

Hemodialysis: Cannulation of AV Fistula or Graft Using Angiocaths

Site Applicability

All PHC Renal Program Hemodialysis (HD) units (In-Centre and Community Dialysis Units)

Practice Level

Specialized:

RNs and LPNs who have completed the required education and provide nursing care in a PHC Renal Program HD unit perform this procedure.

Need to Know

1. Hemodialysis nurses are required to be able to use both angiocath and steel needles for cannulating AV fistulas or grafts.
2. It is recommended that angiocaths are used for new AV fistulas to decrease the risk of infiltration and injury.
 - a. If angiocaths are not available for cannulation, the smallest size steel needle should be used.
3. For matured AV fistulas, the size of the needle should be increased to provide the prescribed blood flow rate without increase in arterial or venous pressures on dialysis.
4. Matured AV fistulas can be accessed by either steel needles or angiocaths depending on the clinical status of the AVF and availability of angiocaths.
 - a. Angiocaths are recommended for:
 - i. New fistulas
 - ii. Fistulas that are prone to infiltration
 - iii. Patients who tend to move during dialysis
 - iv. In-center nocturnal patients
 - v. Patients selected by the vascular access nurse
 - b. If patients are started on HD using angiocaths due to fistula fragility or size, nursing discretion is used to determine if and when the patient may be ready to start using steel needles safely.
5. Cannulation of a vascular access places the HD patient at risk for bacterial contamination. The process of cannulation has the potential of introducing bacteria directly into the patient's bloodstream. Bloodstream infections increase the morbidity and mortality rates in end stage renal disease patients. A clean technique should be used with all cannulation procedures.
6. Providence Health Care (PHC) does not generally supply Emla™ cream (a topical anesthetic). It may

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be prescribed and covered by the BC Provincial Renal Agency (BCPRA). Emla™ cream needs to be applied over potential needle insertion sites one hour prior to cannulation. Patients usually apply Emla™ to their arm and then wrap the sites with "Saran wrap™" until they arrive to the HD unit. Patients should wash the Emla™ cream off their arms before settling into their station. Refer to PHC-PH481 (Topical Anesthetic Orders for easing cannulation pain in Chronic HD Patients) for further information on Emla™ cream application.

7. A local anesthetic (2% lidocaine hydrochloride or 0.5% bupivacaine hydrochloride) may also be used to ease cannulation pain.
8. In determining the direction of blood flow (i.e. arterial or venous) in a loop graft, a recirculation test is performed. The recirculation test reading will result in 0% if the needles are placed in the correct orientation. A bubble test can also be performed to determine the blood flow. To do this, each side of the loop graft is cannulated. The ends of the two needles are joined by a recirculating device. The direction in which the bubble travels is the venous side.
9. SoluPrep™ wipes (2% w/v chlorhexidine gluconate and 70% w/v isopropyl alcohol) are used to clean all AVF and AVG needle sites. SoluPrep™ wipes without isopropyl alcohol (2% w/v chlorhexidine gluconate) may be used if the patient is allergic to alcohol.
An approved antiseptic agent may be used if the patient is allergic to chlorhexidine gluconate and/or isopropyl alcohol.
10. Tegaderm™ is used to secure the needle. Mepore may be used if patient is allergic to Tegaderm. Micropore tape may be used if patient is allergic to both Tegaderm and Mepore.
11. Angiocaths may be used for patients who are restless, have fragile AVFs, have allergies to steel needles, or are on nocturnal HD.
12. If patients are started on HD using angiocath needles due to fistula fragility or size, nursing discretion is used to determine if and when the patient may be ready to start using steel needles safely.
13. The **maximum number of cannulation attempts** at any one session is four (total for both arterial and venous sites) unless ordered otherwise by a physician.

Equipment and Supplies

1. 1 inch Micropore™ tape
2. 2x2 gauze (2)
3. 3 mL syringe (2)
4. 6 x 7 cm Tegaderm™ (2)
5. Blue clamp (2)
6. Cardio Med Medikit Supercath™ needle (2)
7. Non-sterile glove (2)
8. SoluPrep™ wipe (2% w/v chlorhexidine gluconate and 70% w/v isopropyl alcohol) (2)
9. Tourniquet
10. Local anesthetic – optional

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11. 1 mL insulin syringe 28 gauge needle – optional

Procedure

Assessment:

1. Visual inspection
 - a. Signs and symptoms of infection
 - b. Presence of edema and/or bruising
 - c. Presence of collateral vessels
 - d. Presence of aneurysms and pseudoaneurysms
 - e. Assess for steal syndrome
2. Auscultation
 - a. Check for the presence of bruit.
 - b. Check along the course of the central outflow vein for the presence of a bruit. Bruit should diminish in intensity the further away you listen from the anastomosis. The presence of a high-pitched bruit distal from the anastomosis may be an indication of a possible stenosis.
3. Palpation
 - a. Check the anastomosis for the presence of a thrill.
 - b. Increased thrill and pulsatility may be indicative of stenosis.
 - c. For an AVF, apply a tourniquet and identify by palpation the areas that appear to be dilated enough for needle insertion.
 - d. Identify areas where needle placement may be problematic (immature vessels, bends and dips in the vessel that could contribute to high venous and/or arterial pressures).
 - e. Identify areas that are hard or swollen due to possible hematomas.
 - f. Assess for signs of steal syndrome

Steps	Rationale
1. Have patient wash arm with antibacterial soap and water, if possible.	To reduce risk of infection
2. Assess AVF or AVG for potential insertion sites <ol style="list-style-type: none"> a. Arterial needles can either be antegrade (towards the heart) or retrograde (towards the anastomosis) b. Venous needles should always be antegrade unless otherwise specified 	<p>Important to rotate sites. Rotating sites prolongs the life span of an access and slows the development of aneurysms and skin breakdown.</p> <p>Avoid aneurysms, bruises, narrow vessels and contours in the vessel</p> <p>Needles should be a minimum of 2 inches apart (from tip to tip) to avoid recirculation</p>

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	Arterial needle should be a minimum of 2 cm away from the anastomosis site (the weakest point of the access)
3. Wash hands and put on non-sterile gloves.	Reduces the risk of bacterial contamination
4. Clean needle insertion sites, one at a time, in a back and forth up and down motion (waffle technique) 2 inches in diameter with the appropriate cleaning agent. Air-dry for 1 minute.	Once cleaned, avoid touching needle insertion sites to prevent contamination. Air drying allows bacteriostatic action to occur.
5. Instill 0.1 mL of local anesthetic intradermally at the needle insertion sites using a 1 mL insulin syringe (optional).	Emla™ cream may be used as an alternative to injectable anesthetic.
6. Remove angiocath from package. Remove end cap and attach 3 mL syringe (optional).	3mL syringe can aid in testing for successful cannulation within the vessel.
7. Apply pressure to dilate the vessel above cannulation sites by using one of the following: a. Tourniquet b. Digital c. Manual AVGs do not need pressure to be applied unless it is “mushy” on palpation.	Facilitates needle insertion by dilating vessel and prevents unnecessary trauma to vessel intima.
8. Pull skin taut in opposite direction of the needle insertion over vessel but below needle insertion site.	Compresses peripheral nerves. Facilitates smooth puncture of skin and there is less surface area contacting cutting edge of the needle. Precise incisions heal faster than jagged cuts. Better stabilization of the vessel.
9. Hold needle between thumb and forefinger with fingers at the luer-lock connector at the centre of the angiocath. Insert needle at an angle of approximately 25 degree AVF and at a 45 degree angle for AVG. Insert needle until flashback is seen. When flash back is seen, flatten the angle of the needle and continue to advance needle for another 1	Steeper angels of insertion increase the risk of infiltrating the underside of the vessel. Deep AVFs may need to be cannulated at a steeper angle. If a 3mL syringe was attached onto the end of the angiocath, check for patency prior to removing the stylet.

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cm or ¾ inch. Pull back on stylet while advancing plastic needle.	
10. Remove stylet in a singular motion. Do not reinsert into cannula once the stylet has been pulled back.	Reinserting stylet into cannula could result in punctures in cannula or cannula breakage and dislodgement in vessel.
11. Release pressure (tourniquet).	Minimizes discomfort for the patient.
12. Using a blue clamp, clamp the angiocath between blue and pink portions of the needle. Remove endcap and attach a 10 mL syringe. Check for patency.	To check for needle position within the vessel.
<p>13. Secure needle at the same angle as insertion. A 2x2 gauze may be placed under the angiocath if necessary. Apply appropriate anchoring material over the angiocath.</p> <p>Note: If using tape to anchor the needle, use the butterfly technique to secure the wings of the needle. Slide a segment of tape under the wings of the needle with the sticky side up. Crisscross the tape over the wings. A segment of tape should then be applied over the wings, perpendicular to the patient's arm.</p>	<p>Prevents needle dislodgement.</p> <p>Pressing the needle shaft flat against the skin moves the needle out of the desired position within the vessel and can reduce flow.</p>
14. Check outflow and inflow as in step 12.	To check for needle position within the vessel
15. Repeat steps 6-14 for the second needle insertion.	

Documentation

HD log

1. Document any assessment findings that are unusual or not within the normal parameters.
2. Document any changes in the vascular access from the previous HD treatments.
3. Document any problems or difficulties related to needle placement.
4. Initiate HD at a blood pump speed of 200 mL/min. Record arterial and venous pressures. Maximize the blood pump speed until arterial and venous pressures reach but do not exceed +/- 250 mmHg.

Patient and Family Education

Instruct patient to:

1. Never pick scabs near the AVF/AVG.

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2. Wash the AVF/AVG area with soap and water daily.
3. Never allow anyone to take the blood pressure, bloodwork, or insert an IV on arm or leg where the AVF/AVG is located.
4. Avoid keeping AVF/AVG limb bent for long periods.
5. Not wear tight fitting clothing or wear watchbands around the access limb.
6. Not carry purses or shopping bags over the access area.
7. Avoid heavy lifting with access arm.
8. Remember to protect AVF/AVG when participating in sports.
9. Remove the dressings from access site no sooner than 6 hours after HD treatment is completed. Leave the dressings on until the next morning, if possible.

Related Documents

1. Cannulation of an Arteriovenous (AV) Fistula or Graft (NCS5434)
2. [First Time Cannulation of an Arteriovenous Fistula and Using a Central Venous Catheter](#) (NCS6326)
3. [B-00-11-10191](#) - Hand Hygiene
4. [B-00-07-12026](#) – Gloves – Infection Control
5. [B-00-07-13027](#) – Face Protection: Masks, Goggles and Face Shields – Infection Control
6. [B-00-07-13033](#) – Gowns and Protective Apparel
7. [B-00-07-13038](#) – Spills: Blood and Body Fluids
8. Occupational Health and Safety – [Cytotoxic /Hazardous Drugs](#)

References

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3. Cardiovascular Intravenous Cannulation (IV). (May 26, 2018). *Intravenous Cannulation*. <https://www.medistudents.com/osce-skills/intravenous-cannulation>
4. Medikit, Procedure to cannulate with supercath needle. Cardio Med Supplies Inc. P.O. Box 575, Gormley, Ontario. Canada. L0H 1G0.
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6. Nursing Manthra Blog + News (2017). *Intravenous Cannulation Procedure*. <https://nursingmanthra.com/2017/08/29/intravenous-cannulation-procedure>

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First Released Date:	March 2005
Posted Date:	22-SEP-2021
Last Revised:	22-SEP-2021
Last Reviewed:	
Approved By: <i>(committee or position)</i>	PHC
	Renal Practice Committee Professional Practice Standards Committee
Owners:	PHC
	Renal Program