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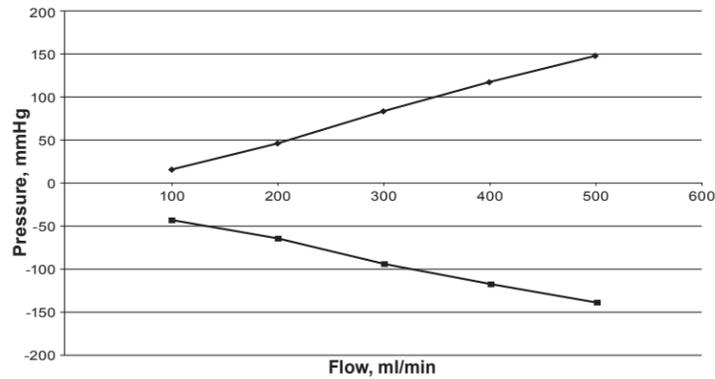
For single product and patient use only. Do not reuse, reprocess or re-sterilize. Reuse, reprocessing or re-sterilization may compromise the structural integrity of the device and/or lead to device failure, which in turn may result in patient injury, illness or death. Reuse, reprocessing or re-sterilization may also create a risk of contamination of the device and/or cause patient infection or cross-infection, including, but not limited to, the transmission of infectious disease(s) from one patient to another. Contamination of the device may lead to injury, illness or death of the patient. Federal (USA) law restricts this device to be used by or under the direction of a physician.

Standard Kit:	Peel-Away Kit:	Exchange Kit:
(1) 15.5Fr UltraStream Catheter	(1) 15.5Fr UltraStream Catheter	(1) 15.5Fr UltraStream Catheter
(1) Flexible Stiffener	(1) Peel Away Introducer with Valve	(1) Flexible Stiffener
(1) Tunneling Device	(1) Tunneling Device	(2) Injection Caps
(1) 16Fr Vessel Dilator	(1) 16Fr Vessel Dilator	
(1) Safety Scalpel	(1) Safety Scalpel	
(1) 18ga x 7cm Introducer Needle	(1) 18ga x 7cm Introducer Needle	
(1) Safety Foam	(1) 0.038" x 80cm Guidewire	
(2) Adhesive Dressing	(1) Safety Foam	
(2) Injection Caps	(2) Adhesive Dressing	
	(2) Injection Caps	
	(1) Flexible Stiffener	

Device Description

The UltraStream Chronic Hemodialysis Catheter is a chronic, multi-lumen, radiopaque, polyurethane catheter with a polyester cuff and two female luer locking adapters. The cuff promotes tissue in-growth for fixation of the catheter in a subcutaneous tunnel. The luer locking adapters are color coded to differentiate between the arterial and venous lumens. The red luer represents arterial outflow from the patient and the blue luer represents venous return to the patient. In addition, each clamp has a tag which is labeled with its respective priming volume.

The **Flow Rate vs. Pressure profile** of the UltraStream Chronic Hemodialysis Catheter is depicted below.



Indications For Use

The UltraStream Chronic Hemodialysis Catheter is designed for chronic hemodialysis and apheresis.

Contraindications

The device is contraindicated when:

- The presence of other device related infection, bacteremia, or septicemia is known or suspected.
- Severe chronic obstructive lung disease exists.
- Post irradiation of prospective insertion site.
- Previous episodes of venous thrombosis or vascular surgical procedures at the prospective placement site have occurred.
- Local tissue factors will prevent proper device stabilization and/or access.

Warnings

- Due to the risk of exposure to HIV (Human Immunodeficiency Virus) or other blood borne pathogens, health care workers should routinely use universal blood and body-fluid precautions in the care of all patients. Sterile technique must be strictly adhered to during any handling of the device.
- To avoid air embolism, keep the catheter clamped at all times when not attached to syringes or blood lines.

- Do not use acetone, or alcohol-based iodine solutions (tinctures) on any part of the catheter tubing. Exposure to these agents may cause catheter damage. Aqueous-based povidone-iodine is recommended for exit site care.
- The guidewire must always be distal to the tip of the stiffener during catheter insertion.
- Catheter must only be advanced over a guidewire.

General Precautions

- If catheter or components show any sign of damage (crimped, crushed, cut, etc.) do not use.
- Do not use sharp instruments near the extension tubes or catheter shaft. Do not use scissors to remove the dressing, as this could possibly cut or damage the catheter. Do not suture through any part of the catheter. If sutures are used to secure the catheter, be sure to use the suture wing. Catheter tubing can tear when subjected to excessive force or rough edges.
- Avoid sharp or acute angles during implantation that may compromise catheter functionality.
- Fill (prime) the device with sterile, heparinized saline or normal saline solution to help avoid air embolism prior to catheter insertion.
- Excessive force should not be used to flush obstructed lumen. Do not use a smaller syringe than 10 ml (cc).
- To prevent accidents, assure the security of all caps and bloodline connections prior to and between treatments.
- It is recommended that only luer lock (threaded) accessories and components are used with the UltraStream Chronic Hemodialysis Catheter. Repeated over tightening of bloodlines, syringes, and caps will reduce connector life and could lead to potential connector failure. Inspect the catheter frequently for nicks, scrapes, cuts, etc. which could impair its performance.
- Clamping the extension tubes repeatedly in the same spot could weaken the tubing. Change the position of the clamp regularly to prolong the life of the tubing. Avoid clamping near the adapter and hub of the catheter. Do not clamp the shaft of the catheter. Use only the line extension clamps which have been provided with the catheter. Examine tubing for damage at the end of each treatment.

Possible Complications

- Air Embolism
- Perforation of Vessel
- Hemorrhage
- Endocarditis
- Bacteremia
- Pneumothorax
- Hemothorax
- Exit Site Infection
- Bleeding
- Subcutaneous Hematoma
- Inflammation
- Exit Site Necrosis
- Brachial Plexus Injury
- Thoracic Duct Injury
- Laceration of Vessel
- Fibrin Sheath Formation
- Cardiac Arrhythmia
- Tunnel Disease
- Lumen/Vessel Thrombosis
- Hematoma
- Cardiac Tamponade
- Vascular Thrombosis
- Death

Insertion Sites

The UltraStream Chronic Hemodialysis Catheter may be inserted percutaneously and is ideally placed in the jugular vein. Although this catheter may be placed in the subclavian vein, the internal jugular is the preferred site (National Kidney Foundation Dialysis Outcomes Quality Initiative (DOQI) Guideline 5, K/DOQI Update 2000).

Caution

- Patients requiring ventilator support are at increased risk of pneumothorax during subclavian vein cannulation.
- Long time use of the subclavian vein may be associated with subclavian vein stenosis.

Directions for Catheter Insertion (Standard Kit)

The UltraStream Chronic Hemodialysis Catheter should be inserted, manipulated, and removed only by a qualified, licensed, physician or other health care practitioner authorized by and under the direction of such physician. Medical techniques and procedures described in these instructions do not represent all medically accepted protocols, nor are they intended as a substitute for a physician's experience and judgment in treating any specific patient.

Caution: Strict aseptic technique must be used during the insertion, maintenance, and removal procedures.

- 1) Select the appropriate catheter length to achieve proper tip positioning. Proper catheter length selection is important and will be determined by patient anatomy.

NOTE: For ease in dressing the exit site and for patient comfort, locate the subcutaneous tunnel exit site below the clavicle. Tunnels with a wide gentle arc lessen the risk of kinking. The tunnel should be short enough to keep the Y-hub of the catheter from entering the exit site, yet long enough to keep the cuff at least 2cm from the skin opening.

- 2) Administer sufficient local anesthetic to completely anesthetize the insertion area and the tunnel site.

- 3) Gain percutaneous access to the selected vein using a micro-puncture or similar introducer system.

- 4) After gaining access, exchange the .018 in. introducer guidewire for an appropriate length .035/.038 in. guidewire. Be sure to confirm proper guidewire position using fluoroscopic visualization.

CAUTION: The length of wire inserted is determined by the size of the patient. Monitor patient for signs of arrhythmia throughout this procedure. The patient should be placed on a cardiac monitor during this procedure. Cardiac arrhythmias may result if the guidewire is allowed to pass into the right atrium or ventricle. The guidewire should be held securely during this procedure.

CAUTION: When an introducer needle is used, do not withdraw guidewire against needle bevel to avoid possible severing of guidewire.

- 5) Flush the dilator with sterile, normal or heparinized saline solution and insert over the .035/.038 in. guidewire located at the venotomy site. Dilator may be left in place.

- 6) Make a small incision at the predetermined exit site on the chest wall wide enough to accommodate the polyester catheter cuff, approximately 1 cm long.

- 7) Prepare the UltraStream and flexible stiffener for insertion by gently wiping the exposed distal portion with sterile, normal or heparinized saline solution and irrigating all lumens using 10 ml (cc) syringes filled with normal or heparinized saline solution.

- 8) Clamp only the red (arterial) extension tubing using the color coded in-line clamp provided and remove syringe. Attach stainless steel tunneler to the UltraStream's venous tip. Avoid damage to the catheter tip during placement. Slide the protective sheath onto the UltraStream to fully cover the catheter tip. Advance the flexible stiffener into the venous luer until the stiffener tip gently contacts the stainless steel tunneler.

NOTE: Stiffener luer and UltraStream venous luer will not be connected during catheter tunneling.

- 9) Using the tapered tip of the tunneler to perform blunt dissection, create a subcutaneous tunnel starting at the exit site and ending by exiting at the site of the venotomy/dilator.

CAUTION: Do not tunnel through the muscle. The tunnel should be made with care to prevent damaging surrounding vessels and nerves.

- 10) Pull the UltraStream through the subcutaneous tract. Position proximal catheter allowing for standard polyester cuff placement (approx. 2cm within the tract)

- 11) Gently remove the tunneler from the UltraStream. Advance the stiffener until the luer connection with the UltraStream can be tightened and secured.

- 12) Maintaining pressure over the vascular access site to prevent bleeding, remove the dilator leaving the 0.035"/0.038" guidewire in place. Backload the guidewire into the UltraStream distal stiffener lumen.

- 13) Advance the UltraStream and flexible stiffener over the proximal portion of the 0.035"/0.038" guidewire through the subcutaneous tissue and into the vessel until proper catheter tip positioning is confirmed with fluoroscopic visualization. If resistance is encountered, further blunt dissection may facilitate insertion. It is recommended that arterial lumen, as indicated by the red luer connector, be oriented cephalad.

CAUTION: Do not advance the catheter and stiffener past the tip of the guidewire as this could cause vessel perforation, and or bleeding.

- 14) When the UltraStream and the stiffener are properly located within the vessel using fluoroscopic visualization, unlock and gently remove the stiffener and guidewire from the catheter.

- 15) Attach a 20 ml (cc) syringe to one extension and open clamp. Blood should aspirate easily. Once adequate blood flow has been established, flush the lumen(s) and then re-clamp the extension tube and remove syringe. Repeat this step for the other catheter extension.

CAUTION: Avoid air embolism by keeping the catheter tubing clamped at all times when not in use and by filling the catheter with sterile, normal or heparinized saline solution prior to use. With each change in tubing connections, purge air from the catheter and all connecting tubing and caps.

CAUTION: Clamp only the extension tubes with the in-line clamps provided with the UltraStream catheter. Do not use forceps and do not clamp the distal portion of the catheter.

NOTE: If excessive resistance to blood aspiration exists, the catheter may need to be rotated, flushed or repositioned to sustain adequate blood flow. A pre-existing fibrin sheath may also be present.

- 16) Fill a 20 ml (cc) syringe with sterile, normal or heparinized saline solution, attach to one of the catheter extensions, open clamp, and irrigate the lumen. Once the lumen has been irrigated, re-clamp the extension tube and remove the syringe. Repeat this step for the other catheter extension.

- 17) Attach both injection caps to the catheter luers post placement

- 18) If the catheter is not used immediately for treatment, follow standard protocol for establishing a heparin lock in each catheter. Refer to the Heparinization section for additional notes.

- 19) Immediately after insertion, confirm proper placement of the tip of the catheter with fluoroscopic visualization. The catheter tip should be positioned at the level of the caval atrial junction or into the right atrium to ensure optimal blood flow (as recommended in current NKF DOQI Guidelines). ALWAYS ATTACH BOTH INJECTION CAPS TO CATHETER LUERS POST PLACEMENT.

CAUTION: Failure to verify catheter placement may result in serious trauma or fatal complications.

- 20) Suture the tunnel exit site and vein insertion site if necessary. Suture the catheter to the skin using the fixed suture wings. Do not suture the catheter tubing.

- 21) Apply provided dressings per hospital policy.

NOTE: It is particularly important to immobilize cuffed catheters for 7 days to prevent cuff dislodgment.

NOTE: Before dialysis begins, all connections to the extracorporeal circuit should be checked carefully. During all dialysis procedures, frequent visual inspection should be conducted to detect leaks and prevent blood loss or entry of air into the extracorporeal circuit.

Directions for Catheter Insertion (Standard Kit with Peel Away Sheath)

The 15.5F UltraStream Chronic Dialysis Catheter should be inserted, manipulated, and removed only by a qualified, licensed physician or other healthcare practitioner authorized by and under the direction of such physician. Medical techniques and procedures described in these instructions do not represent all medically accepted protocols, nor are they intended as a substitute for a physician's experience and judgment in treating any specific patient.

Caution: Strict aseptic technique must be used during the insertion, maintenance, and removal procedures.

- 1) Select the appropriate catheter length to achieve proper tip positioning. Proper catheter length selection is important and will be determined by patient anatomy.

NOTE: For ease in dressing the exit site and for patient comfort, locate subcutaneous tunnel exit site below the clavicle. Tunnels with a wide gentle arc lessen the risk of kinking. The tunnel should be short enough to keep the Y-hub of the catheter from entering the exit site, yet long enough to keep the cuff at least 2cm from skin opening.

- 2) Administer sufficient local anesthetic to completely anesthetize insertion area and tunnel site.

- 3) Gain percutaneous access to the selected vein by inserting introducer needle placing thumb over the end to prevent blood loss and air embolism.

- 4) Insert 0.038" cm marked guidewire through needle and into the vein. Guidewire should be inserted under Fluoroscopy, note the depth markings on guidewire when desired tip position is reached.

CAUTION: Length of wire inserted is determined by the size of the patient. Monitor patient for signs of arrhythmia throughout this procedure. Patient should be placed on a cardiac monitor during this procedure. Cardiac arrhythmias may result if the guidewire is allowed to pass into the right atrium or ventricle. Guidewire should be held securely during this procedure.

CAUTION: When introducer needle is used, do not withdraw guidewire against needle bevel to avoid possible severing of guidewire.

5) Remove introducer needle leaving guidewire in the vessel.

6) Flush the tissue dilator with sterile, normal or heparinized saline solution and insert over the 0.038” guidewire located at the venotomy site.

7) Prepare the peel away introducer by removing the dilator, sliding the valve and inserting the dilator through the valve. Lock in place by using the rotating collar. Flush peel away introducer with sterile, normal or heparinized saline.

8) Remove the tissue dilator leaving guidewire in vessel.

9) Advance the peel away introducer over the guidewire and into the vein.

10) Remove the peel away dilator and the guidewire by unlocking the rotating collar and gently withdrawing dilator from the sheath.

11) Make a small incision at the predetermined exit site on the chest wall wide enough to accommodate polyester catheter cuff, approximately 1 cm long.

12) Prepare the UltraStream for insertion by gently wiping the exposed distal portion with sterile, normal or heparinized saline solution and irrigating all lumens using 10ml (cc) syringes filled with normal or heparinized saline solution.

13) Clamp only the red (arterial) extension tubing using color coded in-line clamp provided and remove syringe. Attach tri-ball tunneler to venous tip. Avoid damage to catheter tip during placement. Slide protective sheath onto UltraStream to fully cover the catheter tip.

14) Using tapered tip of the tunneler to perform blunt dissection, create a subcutaneous tunnel starting at the exit site and ending by exiting at the site of the venotomy/dilator.

CAUTION: Do not tunnel through the muscle. The tunnel should be made with care to prevent damaging surrounding vessels and nerves.

NOTE: The flexible stiffener may be used as needed.

15) Pull catheter through subcutaneous tract. Position proximal catheter allowing for standard polyester cuff placement (Approx. 2cm within tract).

16) Gently remove tunneler from catheter.

17) Advance catheter through the valved peel away sheath. To prevent kinking the catheter, it may be necessary to advance in small steps by grasping the catheter close to the sheath. It is recommended that arterial lumen, as indicated by the red luer connector, be oriented cephalad.

18) After the catheter is in position, crack the sheath handle in half.

19) Peel the non-valved side of the handle partially away from the catheter.

20) Near the valve, hold the catheter firmly in position and pull the valve off the catheter.

NOTE: It is normal to experience some resistance while pulling the catheter through the slit on the valve.

21) Remove the peel-away sheath from the patient.

22) Attach a 20 ml (cc) syringe to one extension and open clamp. Blood should aspirate easily. Once adequate blood flow has been established, flush the lumen(s) and then re-clamp extension tube and remove syringe. Repeat this step for the other catheter extension.

CAUTION: Avoid air embolism by keeping the catheter tubing clamped at all times when not in use and by filling the catheter with sterile, normal or heparinized saline solution prior to use. With each change in tubing connections, purge air from the catheter and all connecting tubing and caps.

CAUTION: Clamp only the extension tubes with in-line clamps provided with the catheter. Do not use forceps and do not clamp the distal portion of the catheter.

NOTE: If excessive resistance to blood aspiration exists, the catheter may need to be rotated, flushed or repositioned to sustain adequate blood flow. A pre-existing fibrin sheath may also be present.

23) Fill a 20 ml syringe with sterile, normal or heparinized saline solution, attach to one of the catheter extensions, open clamp, and irrigate the lumen. Once the lumen has been irrigated, reclamp the extension tube and remove the syringe. Repeat this step for the other catheter extension.

24) Attach both injection caps to catheter luers post placement.

25) If the catheter is not used immediately for treatment, follow standard protocol for establishing a heparin lock in each catheter. Refer to Heparinization section for additional notes.

26) Immediately after insertion, confirm proper placement of the tip of the catheter with fluoroscopic visualization. The catheter tip should be positioned at the level of the caval atrial junction or into the right atrium to ensure optimal blood flow (as recommended in current NKF DOQIGuidelines). ALWAYS ATTACH BOTH INJECTION CAPS TO CATHETER LUERS POST PLACEMENT.

CAUTION: Failure to verify catheter placement may result in serious trauma or fatal complications.

27) Suture the tunnel exit site and vein insertion site if necessary. Suture the catheter to the skin using fixed suture wings. Do not suture the catheter tubing.

28) Apply provided dressings per hospital policy.

NOTE: It is particularly important to immobilize cuffed catheters for 7 days to prevent cuff dislodgment. Assess catheter fixation before removing sutures.

NOTE: Before dialysis begins, all connections to the extracorporeal circuit should be checked carefully. During all dialysis procedures, frequent visual inspection should be conducted to detect leaks and prevent blood loss or entry of air into the extracorporeal circuit.

Directions for Catheter Exchange

The 15.5Fr UltraStream Chronic Dialysis Catheter should be inserted, manipulated, and removed only by a qualified, licensed physician or other health care practitioner authorized by and under the direction of such physician. Medical techniques and procedures described in these instructions do not represent all medically accepted protocols, nor are they intended as a substitute for a physician’s experience and judgment in treating any specific patient.

CAUTION: Review hospital or departmental protocol, warnings, cautions, guidelines, potential complications and their treatment, prior to catheter removal.

CAUTION: Strict aseptic technique must be used during the insertion, maintenance, and removal procedures.

NOTE: Review existing catheter manufacturer’s instructions for removal and verify if exchange procedure is appropriate.

1) Remove existing catheter by cutting sutures from suture wing, if required.

2) Free the cuff from the tissue using blunt or sharp dissection as needed (located at exit site).

3) Unlock the venous clamp and advance an 0.035”/0.038” guidewire down the venous lumen into the designated position, unless contraindicated. Confirm proper guidewire placement under fluoroscopy per KDOQI guidelines.

NOTE: Guidewire must be the proper length so the guidewire will extend distal to the tip of the catheter at all time of the placement.

4) While holding the 0.035”/0.038” guidewire in place, gently pull the catheter out over-the-wire.

Caution: When removing the catheter, DO NOT use a sharp, jerking motion or undue force; this may tear the catheter.

5) After removing the catheter, apply manual pressure to the puncture site to control bleeding.

6) Remove protective shipping sleeve from the replacement catheter.

7) Prepare the UltraStream catheter and flexible stiffener for insertion by gently wiping the exposed distal portion with sterile, normal or heparinized saline solution and irrigating all lumens using 10 ml (cc) syringes filled with normal or heparinized saline solution. Remove the flexible stiffener prior to irrigation. Lock arterial clamp after irrigating.

8) Fully advance and secure the flexible stiffener into the UltraStream venous lumen.

CAUTION: Do not lock the blue venous clamp over the stiffener. The red arterial clamp should be locked prior to advancing over-the-wire.

9) Insert the 0.035”/0.038” guidewire into the distal end of the flexible stiffener, until guidewire exits out of the blue venous luer.

10) Advance the catheter over-the-wire thru the existing tunnel until proper catheter tip positioning is confirmed with fluoroscopic visualization, per KDOQI guidelines. It is recommended that arterial lumen, as indicated by the red luer connector, be oriented cephalad.

Caution: Do not advance the catheter and stiffener past the tip of the guidewire as this could cause vessel perforation, and or bleeding.

Note: If resistance is felt, a 16F dilator may be used to dilate tunnel.

Note: Polyester cuff should be positioned approximately 2 cm from exit site.

11) Once position is confirmed, slowly remove 0.035”/0.038” guidewire, flexible stiffener, and attention tag attached to the venous clamp.

12) Attach a 20 ml (cc) syringe to one extension and open clamp. Blood should aspirate easily. Once adequate blood flow has been established, flush the lumen(s) and then re-clamp the extension tube and remove syringe. Repeat this step for the other catheter extension.

CAUTION: Avoid air embolism by keeping the catheter tubing clamped at all times when not in use and by filling the catheter with sterile, normal or heparinized saline solution prior to use. With each change in tubing connections, purge air from the catheter and all connecting tubing and caps.

CAUTION: Clamp only the extension tubes with the in-line clamps provided with the UltraStream catheter. Do not use forceps and do not clamp the distal portion of the catheter.

NOTE: If excessive resistance to blood aspiration exists, the catheter may need to be rotated, flushed or repositioned to sustain adequate blood flow. A pre-existing fibrin sheath may also be present.

13) Fill a 20 ml (cc) syringe with sterile, normal or heparinized saline solution, attach to one of the catheter extensions, open clamp, and irrigate the lumen. Once the lumen has been irrigated, re-clamp the extension tube and remove the syringe. Repeat this step for the other catheter extension.

14) Reference hospital protocol for heparin lock concentration and administer according to venous/arterial priming volumes.

15) Attach both injection caps to catheter luers post placement.

16) Close the incision with a suture as needed, then apply an adhesive wound dressing.

17) Suture wings to patients skin.

Heparinization

To maintain catheter function between treatments, a heparin lock must be created in each lumen of the catheter. Follow standard institutional protocol when creating the heparin lock.

- When creating the heparin lock, be sure to maintain positive pressure on the syringe until after the catheter is clamped.
- The internal volume of each lumen is marked on the tags. Inject enough heparin solution to fill all lumens.
- Once the lumens have been heparinized, keep both extensions clamped when not attached to the bloodlines or a syringe.
- The heparin solution must be removed by aspirating 3 ml (cc) out of the lumen immediately prior to use to prevent systemic heparinization of the patient.

Priming Volume:

Tip to Hub Length	Arterial Volume	Venous Volume
24cm	2.6cc	1.6cc
28cm	2.8cc	1.8cc
32cm	3.0cc	2.0cc
36cm	3.2cc	2.2cc
40cm	3.6cc	2.4cc
55cm	4.6cc	3.0cc

Site Care

Caution: Use caution when cleaning the catheter exit site. Povidone iodine, dilute aqueous sodium hypochlorite solution, chlorhexidine gluconate 4%, or chlorhexidine gluconate 2% solution are the recommended antiseptic to be used with this catheter.

Clean the skin around the catheter. Cover the exit site with two occlusive dressings applied sandwich style around the catheter. Leave the extensions, clamps, adapters and caps exposed for access by the staff. Wound dressings must be kept dry. Patient must not swim, shower, or soak dressing while bathing. If adhesion of dressing is compromised by profuse perspiration or accidental wetting, the dressing must be changed by the medical or nursing staff under sterile conditions.

Management of Lumen Obstruction

Lumen obstruction is usually evident by failure to aspirate blood from the lumen, inadequate blood flow and/or high resistance pressures during hemodialysis. The causes may include inadequate catheter tip position, catheter kink and clot. One of the following may resolve the obstruction:

Verify that the clamps are open when trying to aspirate or flush the catheter lumen. Reposition the patient.

Have the patient cough.

Provided there is no resistance, flush the catheter vigorously with sterile normal saline. Never forcibly flush an obstructed lumen. If either lumen develops a thrombus, first attempt to aspirate the clot with a syringe. If aspiration fails, the physician may consider using a thrombus dissolving solution (i.e. TPA) to dissolve the clot.

Removal

Free the cuff from the tissue prior to removal. After removing the catheter, apply manual pressure to the puncture site to control bleeding. Close the incision with a suture as needed. Then apply an adhesive wound dressing.

CAUTION: When removing the catheter, DO NOT use a sharp, jerking motion or undue force; this may tear the catheter.

How Supplied

UltraStream Chronic Hemodialysis Catheters are sterilized by ethylene oxide gas. Contents sterile and non-pyrogenic in unopened and undamaged package. Do not use catheter if package has been damaged or has been opened.

Storage

Store at room controlled temperature. Do not expose to organic solvents, ionizing radiation or ultraviolet light. Rotate inventory so that catheters are used prior to the expiration date on the package label.

References

- Lebanc M, Bosc J, Paganini E, Canaud B. Central Venous Dialysis Catheter Dysfunction, Advances in Renal Replacement Therapy, 1997; 4:377-389.
- Hirsch D, Bergan P, Jindal K. Polyurethane Catheters for Long-Term Hemodialysis Access. Artificial Organs 1997; 21(5):349-354.
- Renner C RN, Polyurethane vs. Silicone PICC Catheters. JVAD Spring 1998; 16-21.
- National Kidney Foundation Dialysis Outcomes Quality Initiative (DOQI)

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