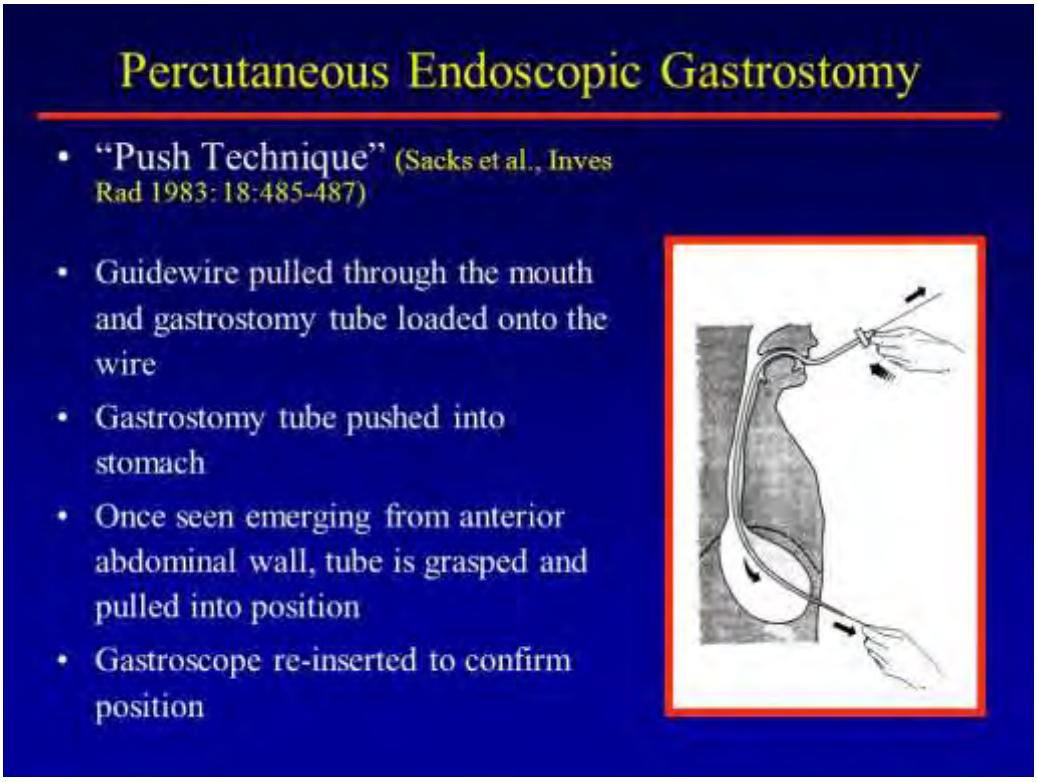


Google Image- slideplayer.com

Indications

These tubes (catheters) are placed to allow nutrition, fluids and medications to bypass the mouth and esophagus. GJ tubes also allow for decompression of air within the stomach. This decreases the risk of reflux and aspiration.

Complications

These include minor complications such as wound infection and minor bleeding, or major complications such as necrotizing fasciitis and colocutaneous fistula. Other complications may include tube dislodgement, peristomal wound leakage, gastric perforation and bleeding, peritonitis and abdominal pain.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Sedation-requires sedation. Are fasting guidelines met (NPO)?
- Bloodwork-recent results for HGB, PLT, INR, PTT, CR and eGFR. Usually within one week for inpatients and one month for out-patients.
- If eGFR <60, notify MRP for hydration orders if appropriate.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Confirm patient received Telebrix (required to visualize loops of colon)
- Patient must have a nasogastric tube on arrival

Intra Procedure:

- Patient is positioned supine
- Full monitoring is required- O2 Sat, ECG, BP, Resp and EtCO2

- Have Yankauer suction available. Use a towel or a cloth to cover patient's eyes and protect from iodine splatter, if a "push" procedure is performed. A bite block is required if planned for a mouth procedure.

Post Procedure:

- Apply dry dressing
- G and GJ tubes are usually changed every 6 to 12 months with the exception of the Perc Flow.

Tray Supplies- Perc G/GJ/J Insertion

- Digital Myelogram tray
- 20 ml syringe
- 30 ml syringe
- Scalpel
- Extension tubing
- Angiogram drape (femoral)
- Shower cap
- Shield cover
- 50 ml Conray 60%
- 10 ml control syringe
- #18 & #25-gauge needles
- Lidocaine 1% and Marcaine 0.5%
- Cope gastrointestinal anchor set
- Empty enema bag filled with CO2
- 8/10/12 Fr dilators
- .035 Amplatz extra stiff wire
- DAV catheter
- U/S machine and probe cover (1012 drape)
- Purple marker

- Kelly clamp
- 5 in 1 connector (double Christmas tree attached to bag of CO2)
- Entero feeding adapter (Red) to be placed on end of MCL catheter

Tray Supplies- Perc G/GJ/J Tube Change (no nursing)

- Digital Myelogram tray
- 20 ml syringe
- 30 ml syringe
- Scalpel
- Extension tubing
- Angiogram drape (femoral)
- Shower cap
- Shield cover
- 50 ml Conray 60%
- 10 ml control syringe
- #18 & #25-gauge needles
- Lidocaine 1% and Marcaine 0.5

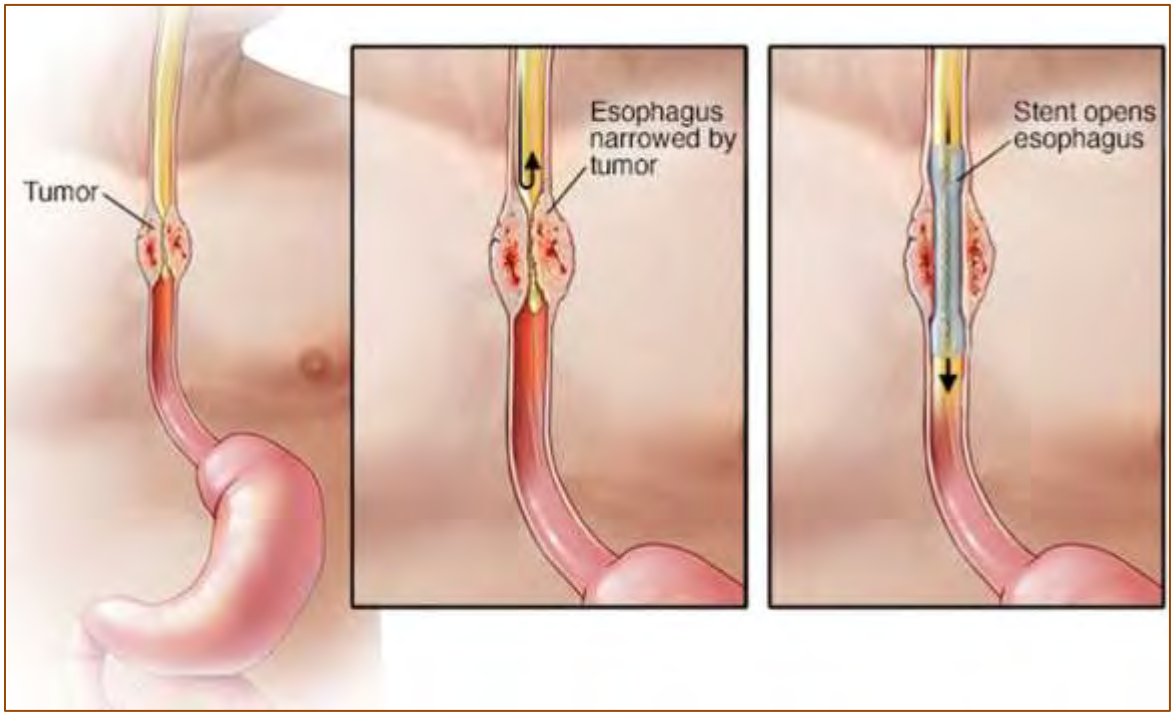
Additional Supplies

- If contrast is not visible in the colon, a non-barium enema may need to be given
- If a 12 Fr MCL is used, then need a Stat Lock or Molnar Disc
- G tube may be a balloon tube, MCL (temporary tube) or a perc flow tube
- G/J use a 10,12 or 14 Fr G/J tube (requires a Stat Lock or Molnar disc)
- Perc Flow 20 Fr catheter, Poviodine, Flashlight, 2nd trolley used to bathe catheter in poviodine
- Perc G using Mic-Key 18 introducer kit. May require a stoma measuring device
- Perc G using a 14,16,18, 20 or 22 Fr Tri- Funnel G tube
- Xylocaine Jelly

Esophageal/Colorectal Dilatation & Stent

Esophageal Dilatation & Stent insertions are performed to treat esophageal strictures. The dilatation is performed using a balloon catheter to stretch the tissue. The stent is used to maintain patency of the esophagus. These procedures may be done alone or together.

Colorectal Dilatation & Stent insertions are performed to treat colonic and rectal strictures. The dilatation is performed using a balloon catheter to stretch the tissue. The stent is used to maintain patency of the esophagus. These procedures may be done alone or together.



Google Image- healthjade.com

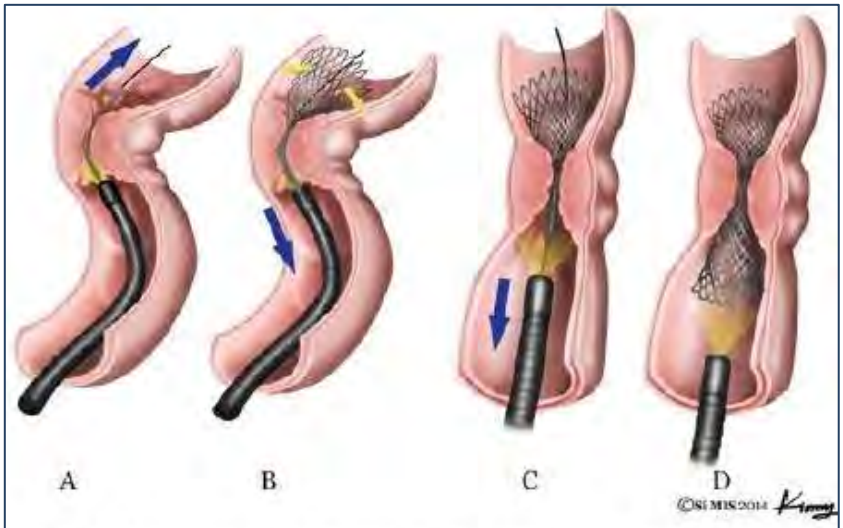


Figure 1 Technique of SEMS placement in acute colorectal obstruction. A: Passing stent and guide wire through lesion with contrast injection. B: Partial stent deployment. C: Pull back stent and scope until fair part of stent reach upper border. D: Fully deployment of SEMS.

Google Image- www.quora.com

Indications

Esophageal Dilatation: These are done for patients who have difficulty swallowing and have the feeling of food being stuck in their throat. The following disorders are associated with esophageal strictures: achalasia (motility disorder of the esophagus), chemical injury, esophagitis, esophageal cancer, GERD (most common), prior esophageal surgery, radiation therapy, sclerotherapy for varices. Esophageal dilatation is not a cure for the disorders and symptoms may recur.

Esophageal Stent: Includes patients with malignant or benign dysphagia and patients with leakage from the esophageal lumen into the surrounding tissue (perforation and fistulae).

Colorectal Dilatation & Stent: These are done for the treatment of strictures within the large bowel or rectum. The most suitable lesions are caused by inflammation or surgical scarring.

Complications

Esophageal Dilatation: These include bleeding and aspiration into the airway or esophagus, difficulty breathing, fever, chest pain and bloody or black bowel movements.

Esophageal Stent: These include bleeding and perforation, stent migration, tumour overgrowth and tumour ingrowth.

Colorectal Dilatation & Stent: These include hemorrhage and perforation of the bowel. There may be some mild bleeding and abdominal tenderness. In stenting procedures there is a risk of stent migration and obstruction.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Sedation-requires sedation. Are fasting guidelines met (NPO)?
- Bloodwork-recent results for HGB, PLT, INR, PTT. Usually within one week for inpatients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Out-patients will require a ride home.

Intra Procedure:

- Esophageal- Patient is positioned supine or on their right side
  Colorectal- Patient lies on their left side in the fetal position
- Full monitoring is required- O2 Sat, ECG, BP, Resp and EtCO2
- Colorectal- Lay blue pads on floor and mattress. These procedures can be messy

Post Procedure:

- Follow-up for esophageal dilatation and stenting may require a Gastrografin swallow 1-week post procedure.

Tray Supplies- Dilatation/Stent

- Digital Myelogram Tray
- 20 ml syringe
- 30 ml syringe
- Scalpel
- Extension tubing
- Angiogram drape (femoral) (**Colorectal only**)
- Shower cap
- Shield cover
- 50 ml Conray 30% (**Colorectal only**)
- Telebrix (**Esophageal only**)
- Inflation device

Additional Supplies- Esophageal

- Assorted esophageal balloons/stents
- .035 Amplatz extra stiff wire (may require exchange length)
- Head-hunter catheter
- One way stop cock
- Hurricane spray
- Fogarty balloon
- Tongue depressor
- Xylocaine jelly

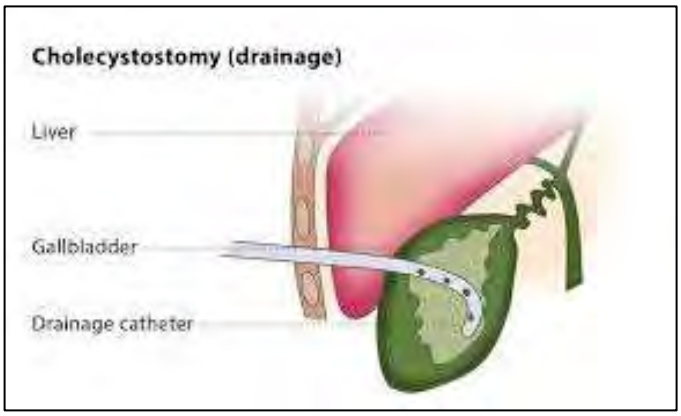
Additional Supplies- Colorectal

- Assorted rectal balloons/stents
- .035 amplatz extra stiff wire
- One way stop cock
- Xylocaine jelly
- 12 Fr check-flo introducer
- Hypaque enema supplies available
- Foley catheter
- Endotracheal tube 7.5 Fr (from anaesthesia cart)
- Water soluble lubricant
- Booties for the radiologist
- Blue Pads

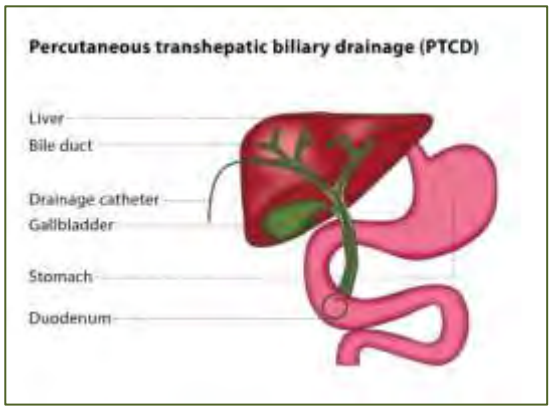
Percutaneous Cholecystostomy (Perc Chole) & Percutaneous Transhepatic Biliary Drainage (PTBD)

Perc Chole is a procedure that uses imaging guidance (U/S or Fluoro) to place a drainage catheter into the lumen of the gallbladder. **PTBD** is a procedure which leads to the drainage of an obstructed bile duct system. A catheter is passed through the bile duct to drain bile, directly into the duodenum. This was previously referred to as a PTC.

A biliary rendezvous is a combined procedure between Endoscopy and Radiology. If they are unable to cross a narrowing and deploy a stent in Endoscopy, Radiology will percutaneously access the biliary tract with a guided wire. The patient can then return to Endoscopy for the completion of their procedure.



Google Image- nnuh.nhs.uk



Google Image- CIRSE

Indications

Perc Chole is used in the stabilization of a patient to enable a more measured surgical approach with time or therapeutic planning. Perc Choles are used for poor surgical candidates and high risk patients with acute calculi or cholycystitis without calculi, unexplained sepsis in critically ill patients and for access or drainage of the biliary tree following failed ERCP or PTBD.

PTBD is widely used for palliative procedures in patients with obstructive jaundice. These conditions include gallbladder cancer, pancreatic adenocarcinoma, metastasis and lymph node compression of the common bile duct. This procedure can alleviate pain, cholangitis and pruritis.

Complications

Perc Chole complications include bile leakage and biliary peritonitis, bleeding, bowel injury and catheter displacement and migration.

PTBD complications include bleeding, possibly requiring transfusion, perforation of gallbladder or common bile duct requiring emergency surgery, infection, fever, pain, an external bile leak, catheter migration, obstruction, dislodgement, pancreatitis or hemobilia.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Sedation-requires sedation. Are fasting guidelines met (NPO)?
- Bloodwork-recent results for HGB, PLT, INR, PTT. Usually within one week for inpatients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?

- Most of these procedures will be performed on In-patients.
- Patients should be receiving antibiotics. If patient not on antibiotics discuss with IR radiologist.

Intra Procedure:

- Full monitoring is required- O2 Sat, ECG, BP, Resp and EtCO2

Post Procedure:

- RNs need to photocopy nurses notes and history for blue chart
- Apply dressing and Stat Lock to prevent dislodgement
- Use a black marker to indicate skin insertion site on catheter.
- Attach drain to bile bag or cap with red end cap. If tube is capped instruct patient or support person to attach to drainage if signs of infection. Must seek medical attention.
- All new biliary catheters should be placed to drainage. If catheter is crossed to the duodenum, drainage is only necessary for 24 hours and then may be capped.
- Ensure any specimen is labelled and sent to lab. If doing a brushing the specimen goes in a cytology jar and a surgical pathology form is required.
- Patients are at particular risk for sepsis. Observe for signs and symptoms of sepsis and report to IR immediately.

Tray Supplies

- Digital Myelogram Tray
- 20 & 30ml syringes
- 10 ml control syringe
- #18 & #25-gauge needles
- Small instrument set
- Lidocaine 1% and Marcaine 0.5%
- Scalpel
- Extension tubing
- Pediatric drape

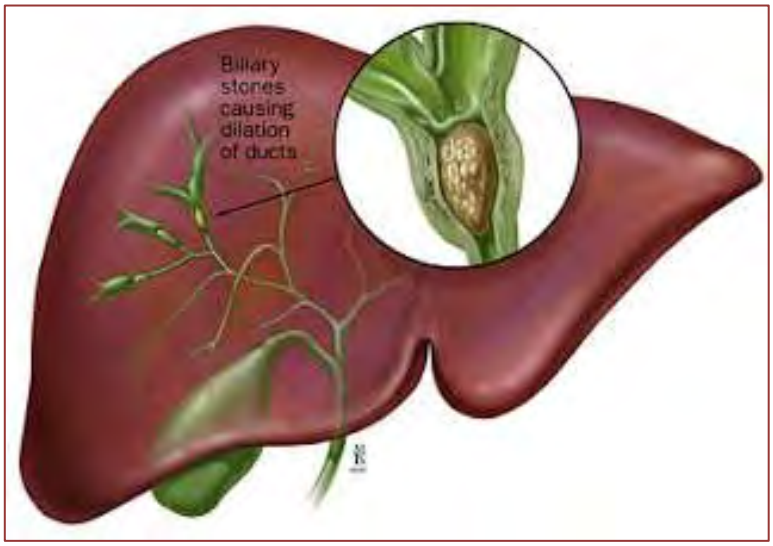
- Shower cap
- Shield cover
- 50 ml Conray 60%
- U/S machine and probe cover (1012 drape)

Additional Supplies-

- .035 angled Terumo wire
- Bile bag
- Connecting tubing
- BCL catheter
- Torque device
- Neff set with radiopaque band, Aprima set or Skater set
- #22-gauge Chiba needle
- Red end cap

Biliary Stone Removal (ISWL)

Intracorporeal shockwave lithotripsy is used to treat large and difficult biliary stones.



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Indications

ISWL is used to treat bile duct obstruction, cholangitis, and biliary pancreatitis.

Complications

These include pain, fever, bleeding and perforation

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Sedation-requires sedation. Are fasting guidelines met (NPO)?
- Bloodwork-recent results for HGB, PLT, INR, PTT. Usually within one week for inpatients and one month for out-patients.

- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Most of these procedures will be performed on In-patients.
- Out-patients will require a ride home.
- If patient not on antibiotics discuss with IR radiologist.

Intra Procedure:

- Full monitoring is required- O2 Sat, ECG, BP, Resp and EtCO2

Post Procedure:

- RNs need to photocopy nurses notes and history for blue chart
- Ensure any specimen is labelled and sent to lab

Tray Supplies- ISWL

- Digital Myelogram Tray
- 20 ml syringe
- 30 ml syringe
- 10 ml control syringe
- #18 & #25-gauge needles
- Small instrument set
- Lidocaine 1% and Marcaine 0.5%
- Scalpel
- Extension tubing
- Pediatric drape
- Shower cap
- Shield cover
- 50 ml Conray 30%

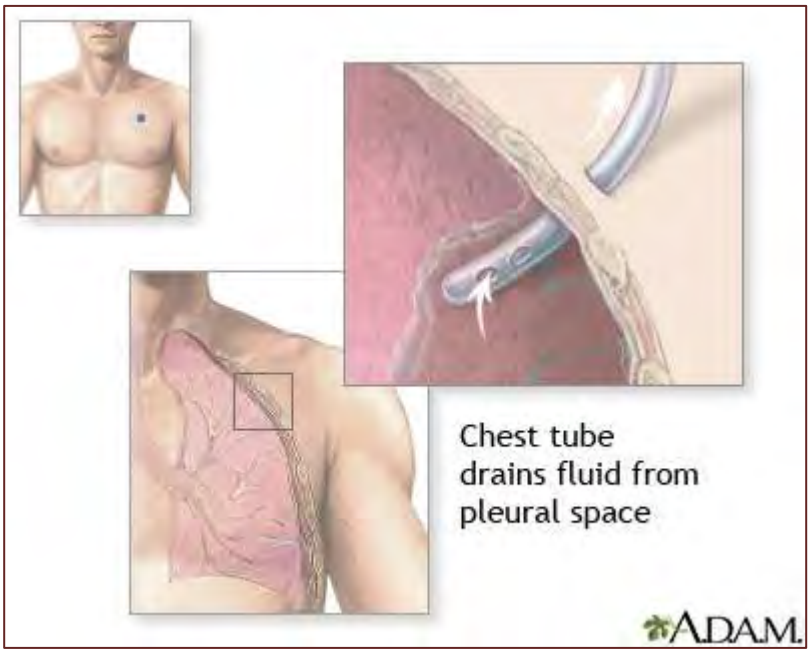
Additional Supplies-

- Extra trolley with a digital myelogram tray

- 500 ml bag of normal saline in a pressure bag, primed with an extension tubing.
- 12 Fr x 15 cm peel away sheath (for baby scope-ureteroscope)
- 19 Fr peel away sheath (for large scope- choledochoscope)
- Tuoy-borst
- Electrical ties (zap strap) x 2
- ISWL(Urology Cart) cart (usually holds some sheaths, litho probes, pressure bag, and alcohol)
- Scopes- located inn bottom cupboards, to the right of the linen closet
- Small opsite
- Mazzar Caprini- forceps
- An array of different sized baskets

Chest Tube Insertion

A chest tube is a hollow plastic tube inserted between the ribs and into the pleural space. These tubes may be connected to suction or drained to gravity. The tube stays in place until the fluid, blood or air is drained.



Google Image- trihealth.adam.com

Indications

Chest tubes are used to treat collapsed lung (pneumothorax), bleeding around the lung (hemothorax), fluid around the lung due to cancer or pneumonia (pleural effusion), dyspnea (difficulty breathing) and lung infection.

Complications

These include pain during placement, infection, bleeding, injury to the lung, diaphragm or stomach and pneumothorax during tube removal.

Nursing Considerations

Pre-Procedure:

- Nurses are usually required only during emergent chest tube placement. Most commonly occurs during lung biopsies. The patient may be in acute distress. Assess patient and monitor vital signs, especially O2Sat. Apply oxygen PRN.
- May need to set up Pleur-evac®).
- Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging would need to be met.

Intra Procedure:

- Monitor patient and administer analgesic PRN

Post Procedure:

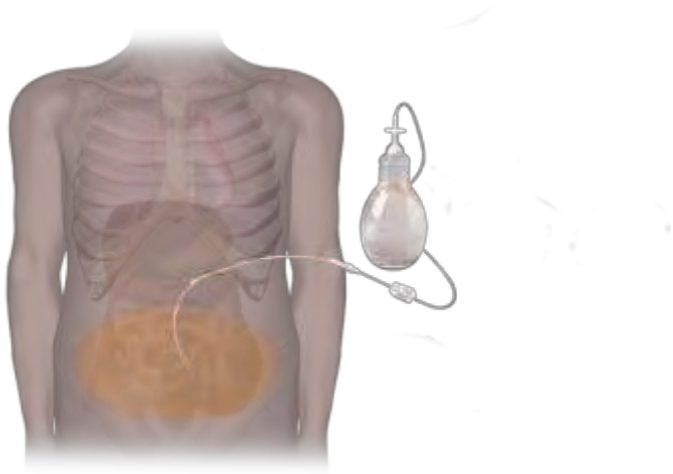
- Post procedure imaging will confirm chest tube placement. Confirm with physician if suction is required and how much.
- Ensure all connections are taped to prevent disconnection and possible pneumothorax.
- Patient should have two clamps available for transport

Tray Supplies- Chest Tube Insertion

- Chest tube insertion kit
- Pleur-evac®).
- Suture
- Instrument set
- Waterproof tape
- 2 artery forceps
- Occlusive dressing with Jelonet
- 10 ml control syringe
- Lidocaine 1%

Ascites Tunelled Catheter (PleurX or Asept)

An ascites tunnelled catheter is used to drain accumulated peritoneal fluid in the abdomen to make patient more comfortable.



Google Image- BD.com

Indications

These catheters are placed to relieve symptoms associated with malignant ascites and pleural effusion.

Complications

These include infection, bleeding, severe sharp pain once procedure completed, damage to the catheter and peritonitis.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- These procedures are often done without sedation.
- Fasting guidelines only need to be met if sedation required.
- Bloodwork-recent results for HGB, PLT, INR, PTT. Usually within one week for inpatients and one month for out-patients.

- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Palliative care supplies the ascites tunnelled catheter

Intra Procedure:

- Nurse to drape patient using same technique as all tunnelled CVC lines. Pre-scrub skin with chlorohexidine CHG sponge and then prep skin with tinted CHG Soluprep.
- Use pediatric drape
- No monitoring required if no sedation given

Post Procedure:

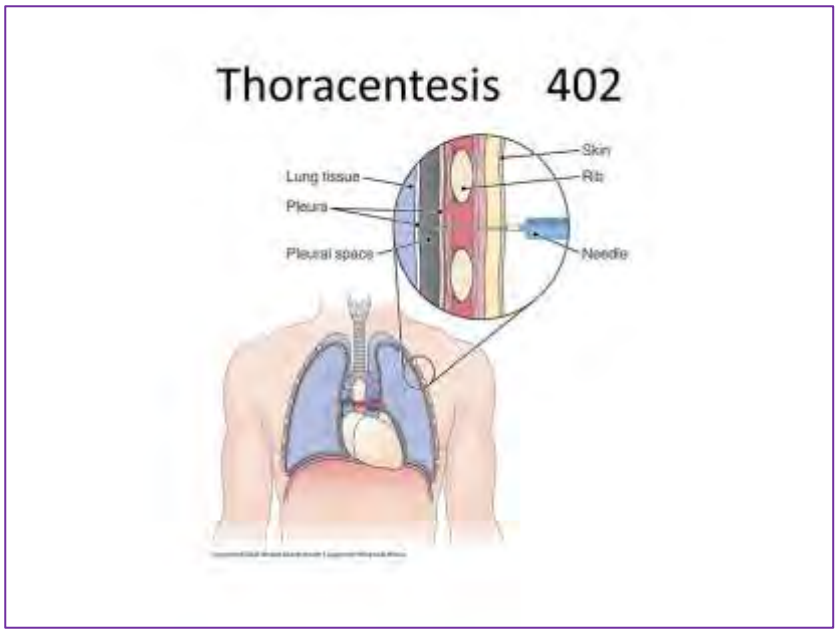
- The drain is left capped. The drainage bottle and connector are sent with patient back to the ward (usually palliative care).

Tray Supplies- Ascites Tunnelled Catheter

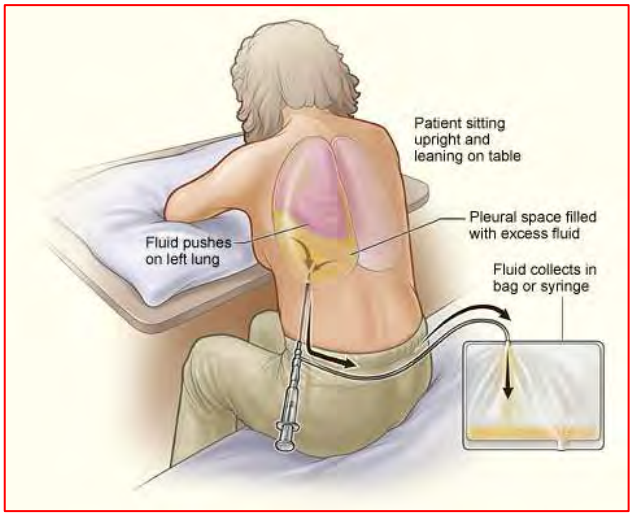
- Small angiogram trolley
- Fistulogram drape pack
- #18 & #25-gauge needles
- 10 ml control syringe
- Gauze
- 2- shower caps
- Shield cover
- U/S Machine and probe cover
- PleurX or Asept catheter
- Small instrument kit
- Suture or StatLock

Thoracentesis

Thoracentesis also known as a “pleural tap” is a procedure to remove fluid or air from the pleural space for diagnostic or therapeutic purposes. A cannula, or hollow needle is introduced into the thorax after the administration of local anaesthetic.



Google Image- slideplayer.com



Google Image- Wikipedia

Indications

Most common indication for thoracentesis is a pleural effusion which is the accumulation of excess fluid around the lung. It can also be used to remove an accumulation of air around the lung, call a “pneumothorax”.

Complications

Thoracentesis is generally considered safe but, the following complications may occur: pulmonary edema, pneumothorax, bleeding, and infection.

Nursing Considerations

Thoracentesis is usually performed by a radiologist and a MRT. RN will only be required in the event of complications.

Pre-Procedure:

- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- Patient is positioned on side or sitting on edge of bed leaning over a bedside table if possible.
- U/S machine and probe cover (1012 drape)

Post Procedure:

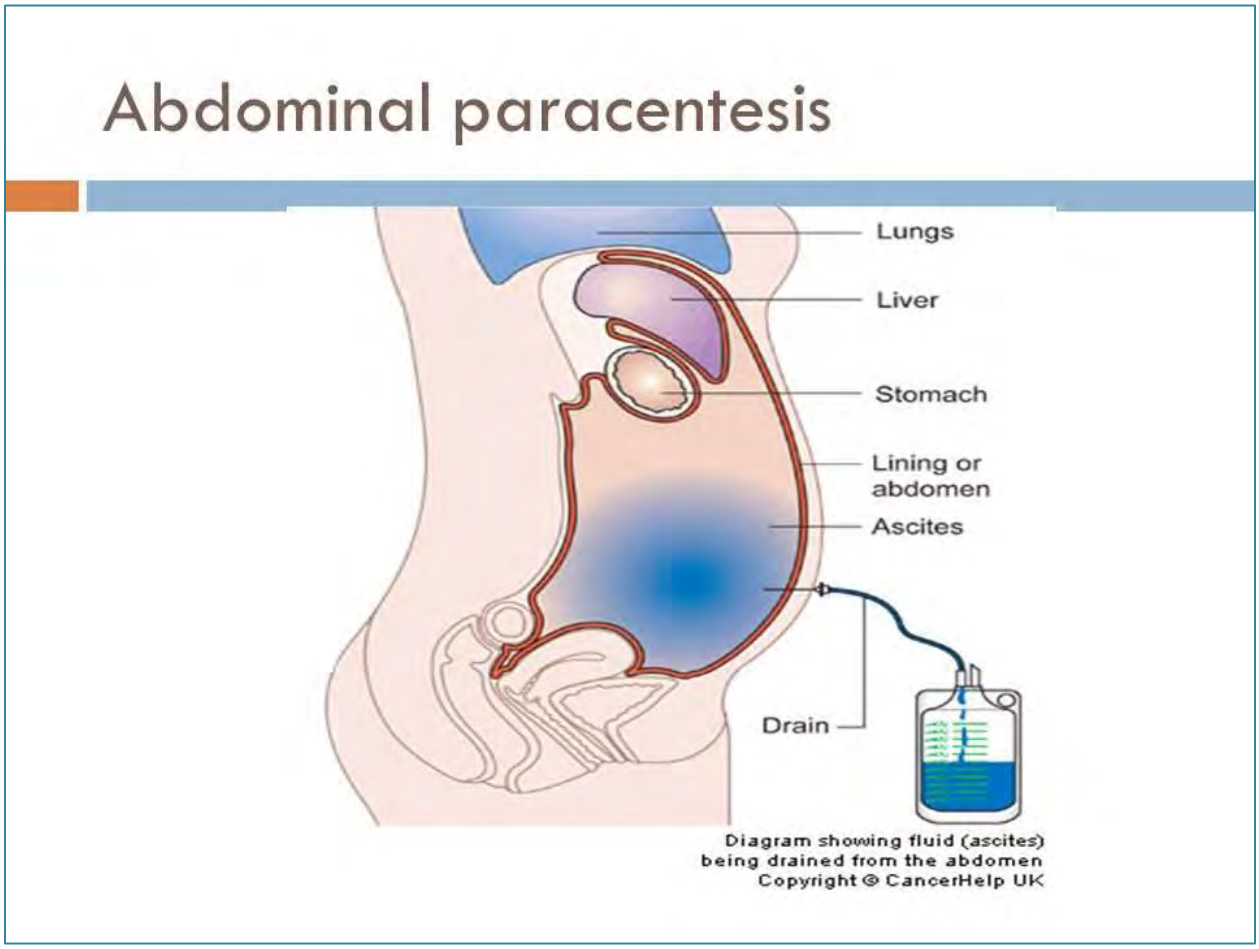
- Patient is connected to a drainage system (Pleur-evac®).
- Ensure specimens are labelled and sent to lab

Tray Supplies- Thoracentesis

- Digital Myelogram Tray
- 20 ml syringe
- 30 ml syringe
- 10 ml control syringe
- #18 & #25-gauge needles
- Small instrument set
- Lidocaine 1%
- Scalpel
- Extension tubing
- Pediatric drape
- Orange top container
- Blood gas syringe
- Water-proof tape
- Gauze for dressing
- 8.5 Fr Dawson Mueller or MCL catheter

Paracentesis

Paracentesis is a procedure that uses a cannula or hollow needle to remove fluid from the abdominal cavity.



Google Image- slideplayer.com

Indications

A paracentesis is done to identify fluid collections and remove fluid that has collected in the peritoneal cavity (ascites). An accumulation of fluid in the abdomen is often associated with cirrhosis, heart or kidney failure, cancer, or an infection.

Complications

Risks of paracentesis include the following: pain, bleeding at the site, internal bleeding, damage to an organ and infection.

Nursing Considerations

Paracentesis is usually performed by a radiologist and MRT. RN will only be required in the event of complications.

Pre-Procedure:

- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?

Post Procedure:

- Patient is connected to a drainage system (ex. ASEPT Pleural drainage system)

Tray Supplies- Paracentesis

- Digital Myelogram Tray
- 20 ml syringe
- 30 ml syringe
- 10 ml control syringe
- #18 & #25-gauge needles
- Small instrument set
- Lidocaine 1%
- Scalpel
- Extension tubing
- Pediatric drape
- Orange top container
- Water-proof tape
- Gauze for dressing
- Multi-purpose drainage catheter

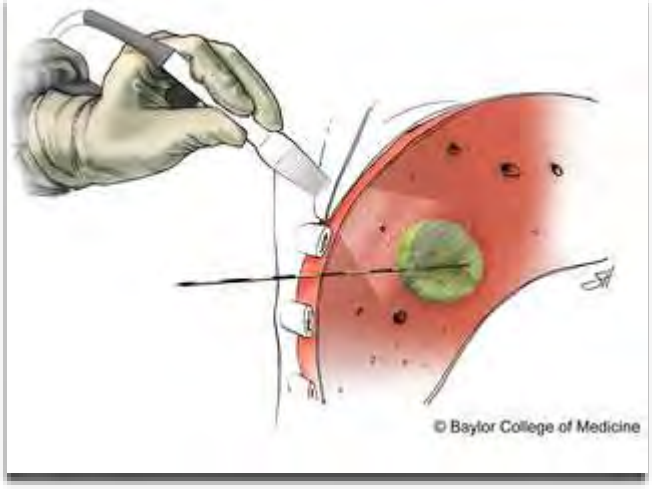
Ablation- Radiofrequency & Microwave LIVER & KIDNEY

Radiofrequency ablation (RFA) uses image guidance to place a needle through the skin into a tumour. In RFA, high frequency electrical currents are passed through an electrode in the needle, creating a small region of heat.

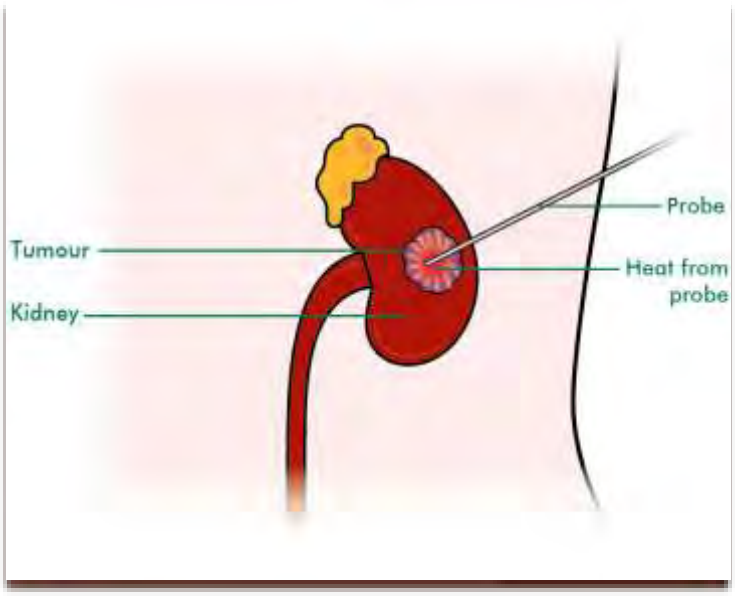
Microwave ablation (MWA) also uses image guidance to place a needle through the skin into a tumour. In MWA, microwaves are created from the needle to create a small region of heat.

The heat from both of these methods, destroy the liver or kidney cancer cells.

Both types of ablations can be done with either CT or Ultrasound guidance.



MWA of LIVER- Google Image- Baylor College of Medicine



RFA of the KIDNEY- Google Image- Macmillan.org.UK

Indications

RFA and MWA are treatment options for patients who might have difficulty with surgery or those whose tumours are less than 1.5 inches in diameter. **Liver**- The two most common types of liver cancer to be treated are hepatocellular carcinoma (HCC) and colon cancer that metastasizes to the liver. This procedure is also suitable for those with liver tumours that have not responded to chemotherapy or that have recurred after being surgically removed.

Kidney- This is an effective treatment option for patients with one kidney or those who might have difficulty with surgery. This is done for renal cell carcinoma (RCC) patients. Ablation may also be used preoperatively to decrease blood loss during surgery or to treat a recurrent tumour after resection.

Complications

Liver- RFA/MWA- These can include infection or abscess, bleeding that may require additional surgery, transient or long-lasting shoulder pain, inflammation of the gallbladder, damage to the bile ducts resulting in biliary obstruction, or thermal damage to the bowel. 1 in 4 patients may develop "post ablation syndrome" with flu like symptoms that appear 3 to 5 days post procedure and lasts about 5 days.

Kidney- RFA/MWA- These include pain which may last a few days, infection, urine leak or narrowing to the ureter that blocks flow of urine to the bladder, and damage to surrounding structures.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required. #20 gauge should be used in the event of a bleed.
- Left ACF IV site is preferred for liver RFA. For renal RFA place IV in opposite arm as kidney.
- Patients with pacemakers should not receive RFA procedures. Notify IR physician if patient has a pacemaker.
- Sedation-requires sedation. Are fasting guidelines met (NPO)?
- Bloodwork-recent results for HGB, PLT, INR, PTT. Usually within one week for inpatients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- These procedures may be performed on In-patients or Out-patients.
- Out-patients will require a PCC bed (approximately 4 to 6 hour recovery) and a ride home.

Intra Procedure:

- Full monitoring is required- O2 Sat, ECG, BP, Resp and EtCO2
- Grounding pads must be placed for RFA procedures as per machine requirement. Shave prep may be required for optimal contact. Avoid scars, steel surgical implants (hips and knees) or rod in the femur.
- These patients may have higher requirements for sedation and analgesic than many other procedures in IR. If patient unable to tolerate procedure, may need to be rebooked with anaesthesia. The nurse must be aware that as soon as the ablation is over, and the patient is no longer receiving painful stimuli, they may become very sedated. Close monitoring of respiratory status is essential.

Post Procedure:

- RNs need to photocopy nurses notes and history for red chart
- Ensure any specimen is labelled and sent to lab.
- Nurse must document the skin integrity after the removal of the grounding pad (s).
- Follow-up requisition for one to three months needs to be given to CT Scan booking after protocol done.

Tray Supplies- Liver and Kidney Ablation

- Digital Myelogram Tray
- 10 ml syringe
- 10 ml control syringe
- #18-gauge blunt needle
- #25-gauge needles
- Lidocaine 1%
- Scalpel
- Pediatric drape or fistula drape pack (includes syringes –waterproof)
- Sterile gauze
- Marking pen with ruler
- Metal marker for needle entry guidance (CT guided)

- Small instrument set
- U/S machine and probe cover (1012 drape)

Tray Supplies- Ablation Additional Supplies

RFA- either Boston Scientific or Covidien Machine

- Correct RFA probe
- Sterile water to test probe
- #22-gauge 3.5 inch spinal needle
- Grounding pads (machine specific)
- May use D5W for distention

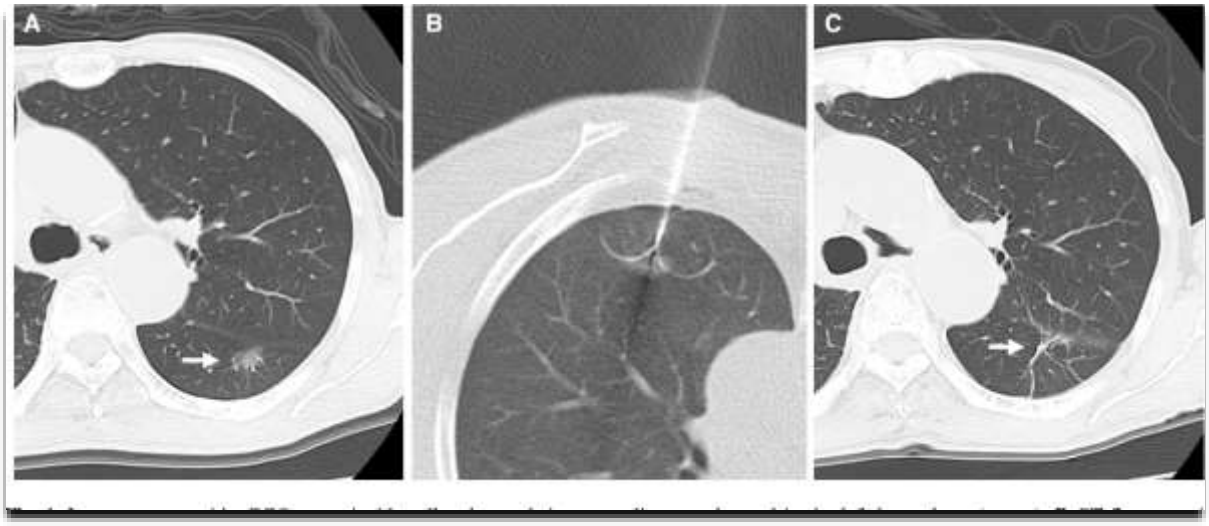
Renal- a biopsy may be done. Have 18 gauge by 20 cm Bard biopsy gun ready.

MWA- NeuWave machine

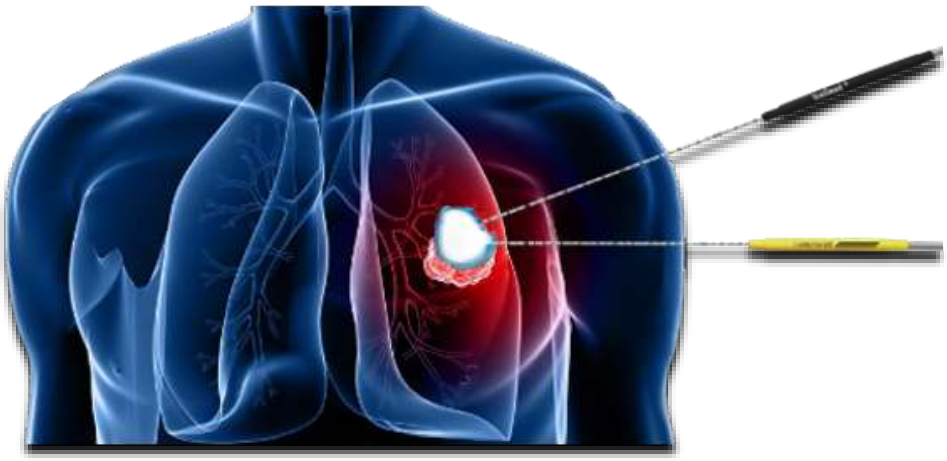
- Correct MWA probe
- Sterile water to test probe
- #22-gauge 3.5 inch spinal needle
- May use D5W for distention

Ablation- Radiofrequency, Cryoablation, Microwave- LUNG

Lung tumours may be treated using RFA, MWA or cryoablation (CRYO) methods. Tumour destruction is based on either heating of the mass to achieve coagulation necrosis (RFA, MWA), or freezing and thawing to produce ice crystal formation and cell death (cryoablation).



RFA OF THE LUNG- Google Image- Semantic Scholar



CRYOABLATION of the LUNG Google Image- sahilmehtamd.com

Indications

Lung ablation is used primarily in two patient populations: patients with stage 1 lung cancer who are not candidates for tumour resection and patients with limited number of pulmonary metastases (fewer than 4) in whom the primary tumour is locally controlled and who have no evidence of other distant metastatic disease.

Complications

The most common complications include pneumothorax, bleeding, hemoptysis, pain, pulmonary infection, and rarely damage to adjacent structures including airway and esophagus. Small pleural effusions are common.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Patients with pacemakers should not receive RFA procedures. Notify IR physician if patient has a pacemaker.
- Are fasting guidelines met (NPO)?
- Preoperative checklist is required
- Anaesthesiology will be involved as patient will likely require a general anaesthetic. Gas machine and Omnicell required
- Bloodwork-recent results for HGB, PLT, INR, PTT. Usually within one week for inpatients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- These procedures may be performed on In-patients or Out-patients.
- Out-patients will require a PCC bed (approximately 4 to 6 hour recovery) and a ride home.

Intra Procedure:

- Full monitoring is required- O2 Sat, ECG, BP, Resp and EtCO2
- Grounding pads must be placed for RFA procedures as per machine requirement. Shave prep may be required for optimal contact. Avoid scars, steel surgical implants (hips and knees) or rod in the femur.
- MWA and Cryoablations do not require grounding pads
- Pneumothorax supplies need to be on hand for urgent chest tube placement.

Post Procedure:

- A final scan will be done at the end of the procedure to verify the presence of any pneumo or hemothorax.
- Ensure any specimen is labelled and sent to lab.
- Nurse must document the skin integrity after the removal of the grounding pad (s).
- Follow-up requisition for one to three months needs to be given to CT Scan booking after protocol done.
- Assess and document skin condition around treatment site for bleeding and frostbite if CRYO.

Tray Supplies- Lung Ablation

- Digital Myelogram Tray
- 10 ml syringe
- 10 ml control syringe
- #18-gauge blunt needle
- #25-gauge needles
- Lidocaine 1%
- Scalpel
- Pediatric drape or fistula drape pack (includes syringes –waterproof)
- Sterile gauze
- Marking pen with ruler
- Metal marker for needle entry guidance (CT guided)

- Small instrument set
- U/S machine and probe cover (1012 drape)

Tray Supplies- Ablation Additional Supplies

RFA- either Boston Scientific or Covidien Machine

- Correct RFA probe
- Sterile water to test probe
- #22-gauge 3.5 inch spinal needle
- Grounding pads (machine specific)
- May use D5W for distention

Renal- a biopsy may be done. Have 18 gauge by 20 cm Bard biopsy gun ready.

MWA- NeuWave machine

- Correct MWA probe
- Sterile water to test probe
- #22-gauge 3.5 inch spinal needle
- May use D5W for distention

CRYO- Visual-ICE Galil machine

- Correct CRYO probe
- Sterile water to test probe
- Warmed saline
- Extra set of sterile gloves (will be filled with sterile warm saline and placed around the probes to prevent frost bite).

Ablation- Cryoablation, Radiofrequency Microwave- BONE

A bone ablation uses thermal technology (heat or cold) to treat a benign bone growth called and osteoid osteoma or other bone lesions from metastases.

OSTEOID OSTEOMA CRYOABLATION- Google Image- umassmed.edu

Indications

Bone ablations are commonly done in the lower extremities, upper extremities, pelvis and sacrum.

Complications

These may include bleeding, infection, neural or skin injury, fracture, and damage to surrounding structures. Cementoplasty should be considered in certain skeletal locations at risk of fracture.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Patients with pacemakers should not receive RFA procedures. Notify IR physician if patient has a pacemaker.
- Are fasting guidelines met (NPO)?
- Preoperative checklist is required
- Anaesthesiology will be involved as patient will likely require a general anaesthetic. Gas machine and Omnicell required
- Bloodwork-recent results for HGB, PLT, INR, PTT. Usually within one week for inpatients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- These procedures may be performed on In-patients or Out-patients.
- Out-patients will require a PCC bed (approximately 4-6 hour recovery) and a ride home.

Intra Procedure:

- Full monitoring is required- O2 Sat, ECG, BP, Resp and EtCO2
- Grounding pads must be placed for RFA procedures as per machine requirement. Shave prep may be required for optimal contact. Avoid scars, steel surgical implants (hips and knees) or rod in the femur.
- MWA and Cryoablations do not require grounding pads

Post Procedure:

- Ensure any specimen is labelled and sent to lab.
- Nurse must document the skin integrity after the removal of the grounding pad (s).

- Follow-up requisition for one to three months needs to be given to CT Scan booking after protocol done.
- Assess and document skin condition around treatment site for bleeding and frostbite if Cryo.

Tray Supplies- Bone Ablation

- Digital Myelogram Tray
- 10 ml syringe
- 10 ml control syringe
- #18-gauge blunt needle
- #25-gauge needles
- Lidocaine 1%
- Scalpel
- Pediatric drape or fistula drape pack (includes syringes –waterproof)
- Sterile gauze
- Marking pen with ruler
- Metal marker for needle entry guidance (CT guided)
- Small instrument set
- U/S machine and probe cover (1012 drape)

Tray Supplies- Ablation Additional Supplies

- Madisson Biopsy Gun & Drill
- Arrow biopsy set with reusable hand drill
- Formalin and surgical pathology form

Cryo- Visual-ICE Galil machine

- Correct Cryo probe
- Sterile water to test probe
- Warmed saline
- Extra set of sterile gloves (will be filled with sterile warm saline and placed around the probes to prevent frost bite

RFA- either Boston Scientific or Covidien Machine

- Correct RFA probe
- Sterile water to test probe
- #22-gauge 3.5 inch spinal needle
- Grounding pads (machine specific)
- May use D5W for distention

MWA- NeuWave machine

- Correct MWA probe
- Sterile water to test probe
- #22-gauge 3.5 inch spinal needle
- May use D5W for distention

Alcohol Ablation- Liver (PEI)

Alcohol ablation also called percutaneous ethanol injection (PEI) is a method to treat lesions within the liver. Dehydrated alcohol 100% is injected directly into a tumour using imaging guidance. Alcohol causes tumour destruction by drawing water out of tumour cells and altering the structure of cellular proteins.

Indications

PEI can be used to treat the primary and secondary malignancies in the liver, with lower risk than RFA, but may require more treatment sessions. It may also be used to treat hepatic cysts and lymphoceles. PEI works best against HCC or primary liver cancer.

Complications

These include intraperitoneal hemorrhage pleurisy and hemobilia, liver abscess, necrosis of the liver segment, cholangitis, pain, fever and hepatic decompensation. The absorbed alcohol may lead to various degrees of intoxication or hypotension.

Nursing Considerations

Pre-Procedure:

- Informed Consent
- IV access is required.
- Left arm IV site is preferred
- Sedation-requires sedation. Are fasting guidelines met (NPO)?
- Bloodwork-recent results for HGB, PLT, INR, PTT. Usually within one week for inpatients and one month for out-patients.
- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- These procedures may be performed on In-patients or Out-patients.

- Out-patients will require a PCC bed (approximately 4 to 6 hour recovery) and a ride home.

Intra Procedure:

- Full monitoring is required- O2 Sat, ECG, BP, Resp and EtCO2
- The alcohol may be absorbed by the patient, and the patient may appear intoxicated. The administration of alcohol may be very uncomfortable for a brief period of time. Coordinate sedation with the physician administering the alcohol.

Post Procedure:

- Patient must be carefully monitored for increased sedation post procedure while alcohol is being absorbed.

Tray Supplies- Alcohol Ablation- Liver

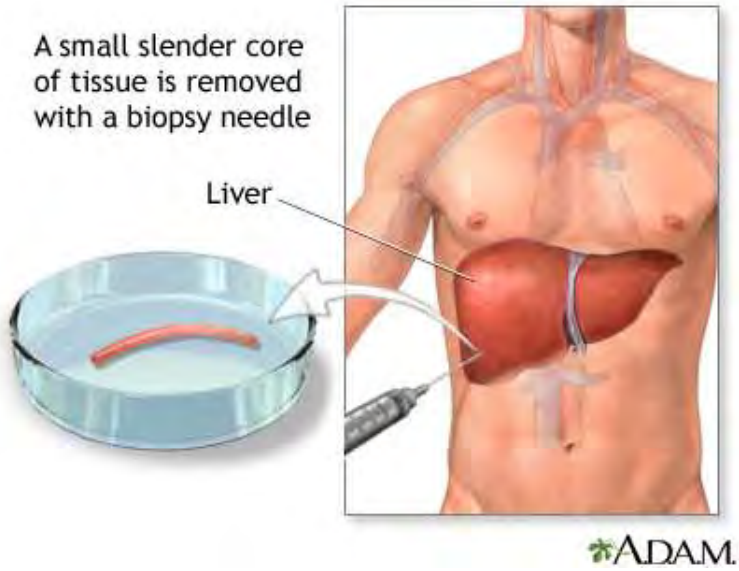
- Digital Myelogram Tray
- 10 ml syringe
- 10 ml control syringe
- Extension tubing
- #18-gauge blunt needle
- #25-gauge needles
- Lidocaine 1%
- Scalpel
- Pediatric drape or fistula drape pack (includes syringes –waterproof)
- Sterile gauze
- Small instrument set
- U/S machine and probe cover (1012 drape)

Tray Supplies- Ablation Additional Supplies

- Chiba needle
- Dehydrated alcohol 100%

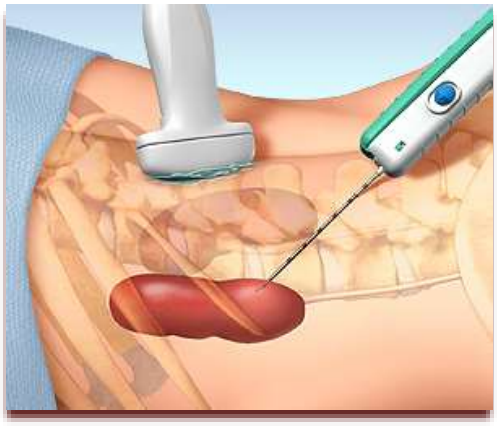
Biopsies- Liver, Renal, Lung

Percutaneous **Liver biopsy** is a procedure in which a needle is introduced through the skin, subcutaneous tissues, intercostal muscles, and peritoneum into the liver to obtain a specimen of liver tissue.



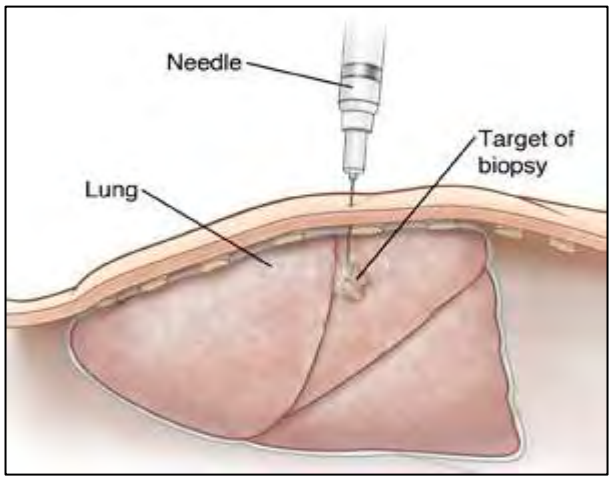
Google Image- mountsinai.org

Renal biopsy is a procedure in which a needle is introduced through the skin, subcutaneous tissues and into the kidney to remove a small piece of kidney tissue.



Google Image- renalmed.com

Lung biopsy is a procedure where samples of lung tissue are removed with a special biopsy needle, to determine is lung disease or cancer is present.



Google Image- Fairview.Org

Indications

Liver Biopsy- may be indicated to determine the presence or severity of liver disease, develop treatment plans based on the livers condition, determine how well treatment for liver disease is working and to monitor the liver after a liver transplant (detect rejection). A biopsy may be recommended if patient has abnormal liver function tests, a mass, or other abnormalities are seen on imaging tests, or ongoing unexplained fevers.

Renal Biopsy- may be indicated to diagnose a kidney problem that can't otherwise be identified, help develop treatment plan based on the kidneys condition, determine how quickly kidney disease is progressing, evaluate how well treatment for kidney disease is working, and monitor the health of a transplanted kidney (detect rejection).

Lung Biopsy- may be indicated to evaluate an abnormality seen on chest x-ray or CT, to diagnose a lung infection or other lung disease, to investigate the cause of an unexplained fluid collection in the lung, to determine if a lung mass is malignant or benign, or to stage malignant tumours.

Complications

Liver Biopsy- associated with pain, bleeding, infection, and accidental injury to a nearby organ. Excessive bleeding may require prolonged hospital stay and transfusion.

Renal Biopsy- associated with pain, bleeding, infection, hematuria, proteinuria and decrease in kidney function.

Lung Biopsy- may include pneumothorax (air trapped in pleural space causing lung to collapse), bleeding in the lung, hemoptysis, and infection.

The Liver and Kidneys are very vascular organs and patients receiving percutaneous biopsies must be closely monitored for signs of bleeding post procedure. Lung biopsies must be monitored closely for pneumothorax.

Nursing Considerations

Pre-Procedure:

- Identify last dose for all anticoagulants. Are the Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging met?
- No IV access is required. These are usually done with local anaesthetic and do not require procedural sedation.

Liver Biopsy- These procedures are done in the U/S department. The RN will assess the patient and review questionnaire and bloodwork. The RN will document baseline vital signs. These procedures are usually done with local anesthetic only, and the nurse does not need to be present. Informed consent is obtained by radiologist. U/S technologist assists with specimen collection.

Renal Biopsy- These patients are routinely admitted to PCC. These procedures are done in the U/S department. They routinely have a 4 hour stay in PCC post procedure.

Lung Biopsy- These procedures are routinely done in CT scan. The RN may be required to assist with emergent insertion of a chest tube. For

patients experiencing pneumothorax, vital signs and patient assessment must be completed and documented. Supplemental O2 may be required.

Intra Procedure:

No nursing usually required unless an emergency occurs, such as a pneumothorax for lung biopsies.

Post Procedure:

Liver Biopsy- The patient will be transported to the nursing recovery area for 1 hour of monitoring. The patient will lie on their right side. Assess procedure site and vital signs Q15min x 1 hour. Report any change >20% from baseline vital signs or any significant discomfort. A patient may be discharged home in 1 hour if vital signs stable and patient comfortable. The patient needs to be given instructions (pamphlet) to seek medical help if signs and symptoms of bleeding occur.

Renal Biopsy- Patient will recover in PCC. IR RN may be required to attend the U/S department in the event of suspected bleeding.

Lung Biopsy- Patient will recover in PCC. The patient will return to radiology for a chest x-ray 3 hours post biopsy. If x-ray is clear patient may be discharged from PCC.

Abbreviations

1. ACF- Antecubital Fossa
2. ACT- Activated Clotting Time
3. ACTH- adrenocorticotropic hormone
4. AV- Arteriovenous
5. AVM- Arterio-venous malformation
6. Bern- Bernstein Catheter
7. BMT- Bone Marrow Transplant
8. BP- Blood Pressure
9. BPH- Benign Prostatic Hypertrophy
10. CHG- Chlorohexidine
11. CJD- Creutzfeldt Jakob Disease
12. CO2- Carbon Dioxide
13. COTT- Carotid Occlusion Tolerance Test
14. CR- Creatinine
15. CRYO- Cryoablation
16. CSF- Cerebrospinal fluid
17. CVC- Central Venous Cather
18. CVP- Central Venous Pressure
19. CWSM- Colour, Warmth, Sensation, Movement
20. DAV- Davis Catheter
21. DMSO- Dimethyl Sulfoxide with tantalum powder
22. DP- Dorsalis Pedis
23. DVT- Deep Vein Thrombosis
24. ECG- Electrocardiogram
25. eGFR- Glomerular Filtration Rate
26. Embo- Embolization
27. ERCP- Endoscopic Retrograde Cholangiopancreatography
28. ESWL- Extracorporeal Shockwave Lithotripsy
29. ET- Endotracheal tube
30. ETCO2- End-Tidal Carbon Dioxide
31. ETOH-Ethyl Alcohol
32. EVD- External ventricular drain
33. FTR- Fallopian Tube Recanalization
34. GA- General Anaesthesia

35. GDC- Guglielmi Detachable Coil
36. GP- General Practitioner
37. HCC- hepatocellular carcinoma
38. HGB- Hemoglobin
39. Hr- Hour
40. HUS- Hemolytic Uremic Syndrome
41. IA- Intra-arterial
42. ICU- Intensive care unit
43. INR- International Normalised Ratio
44. INT/EXT- Internal/External
45. IR- Interventional Radiology
46. ISWL- Intracorporeal shockwave lithotripsy
47. IV- Intravenous
48. IVC – Inferior Vena Cava
49. IVAD- Implanted Venous Access Device
50. IVC- Inferior Vena Cava
51. Lab- laboratory
52. LFT- liver function studies
53. MAC- Monitored anaesthesia care
54. MRP- Most Responsible Physician
55. MRT- Medical Radiology Technologist
56. MS- Multiple Sclerosis
57. MWA- Microwave Ablation
58. NPO- Nothing by Mouth
59. NSAID- Nonsteroidal anti-inflammatory drug
60. NTG- Nitroglycerin
61. NVS- Neuro Vital signs
62. O2- Oxygen
63. OP- Out Patient
64. OVE- Ovarian Vein Embolization
65. PACS- Picture Archiving Communication System
66. PACU- Post anaesthetic care unit
67. PAE- prostatic artery embolization
68. PCA- Patient controlled analgesia
69. PE- Pulmonary Embolism
70. PEG- Percutaneous endoscopic gastrostomy

71. PEI- Percutaneous ethanol injection
72. Perc- Percutaneous
73. PICC- Peripherally Inserted Central Catheters
74. PLEX- Plasma Exchange
75. POPS- Perioperative pain service
76. Port- small medical appliance
77. PRN- as needed
78. PT- Prothrombin Time
79. PTBD- Percutaneous Transhepatic Biliary Drainage
80. PTT- Partial Thromboplastin Time
81. PRBCs- Packed Red Blood Cells
82. PVD- Peripheral Vascular Disease
83. Resp- Respirations
84. RCC- Renal Cell Carcinoma
85. RFA- Radiofrequency Ablation
86. RN- Registered Nurse
87. SAH- Subarachnoid hemorrhage
88. Sat- Saturation
89. SI- Sacro-iliac
90. STI- Sexually Transmitted Infection
91. TACE- transcatheter arterial chemoembolization
92. TIA- Transient ischemic attack
93. TIPS - Transjugular Intrahepatic Portosystemic Shunt
94. TPA- Tissue Plasminogen Activator
95. TPN- Total Parental Nutrition
96. TR Band- Transradial band
97. TTP- Thrombotic Thrombocytopenic Purpura
98. TURP- Trans urethral resection of the prostate
99. UFE- Uterine Fibroid Embolization
100. U/S- Ultrasound
101. UTI- Urinary Tract Infections
102. VGH – Vancouver General Hospital

References

1. About Kids Health
2. AdvancesinPD.com
3. American Journal of Neuroradiology
4. Americanmedicalcoding.com
5. Anatomyatlases.org
6. Ask Dr.K
7. Basic Medical Key
8. Baylis Medical
9. Baylor College of Medicine
10. BD.com
11. BUPA
12. California Institute of Neuroscience
13. Canadian Medical Association Journal (CMAJ)
14. Casemed.case.edu
15. CIRSE
16. Clinica Neuros
17. Creutzfeldt-Jakob Disease (CJD) VCH Protocol
18. Daviddarling.info
19. Doereport.com
20. Dove.press.com
21. Dreddyclinic.com
22. Drhoney.org
23. Dr Manish Tanega
24. Endovascular Today
25. Eorthopod.com
26. Fairview.org
27. Google
28. Handbook of Interventional Radiologic Procedures, Forth Edition. Krishna Kandarpa; Lindsay Machan
29. Healthjade.com
30. Healthline.com
31. ICP- Intracranial pressure

32. IndiaMART
33. Interventionalnews.com
34. IR Device Catalogue
35. Link.springer.com
36. Luarchive
37. McGill University Health Centre
38. Macmillan.org.uk
39. Management Guidelines for Patients having Elective Invasive Procedures in Medical Imaging
40. Massachusetts General Hospital
41. Mayfieldclinic.com
42. Mayoclinic.org
43. Mayo Foundation for Medical Education and Research
44. Memorial Sloan Kettering Cancer Centre
45. Mercyangiography.co.nz
46. Mountsinai.org
47. MRT- Medical Radiation Technologist
48. Myclevelandclinic.org
49. My VCH
50. National Spine and Pain Centers
51. Nephrology Dialysis Transplantation
52. Nih.gov
53. Noinsurancesurgery.com
54. Nnuh.nhs.uk
55. Nyurological.com
56. Pancreatic.cancer.org.uk
57. Pinterest.com
58. Practo
59. Professional Radiology
60. Pulmonaryadvisor.com
61. Quizlet.com
62. Quora.com
63. Radiologyinfo.org
64. Radiopaedia

65. Realpages.com
66. Renalmed.com
67. Researchgate.net
68. Sahilmehtamd.com
69. Sapub.org
70. Scielo.mec.pt
71. Semantic Scholar
72. Shawltechnique.com
73. Slideplayer.com
74. Slideshare.net
75. The Southeastern Spine Institute
76. SPECT- single photon emission computed tomography
77. Spinal-injury.net
78. Surgery.ucsf.edu
79. Teleflex.com
80. Tgh.org
81. Trihealth.adam.com
82. Umassmed.edu
83. URMC- University of Rochester
84. UWMSK.org
85. Virclinic.com
86. What-when-how.com
87. Wikepedia
88. Zina-studio.com

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	VGH Medical Imaging CNE			
Revision History:	**Version**	**Date**	**Description/ Key Changes**	**Revised By** (Name and Position)
	1.0	24-Sep-2019	Initial Release	Sheila Pettypiece, IR RPL Shannon Coleman, VGH MI CNE
	2.0	17-Jan-2020	Addition of Lung Biopsy and Peritoneal Dialysis Procedures to document	Sheila Pettypiece, IR RPL Shannon Coleman, VGH MI CNE
	3.0	23-Jul-2020	Addition of Lymphangiogram Procedure to document	Sheila Pettypiece, IR RPL Shannon Coleman, VGH MI CNE
	4.0	08-Feb-2023	Additional procedure content to : • Ectopic Pregnancy • Splenic Artery Embolization • Renal Denervation	Shannon Coleman, VGH MI CNE