PowerPort®
Implantable Port
PowerLoc®
Safety Infusion Set
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† POWERLoc®, POWERLoc® Clear, and POWERLoc® MAX Safety Infusion Sets (SIS)
**POWER INJECTION**

**Important Information For Power-Injection**

- A PowerLoc® Safety Infusion Set Family™ device must always be used to access the PowerPort® Implantable Port for power injecting contrast media.
- A PowerLoc® Safety Infusion Set Family™ device may also be used to access a power-rated port for power injecting contrast media if indicated by the port manufacturer.

Contrast media should be warmed to body temperature prior to power injection.

**Warning:** Failure to warm contrast media to body temperature prior to power injection may result in port system failure.

- Check for blood return, then flush the PowerPort® Implantable Port using at least 10 mL of sterile normal saline prior to and immediately following the completion of power injection studies. Always ensure the patency of the PowerPort® Implantable Port to prevent damage to the port system. Resistance to flushing may indicate catheter occlusion. Do not proceed with power injection study until occlusion has been cleared.

**Warning:** Failure to ensure patency of the catheter prior to power injection studies may result in port system failure.

**Warning:** Do not power inject through a port system that exhibits signs of clavicle-first rib compression or pinch-off as it may result in port system failure.

- If possible, the patient should receive power injection with arms vertically above the shoulder with the palms of the hands on the face of the gantry during injection. This allows for uninterrupted passage of injected contrast through the axillary and subclavian veins at the thoracic outlet.

**Warning:** Power injector machine pressure limiting feature may not prevent over-pressurization of an occluded catheter.

- Do not exceed a 300 psi pressure limit setting, or the maximum flow rate setting shown below, on the power injection machine if power injecting through the PowerPort® Implantable Port.

**Power-Injection Checklist**

- Ensure patient has a Power Injectable Port
- Access with power injectable needle
- Replace any needleless cap on infusion set with dead-ender cap
- Check blood return and flush
- Check maximum recommended flow rate for port and infusion set

**Power Injectable Port & Needle Identification**

Always verify that the patient has a PowerPort® Implantable Port by at least two means. Ensure the port is accessed with a PowerLoc® Safety Infusion Set Family™ device, and verification tag is affixed to the PowerLoc® Safety Infusion Set Family™ device extension tubing, prior to power injection.

Bard® PowerPort® Implantable Ports can be distinguished from non-power injectable ports through the following means:

**Patient Implant Record**

- Check patient’s chart for a PowerPort® Implantable Port patient record sticker.

**Patient Chart**

**Patient Discharge Packet**

- Ask patient to see the patient identification card, bracelet or key chain received when the port was implanted.

**ID Items**
Power-Injection Procedure

1. Verify patient has a PowerPort® Implantable Port (See “Identifying a PowerPort® Implantable Port”).

   **Note:** It is recommended that catheter tip placement be verified through institutional protocol.

2. Ensure the port is accessed with a PowerLoc® Safety Infusion Set Family† device. Make certain that needle tip is inserted fully within the port.

   **Warning:** A PowerLoc® Safety Infusion Set Family† device must always be used to access the PowerPort® Implantable Port for power injecting contrast media.

3. Replace any needleless cap on the PowerLoc® Safety Infusion Set Family† device Y-site with a dead-ender cap.

4. Attach a syringe filled with sterile normal saline.

5. Check blood return and vigorously flush the port with at least 10 mL of sterile normal saline. Check for patency with the patient in the position that they will assume during CECT procedure.

   **Warning:** Failure to ensure patency of the catheter prior to power injection studies may result in port system failure.

6. Detach syringe.

7. Warm contrast media to body temperature.

8. If possible, the patient should receive power injection with arms vertically above the shoulder with the palms of the hands on the face of the gantry during injection. This allows for uninterrupted passage of injected contrast through the axillary and subclavian veins at the thoracic outlet.

9. Attach the power injection device securely to the PowerLoc® Safety Infusion Set Family† device.

10. Check table below to confirm the maximum flow rate.

11. Instruct the patient to communicate immediately any pain or change in feeling during the injection. Inject warmed contrast, taking care not to exceed the flow rate limits. **Warning:** If local pain, swelling or signs of extravasation are noted, the injection should stop immediately.

   **Warning:** Do not exceed a 300 psi pressure limit setting, or the maximum flow rate setting shown below, on the power injection machine if power injecting through the PowerPort® Implantable Port.

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### PowerLoc® Safety Infusion Set Family† device verification sticker.

- Sticker is placed on extension tubing when a port is initially identified and accessed. This tag instructs CT to power inject through the PowerPort® Implantable Port/PowerLoc® Safety Infusion Set System.

- **Verification Tag for the PowerLoc® Safety Infusion Set Family† needle**

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### Palpation of the Port

- Palpate each septum on the port to identify a triangular arrangement of three palpation bumps. Palpate sides of single lumen port to identify triangular port housing.

### Port Palpation

- **Single Port**
- **Dual Port**

- **Feel the soft top of the port to locate the three palpation bumps arranged in a triangle.**
- **Feel the sides of the port to identify its unique triangle shape.**
- **Palpate port housing.**
- **Locate Septum-Finder® Ridge and palpation bumps.**

### Radiopaque Identifier

Symbols on the bottom of the plastic and titanium ports are visible under X-ray, fluoroscopy or other appropriate imaging technology.

- Symbol may also aide in identification of a flipped port with reduced artifact.

### Radiopaque Identifier

### Titanium PowerPort® Implantable Port

### PowerPort® duo Implantable Port

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### PowerPort® M.R.I.® Implantable Port

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**Note:** If the patient is not going to receive a CT scan with contrast, applying the sticker is not needed.

**Note:** If a patient does not have a PowerPort® Implantable Port, the sticker must not be used, as it could lead to power injecting through a non-power port.

For additional assistance on recognizing a power injectable port/infusion set system, contact Bard’s Clinical Information Hotline at 800-443-3385.
12. Disconnect the power injection device.
13. Flush the PowerPort® Implantable Port with 10 mL of sterile normal saline. For dual lumen PowerPort® Implantable Port flush each lumen separately.
14. Have heparin lock procedure performed for open-ended catheters. For implantable ports with Groshong® Catheters, a sterile normal saline lock may be used.

Caution: Remember that some patients may be hypersensitive to heparin or suffer heparin induced thrombocytopenia (HIT) and these patients must not have their port locked with heparin flush solution.
15. After therapy completion, flush port per institutional protocol. Close clamp while injecting last 0.5 mL of solution. This helps reduce the potential for blood backflow into the catheter tip, which could encourage catheter clotting.

### POWERPORT® IMPLANTABLE PORT

**Description - PowerPort® Implantable Port**

The PowerPort® Implantable Port is an implantable access device designed to provide repeated access to the vascular system. Port access is performed by percutaneous needle insertion using a non-coring needle. **Power injection is performed using a PowerLoc® Safety Infusion Set Family† device only.** The PowerPort® Implantable Port consists of two primary components: an injection port with self-sealing septum and a radiopaque catheter. Single lumen PowerPort® Implantable Ports can be identified by feeling the top of the septum which includes three palpation bumps arranged in a triangle and by palpating the sides of the port, also in a triangular shape.

Dual lumen PowerPort® Implantable Ports can be identified subcutaneously by feeling the tops of each septum which include three palpation bumps arranged in a triangle. The PowerPort® Implantable Port’s triangular shape and/or radiopaque identifier (CT marker) may also be visible under X-ray.

The unique radiopaque identifier featured on the PowerPort® Implantable Ports aide in identification of a flipped port.

All materials are biocompatible, can be used with virtually all injectable solutions and can be safely used with CECT. For implantable ports with Groshong® Catheters, the Groshong® Catheter valve helps provide security against blood reflux into the port/catheter system. The Groshong® Catheter may be flushed with normal saline and does not require heparin to maintain patency.

### Indications For Use

The PowerPort® Implantable Port is indicated for patient therapies requiring repeated access to the vascular system. The port system can be used for infusion of medications, I.V. fluids, parenteral nutrition solutions, blood products, and for the withdrawal of blood samples.

When used with a PowerLoc® Safety Infusion Set Family device, the PowerPort® Implantable Port is indicated for power injection of contrast media. For power injection of contrast media, the maximum recommended infusion rate is 5 mL/s.

### Warnings

- Intended for Single Patient Use. DO NOT REUSE. Bard Peripheral Vascular, Inc. PowerPort® Implantable Ports are single use devices and should never be reimplanted. Any device that has been contaminated by blood should not be reused or resterilized.
- After use, this product may be a potential biohazard. Handle and discard in accordance with accepted medical practice and applicable local, state and federal laws and regulations.
- The use of a non-PowerLoc® Safety Infusion Set Family† device during power injection may lead to system failure and possibly patient injury.
- **Do not use a syringe smaller than 10 mL.** Fluxing occluded catheters with small syringes can create excessive pressures within the port system.
- Do not power inject through the port if you cannot aspirate, if resistance to flushing seems excessive, or if the port system is occluded.
- Failure to warm contrast media to body temperature prior to power injection may result in port system failure.
- Failure to ensure patency of the catheter prior to power injection studies may result in port system failure.
- Do not power inject through a port system that exhibits signs of clavicle-first rib compression or pinch-off as it may result in port system failure.
- Power injector machine pressure limiting feature may not prevent over pressurization of an occluded catheter.
- Do not exceed a 300 psi pressure limit setting, or the maximum flow rate setting shown below, on the power injection machine if power injecting through the PowerPort® Implantable Port.

#### PowerLoc® Safety Infusion Set Family† Device Gauge Size

|-------------------|-------|-------|-------|

#### PowerLoc® Safety Infusion Set Family† Device Gauge Color

<table>
<thead>
<tr>
<th>Device Gauge Color</th>
<th>Cream</th>
<th>Yellow</th>
<th>Black</th>
</tr>
</thead>
</table>

#### Maximum Recommended Flow Rate Setting

<table>
<thead>
<tr>
<th>Flow Rate Setting</th>
<th>5 mL/sec</th>
<th>5 mL/sec</th>
<th>2 mL/sec</th>
</tr>
</thead>
</table>

- The PowerPort® Implantable Port indication for power injection of contrast media implies the device’s ability to withstand the procedure, but does not imply appropriateness of the procedure for a particular patient. A suitably trained clinician is responsible for evaluating the health status of a patient as it pertains to a power injection procedure. The PowerPort® Implantable Port is only power injectable when accessed with a PowerLoc® Safety Infusion Set Family† device.
Accessing Implantable Ports

**Equipment:**
- Syringe
- Dead End Caps
- Sterile Gloves
- If the port will be accessed for power injection, it must be accessed with a PowerLoc® Safety Infusion Set Family† device to prevent damage to the device and injury to the patient.

**Procedure for Single Lumen PowerPort® Implantable Ports:**
1. Perform aseptic site preparation.
2. Locate port septum by palpation.
   a. Locate base of port with non-dominant hand.
   b. Triangulate port between thumb and first two fingers of non-dominant hand. Aim for center point of these three fingers.
3. Insert needle perpendicular to port septum. Advance PowerLoc® Safety Infusion Set Family† device through the skin and port septum until reaching bottom of reservoir.
4. Confirm correct needle placement and patency by blood aspiration and flushing.
5. Always flush the port following injection.
6. Perform heparin lock procedure for open-ended catheters. **For implantable ports with Groshon® Catheters, a sterile normal saline lock may be used.**
7. When deaccessing the port, the needle should be removed using the positive pressure technique. Positive pressure is maintained while flushing the accessed port by clamping the infusion set tubing, while still flushing the line. This helps reduce the potential for blood backflow into the catheter tip, which could encourage catheter clotting.

**Recommended Flushing Volumes**

<table>
<thead>
<tr>
<th><strong>Open-Ended Catheter Flushing Volumes (per lumen)</strong></th>
<th><strong>Volume (100 U/mL)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>When port is not in use</td>
<td>5 mL heparin flush solution every 28 days</td>
</tr>
<tr>
<td>After each infusion of medication or TPN</td>
<td>10 mL sterile normal saline, then 5 mL heparin flush solution</td>
</tr>
<tr>
<td>After blood withdrawal</td>
<td>20 mL sterile normal saline, then 5 mL heparin flush solution</td>
</tr>
<tr>
<td>After power injection of contrast media</td>
<td>10 mL sterile normal saline, then 5 mL heparin flush solution</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Groshon® Catheter Flushing Volumes (per lumen)</strong></th>
<th><strong>Volume</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>When port is not in use</td>
<td>5 mL sterile normal saline every 90 days</td>
</tr>
<tr>
<td>After each infusion of medication or TPN</td>
<td>10 mL sterile normal saline</td>
</tr>
<tr>
<td>After blood withdrawal</td>
<td>20 mL sterile normal saline</td>
</tr>
<tr>
<td>After power injection of contrast media</td>
<td>10 mL sterile normal saline</td>
</tr>
</tbody>
</table>

**Precautions**
- Precautions are intended to help avoid product damage and/or patient injury.
- Carefully read and follow all instructions prior to use.
- Follow Universal Precautions when inserting and maintaining the catheter.
- Follow all contraindications, warnings, cautions, precautions and instructions for all infusates as specified by their manufacturers.
- Use only non-coring needles with the port.
- Only accessories and components with luer lock connections should be used with this device.
- If signs of extravasation exist, discontinue injections. Begin appropriate medical intervention immediately.

**Use & Maintenance Instructions**

**Site Preparation**
Always inspect and aseptically prepare the injection site prior to accessing the port.

**Equipment:**
- Alcohol or chlorhexidine wipe
- Antiseptic swabs (3)
- Sterile gloves

**Note:** Additional sterile precautions may be used according to hospital protocol.

**Procedure:**
1. Explain procedure to patient. Warn of needle prick sensation. (Sensation of needle insertion decreases over time. Use of a topical anesthetic may be appropriate.)
2. Wash hands thoroughly.
3. Don sterile gloves, and follow your hospital protocol for sterile precautions.
4. Cleanse or scrub the area according to the cleansing agent manufacturers instructions. We suggest an area of at least 10 – 13 cm diameter at the port insertion site. Allow to dry completely.

**Directions for the Use of ChloraPrep™ Preoperative Skin Preparation:**
Prepare the site with ChloraPrep™ One-Step Applicator Solution or according to institutional policy using sterile technique. “Pinch-Off” the wings on the ChloraPrep™ preoperative skin preparation One-Step Applicator to break the ampule and release the antiseptic. Do not touch the sponge. Wet the sponge against the treatment area until fluid is visible on the skin. Use repeated back-forth strokes of the sponge for approximately 30 seconds. Completely wet the treatment area with antiseptic. Allow the area to dry for approximately 30 seconds. Do not blot or wipe away. Maximum treatment area for one applicator is approximately 130 cm² (approximately 4 x 5 in.). Discard the applicator after use.

**Note:** Follow established hospital or institutional policy for changing I.V. tubing and accessing cannula. The Center for Disease Control (CDC) or Oncology Nursing Society (ONS) may have recommended guidelines.
Procedure for Dual Lumen PowerPort® Implantable Ports:
1. Perform aseptic site preparation.
2. Locate port septum by palpation.
   a. Locate base of port with non-dominant hand.
   b. Locate center of dual lumen port by palpating Septum-Finder® Ridge on top of port and place index finger of dominant hand to mark.
   c. Triangulate right or left side of dual lumen port between thumb and first two fingers with non-dominant hand. Aim for center point of these three fingers.
3. Insert needle perpendicular to port septum. Advance PowerLoc® Safety Infusion Set Family† device through the skin and port septum until reaching bottom of reservoir.
4. Confirm correct needle placement and patency by blood aspiration and flushing.
5. Flush each lumen separately following injection.
6. Perform heparin lock separately on each lumen.
7. When deaccessing the port, the needle should be removed using the positive pressure technique. Positive pressure is maintained while flushing the accessed port by clamping the infusion set tubing, while still flushing the line. This helps reduce the potential for blood backflow into the catheter tip, which could encourage catheter clotting.

MRI Scans
⚠️ MR Conditional
Non-clinical testing has demonstrated that the device is “MR Conditional”. A patient with this device can be scanned safely immediately after placement under the following conditions:

Static Magnetic Field
- Static Magnetic Field of 3 Tesla or less
- Maximum spatial gradient magnetic field of 3000 Gauss/cm or less

MRI-Related Heating
In non-clinical testing, the device produced a temperature rise of up to 1.9° C during MRI performed for 15 minutes of scanning (i.e., per pulse sequence) in the 3-Tesla (3-Tesla/128-MHz, Excite, HDX, Software 14X.M5, General Electric Healthcare, Milwaukee, WI) MR system.

Therefore, the MRI-related heating experiments for the device at 3 Tesla using a transmit/receive RF body coil at an MR system reported whole body averaged specific absorption rate (SAR) of 2.9 W/kg (i.e., associated with a calorimetry-measured whole body averaged value of 2.7 W/kg) indicated that the greatest amount of heating that occurred in association with these specific conditions was equal to or less than 1.9°C.

Artifact Information
MR image quality may be compromised if the area of interest is in the exact same area or relatively close to the position of the device (within 4 – 40 cm², depending on port size and materials). Therefore, optimization of MR imaging parameters to compensate for the presence of this device may be necessary.

POWERLOC® SAFETY INFUSION SET FAMILY† DEVICES

Description - PowerLoc® Safety Infusion Set Family† Devices
PowerLoc® Safety Infusion Set Family† Devices are power injectable safety infusion sets ideal for accessing power injectable ports. This power-combo enables contrast agents to be power-injected. As a result, tissues show up more clearly in CECT scans, making it easier to monitor patient condition.

Indications For Use
The PowerLoc® Safety Infusion Set Family† of devices are intended for use in the administration of fluids and drugs, as well as blood sampling through surgically implantable vascular ports. The PowerLoc® Safety Infusion Set Family† of devices are also indicated for power injection of contrast media into the central venous system only with an implantable port that is also indicated for power injection. The maximum recommended infusion rate at 11.8 cPs is 5 mL/second for 19 Ga. needles, 5 mL/second for 20 Ga. needles, and 2 mL/second for 22 Ga. needles.

Contraindications
- **DO NOT USE**, if the presence of a device related infection, bacteria or septicemia is known or suspected.
- **DO NOT USE**, if local tissue factors will prevent proper device stabilization and/or access.

When used with an implantable power injectable port for contrast media infusion, the following warnings apply:

- **When a PowerLoc® Safety Infusion Set Family† device is used for power injection of contrast media, it must be used in conjunction with an implantable power-injectable port, such as the PowerPort® Implantable Port. All PowerLoc® Safety Infusion Set Family† devices have been tested and verified for power injection with PowerPort® Implantable Ports.**
- **Verify patient has an implantable power injectable port. When used specifically for power-injection, a PowerLoc® Safety Infusion Set Family† device may be used only in tandem with an appropriate power-rated port.**
- **PowerPort® Implantable Ports**: A BARD® PowerPort® Implantable Port can be identified by any two of the following methods:
  - Palpation bumps, triangular shape, radiopaque CT identifier, PowerPort® Implantable Port patient ID card or PowerPort® Implantable Port medical record.
- **Other Power-Injectable Ports**: Verify identification methods per port manufacturer’s instructions.
- **Do not power inject through a PowerLoc® Safety Infusion Set Family† device unless blood return is confirmed.**
- **Failure to warm contrast media to body temperature prior to power injection may result in device failure.**
- **Exceeding the indicated maximum flow rate, and the maximum pressure of the power injector may result in device failure. Refer to individual product labeling for maximum pressure of the power injector.**
- **When power injecting through a PowerLoc® Safety Infusion Set Family† device with a Y-site, replace any needleless cap on the unused extension leg with a dead-end cap and tighten.**
Removal
1. After therapy completion, flush port per institutional protocol. Close clamp while injecting the last 0.5 mL of solution.
2. With non-dominant hand, stabilize the port.
3. Deaccess per instructions of the appropriate device listed above.

Insertion
1. Prepare the port site for sterile accessing following institutional protocol.
2. Prime infusion set using aseptic technique following institutional protocol.
3. Verify correct needle placement by aspirating for blood.
4. Flush per institutional protocol and close clamp on extension tubing.
5. Secure needle to site following institutional protocol. Do not manipulate the tubing once it is in the septum.

MRI Scans
Non-clinical testing has demonstrated that the device is “MR Conditional”. A patient with this device can be scanned safely immediately after placement under the following conditions:

**Static Magnetic Field**
- Static Magnetic Field of 3 Tesla or less
- Maximum spatial gradient magnetic field of 3000 Gauss/cm or less

**MRI Related Heating**
In non-clinical testing, the PowerLoc® Safety Infusion Set produced a temperature rise of less than 1.2 °C at a maximum whole body averaged specific absorption rate (SAR) of 4 W/kg, as assessed by calorimetry for 15 minutes of MR scanning in a 3 Tesla Siemens Trio using software version VA25.

In non-clinical testing, the PowerLoc® Clear Safety Infusion Set produced a temperature rise of less than 1.4 °C at a maximum whole body averaged specific absorption rate (SAR) of 4 W/kg, as assessed by calorimetry for 15 minutes of MR scanning in a 3 Tesla Siemens Trio using software version VB15.

In non-clinical testing, the PowerLoc® MAX Safety Infusion Set produced a temperature rise of less than 1.6 °C at a maximum whole body averaged specific absorption rate (SAR) of 4 W/kg, as assessed by calorimetry for 15 minutes of MR scanning in a 3 Tesla Siemens Trio using software version VB15.

**Artifact Information**
- MR image quality may be compromised if the area of interest is within the distance, specified in the table below, to the position of the device. Therefore, it may be necessary to optimize MR imaging parameters for the presence of this metallic implant.

<table>
<thead>
<tr>
<th>PowerLoc® Safety Infusion Set Family</th>
<th>Image Artifact Distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerLoc® Safety Infusion Set</td>
<td>5.5 cm</td>
</tr>
<tr>
<td>PowerLoc® Clear Safety Infusion Set</td>
<td>6.0 cm</td>
</tr>
<tr>
<td>PowerLoc® MAX Safety Infusion Set</td>
<td>7.3 cm</td>
</tr>
</tbody>
</table>
TROUBLESHOOTING GUIDE

Aspiration Difficulties
Do not power inject if you cannot aspirate as patient injury may result.

A. Possible Causes
1. Failure to flush adequately, resulting in lumen obstruction.
2. Catheter tip sucking up to vein wall with aspiration.
3. Blood clot, fibrin sheath, or particulate matter obstructing lumen when catheter is aspirated.
   • A clot or other obstruction in the catheter lumen can produce a one-way valve effect. During infusion, the catheter wall expands slightly and allows fluid to flow around the plug. During aspiration, the catheter wall contracts slightly, tightening down around the obstruction and preventing aspiration.
   • Fibrin sheaths usually begin to form within a few days after the insertion of a central venous catheter. If it has grown enough to extend past the tip of the catheter, it may be pulled into and obstruct the catheter opening when aspiration is attempted, but no resistance to infusion.
4. Compression or transection of the catheter between the clavicle and first rib (“pinch-off area”).
5. Kinked catheter.
   • Catheter may be pulled too tight through skin tunnel, causing kink at vessel insertion site, or where it curves into the subcutaneous tunnel.
   • Catheter may be curled or kinked within the vessel, or under the dressing.
6. Malposition of catheter tip (i.e. jugular vein, outside of vein).
7. Improper catheter length selection for patient size.

B. Possible Solutions
1. If no resistance to infusion is felt, attempt to flush with 10 mL normal saline. Then pull back gently on syringe plunger 2-3 mL, pause and proceed with aspiration.
2. If resistance to infusion is felt, check for signs of extravasation. If present, notify physician of possible catheter leakage or transection and embolization. If not present, see step 4.
3. Attempt to aspirate with a 20 mL syringe (creates a greater vacuum).
4. Move patient’s arm, shoulder and head to see if a change in position will allow aspiration. If aspiration can only be accomplished with the patient in a certain position, the patient should be examined to see if the catheter has been placed in the “pinch-off” area. See step 5.
5. Obtain physician’s order for a chest X-ray to determine the position of the catheter.
   • If the catheter tip is not in the superior vena cava, the catheter should be repositioned.
   • If the catheter tip is not in a vein, the catheter should be replaced.
   • If the catheter has been placed through the “pinch-off” area, between the clavicle and the first rib, and is being compressed enough to interfere with infusion or aspiration, it is at risk for catheter transection and embolization. The physician should evaluate the patient for catheter replacement.

Patient with Fever and/or Infection

A. Symptoms:
   • Inflammation at incision site
   • Fever
   • Positive site culture and/or blood cultures

B. If signs of infection are present:
   • Notify physician

Insufficient Flow
Do not power inject if resistance to flushing seems excessive.

Excessive force must not be used to flush an obstructed lumen. Insufficient blood flow may be caused by the catheter contacting the wall of the vein or an occluding clot. The physician may attempt to dissolve the clot with a fibrinolytic agent before power injecting. Physician discretion advised.

Catheter Occlusion
Do not power inject an occluded device.

A. Possible Causes
2. May be kinked, coiled, damaged, or compressed between the clavicle and the first rib.
3. Catheter tip may not be within vein.
4. May be partially or completely transected. Transection can occur from the repeated pressure of the clavicle and the first rib on the catheter during normal movement if it is placed through the “pinch-off” area. (For subclavian placements only.)
5. Improper catheter length for patient size.

B. Possible Solutions
1. Ask responsible nurse or physician to attempt to aspirate blood clot.
2. Move patient’s arm, shoulder and head to see if position change affects ability to infuse. If so, see step 3 (could be pinch-off).
3. Obtain physician’s order for a chest x-ray to determine the position of the catheter.
   • Move patient’s arm, shoulder and head to see if position change affects ability to infuse.
   • If the catheter tip is not in the superior vena cava, the catheter should be repositioned.
   • If the catheter tip is not in a vein, the catheter should be replaced.
   • If the catheter has been placed through the “pinch-off” area, between the clavicle and the first rib, and is being compressed enough to interfere with infusion or aspiration, it is at risk for catheter transection and embolization. The physician should evaluate the patient for catheter replacement.
   • Alcohol should not be used to soak or declot polyurethane catheters because alcohol is known to degrade polyurethane catheters over time with repeated and prolonged exposure.
Signs of Pinch-off

Clinical:
- Difficulty with blood withdrawal
- Resistance to infusion of fluids
- Patient position changes required for infusion of fluids or blood withdrawal

Radiologic:
- Grade 1 or 2 distortion on chest X-ray.

Pinch-off should be evaluated for degree of severity prior to explantation. Patients indicating any degree of catheter distortion at the clavicle/first rib area should be followed diligently. There are grades of pinch-off that should be recognized with appropriate chest X-ray as follows:¹,²

<table>
<thead>
<tr>
<th>Grade</th>
<th>Severity</th>
<th>Recommended Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 0</td>
<td>No distortion</td>
<td>No action.</td>
</tr>
<tr>
<td>Grade 1</td>
<td>Distortion present without luminal narrowing</td>
<td>Chest X-ray should be taken every one to three months to monitor progression of pinch off to grade 2 distortion. Shoulder positioning during chest X-rays should be noted as it can contribute to changes in distortion grades.</td>
</tr>
<tr>
<td>Grade 2</td>
<td>Distortion present with luminal narrowing</td>
<td>Removal of the catheter should be considered.</td>
</tr>
<tr>
<td>Grade 3</td>
<td>Catheter transection or fracture</td>
<td>Prompt removal of the catheter.</td>
</tr>
</tbody>
</table>

Use of Fibrinolytic Agent for Catheter Blockage

Use of a fibrinolytic agent has successfully cleared clotted catheters when gentle irrigation and aspiration have failed. The instructions provided by the drug manufacturer should be followed.

REFERENCES


FURTHER READING

- See POWERPORT® Implantable Port IFU, POWERPORT® Implantable Port Nursing Guide, POWERPORT® Implantable Port Patient Guide, POWERLOC® Safety Infusion Set Family device IFU, and POWERLOC® Safety Infusion Set Family device wall chart for more details.

- Bard Peripheral Vascular is proud to offer “Your Port Access Advantage” patient education module for helping patients select their best access option.
- See www.powerportadvantage.com

See your Bard Peripheral Vascular Sales Representative for more information about any of these products.

An issued or revision date for these instructions is included for the user's information. In the event two years have elapsed between this date and product use, the user should contact Bard Peripheral Vascular, Inc. to see if additional product information is available.

Revised date: April 2014

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