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MC-0031-03 0712R

# power port<sup>\*</sup>

IMPLANTABLE PORT

FEEL THE NEW,  
STANDARD OF CARE<sup>\*</sup>



## Implanted Port System **Nursing Guide**



This product and package does not contain natural rubber latex



300 psi max

**BAIRD**

Access Systems

# *Table of Contents*

<b>Introduction</b>	<b>1</b>
<b>Important Information</b>	<b>2</b>
<b>Description</b>	<b>3</b>
<b>Indications for Use</b>	<b>4</b>
<b>Warnings</b>	<b>4</b>
<b>Precautions</b>	<b>5</b>
<b>Identifying a PowerPort* Port Patient</b>	<b>5</b>
<b>Possible Complications</b>	<b>6</b>
<b>Use and Maintenance</b>	<b>7</b>
Site Preparation	<b>7</b>
Accessing Implanted Ports	<b>8</b>
Bolus Injection Procedure Other Than Power Injection	<b>9</b>
Continuous Infusion Procedure	<b>10</b>
Blood Sampling Procedure	<b>12</b>
Heparin Lock Procedure	<b>13</b>
Determining Port Volumes	<b>14</b>
Recommended Flushing Volumes	<b>14</b>
<b>Power Injection Procedure</b>	<b>15</b>
<b>Troubleshooting Guide</b>	<b>17</b>
Aspiration Difficulties	<b>17</b>
Patient with Fever and/or Infection	<b>18</b>
Insufficient Flow	<b>19</b>
Catheter Occlusion	<b>20</b>
Signs of Pinch-off	<b>21</b>
Use of Fibrinolytic Agent for Catheter Blockage	<b>22</b>
<b>References</b>	<b>22</b>
<b>Further Reading</b>	<b>22</b>

## ***Introduction:***

Bard Access Systems' PowerPort\* power-injectable port not only facilitates infusions, but is the first port indicated for the power injection of contrast media for CECT scans.

Contrast enhanced computed tomography (CECT) scans are simple, safe and non-invasive procedures that provide quick and accurate diagnostic information to help track tumor markers or diagnose pulmonary embolisms, for example. The scans are many times more sensitive than conventional x-rays. Radiologists can distinguish small differences in soft tissues that may not be detected with x-rays.

Before performing a CECT scan, the CT team will inject a contrast agent, which is a special fluid that acts like a dye, into the patient to help produce clearer pictures during the CECT scan procedure. For best results, the contrast agent is infused at a high rate into your bloodstream. This process is called power injection.

Bard's PowerPort\* power-injectable port used with the PowerLoc\* Safety Infusion Set has the unique ability to allow clinicians to perform power-injected CECT scans without having to use peripheral I.V. needles.



## Important Information:

- A PowerLoc\* Safety Infusion Set must always be used to access the PowerPort\* implanted port for power injecting contrast media.



- 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 patency, via aspiration, then vigorously flush the PowerPort\* device using at least 10 ml of sterile normal saline prior to and immediately following the completion of power injection studies. It is important to ensure the patency of the PowerPort\* device to prevent damage to the catheter. Resistance to flushing may indicate partial or complete 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.

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

**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\* device:

PowerLoc* Safety Infusion Set Gauge Size	19 Ga.	20 Ga.	22 Ga.
PowerLoc* Safety Infusion Set Gauge Color	Cream	Yellow	Black
Maximum Flow Rate Setting	5 ml/sec	5 ml/sec	2 ml/sec

**Warning:** The PowerPort\* implanted 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\* device is only power injectable when accessed with a PowerLoc\* Safety Infusion Set.

## Description

The PowerPort\* Implanted 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 only. The PowerPort\* device consists of two primary components: an injection port with a self-sealing silicone septum and a radiopaque ChronoFlex\* polyurethane catheter. PowerPort\* implanted ports can be identified subcutaneously by feeling the top of the septum which includes three palpation points arranged in a triangle and by palpating the sides of the port, also in a triangular shape. All materials are biocompatible, can be used with virtually all injectable solutions and can be safely used with CECT.

## Indications For Use

The PowerPort\* Implanted 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 the PowerLoc\* Safety Infusion Set, the PowerPort\* device is indicated for power injection of contrast media. For power injection of contrast media, the maximum recommended infusion rate is 5 ml/s.

## Warnings

- 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.
- Intended for Single Patient Use. **DO NOT REUSE.** These Bard Access Systems, Inc. products 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 bio-hazard. Handle and discard in accordance with accepted medical practice and applicable local, state and federal laws and regulations.
- **The use of an infusion set other than PowerLoc\* Infusion Sets during power injection will lead to system failure and possibly patient injury.**
- **DO NOT USE A SYRINGE SIZE SMALLER THAN 10 ml. Prolonged 25 psi infusion pressure may cause damage to a patient's vessels and viscus, and therefore, is not recommended.**



## Precautions

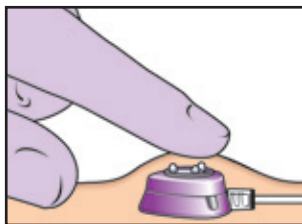
- Carefully read and follow all instructions prior to use.
- Follow Universal Precautions when accessing the port.
- Follow all warnings, precautions and instructions for all infusates as specified by their manufacturers.
- Precautions are intended to help avoid product damage and/or patient injury.
- 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 only non-coring needles with the port.

## Identifying a PowerPort\* Port Patient

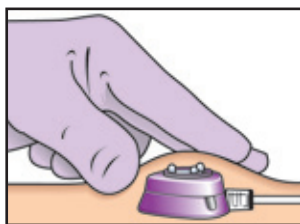
- Power-injectable ports can be distinguished from traditional ports through the following means:
  - Check patient's chart for a PowerPort\* port patient record sticker.



- Palpate sides of port to identify triangular port housing.
- Palpate top of port to identify three palpation points (bumps) on the septum, arranged in a triangle.



*Feel the soft top of the port to locate the three palpation points arranged as a triangle.*



*Feel the sides of the port to identify its unique triangle shape.*

- Request confirmation from the patient by asking them to show you the patient identification card, ID bracelet, or keychain they received when the port was implanted.



Keychain



Identification card



ID Bracelet

- Always verify the patient has a PowerPort\* port by at least two means and ensure they are accessed with a PowerLoc\* Infusion Set, prior to power injection.
- For additional guidance on recognizing a power injectable port / safety infusion set system, contact Bard's Clinical Information Hotline at 800-443-3385.

## Possible Complications

The use of a subcutaneous port provides an important means of venous access for critically ill patients. However, the potential exists for serious complications, including, but not limited to the following:

- Air Embolism
- Bleeding
- Brachial Plexus Injury
- Cardiac Arrhythmia
- Cardiac Tamponade
- Catheter or Port Erosion Through the Skin
- Catheter Embolism
- Catheter Occlusion
- Catheter Occlusion, Damage or Breakage due to Compression between the Clavicle and First Rib
- Catheter or Port related Sepsis
- Device Rotation or Extrusion
- Endocarditis
- Extravasation
- Fibrin Sheath Formation
- Hematoma
- Hemothorax
- Hydrothorax
- Intolerance Reaction to Implanted Device
- Inflammation, Necrosis, or Scarring of Skin Over Implant Area
- Laceration of Vessels or Viscus
- Perforation of Vessels or Viscus
- Pneumothorax
- Spontaneous Catheter Tip Malposition or Retraction
- Thoracic Duct Injury
- Thromboembolism
- Vascular Thrombosis
- Vessel Erosion
- Risks Normally Associated with Local or General Anesthesia, Surgery, and Post-Operative Recovery

These and other complications are well documented in medical literature.

## ***Use and Maintenance Instructions***

### **Site Preparation**

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

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

### **Equipment:**

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

### **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. Put on sterile gloves.
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.

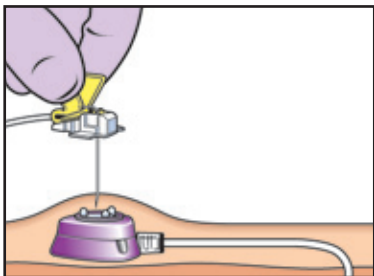
**Directions for the use of ChloroPrep\* pre-operative skin preparation:** Prepare the site with ChloroPrep\* One-Step Applicator Solution or according to institutional policy using sterile technique. “Pinch-Off” the wings on the ChloroPrep\* One-Step Applicator Solution to break the ampule and release 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 ml (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.

## Accessing Implanted Ports

### Equipment:

- Syringe
- If the port will be accessed for power injection, it must be accessed with a PowerLoc\* Safety Infusion Set. If not power injecting, it can be accessed with any non-coring safety needle. Choose a needle length based on reservoir depth, tissue thickness, and the thickness of any dressing beneath the bend of the needle.

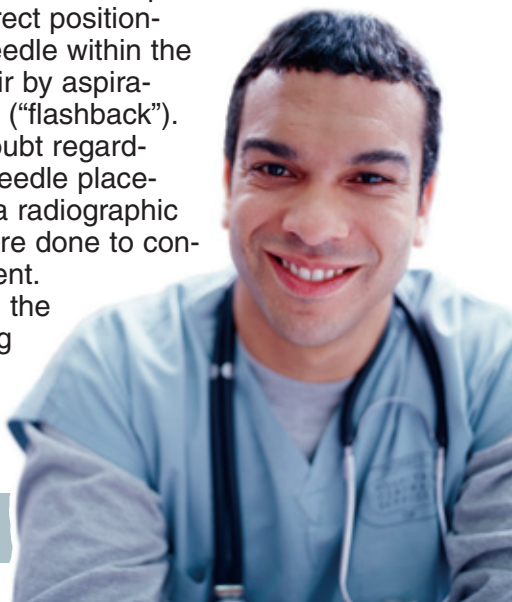


### Procedure:

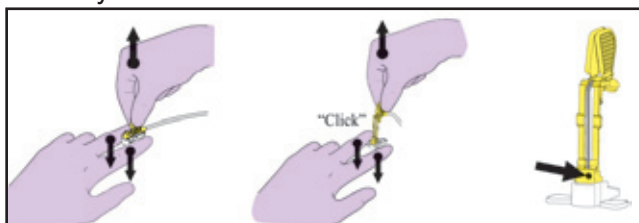
1. Perform aseptic site preparation.
2. Locate port septum by palpation.
  - a. Locate base of port with non-dominant hand.
  - b. Triangulate port between thumb and first two fingers of non-dominant hand. Aim for center point of these three fingers.



3. Insert PowerLoc\* Safety Infusion Set or other non-coring safety needle perpendicular to port septum. Advance needle through the skin and septum until reaching bottom of reservoir. Make certain that needle tip is inserted fully within the port.
4. Confirm correct positioning of the needle within the port reservoir by aspiration of blood ("flashback"). If there is doubt regarding proper needle placement, have a radiographic dye procedure done to confirm placement.
5. Always flush the port following injection.



6. Perform heparin lock procedure for open-ended catheters. **Caution:** Remember that some patients may be hypersensitive to heparin or suffer from heparin induced thrombocytopenia (HIT) and these patients must not have their port locked with heparinized saline
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. If using a PowerLoc\* safety infusion set, activate safety mechanism while withdrawing the needle until you feel a “click” at which time the needle should be captured within the safety mechanism of the PowerLoc\* safety infusion set.



## **Bolus Injection Procedure Other Than Power Injection**

### **Equipment:**

- PowerLoc\* Safety Infusion Set, or other non-coring safety needle. Choose a needle length based on reservoir depth, tissue thickness, and the thickness of any dressing beneath the bend of the needle.
- Syringe filled with sterile normal saline
- Extension set with clamp

### **Procedure:**

Review Site Preparation and Accessing Implanted Port sections before proceeding with this section.

1. Explain procedure to patient and prepare injection site. Remember to check patient's records, and ask patient, to determine whether they have any known allergies to chemicals or materials that will be used during the injection procedure.
2. Attach PowerLoc\* Safety Infusion Set or other non-coring safety needle to extension set and syringe filled with sterile normal saline. Expel all air and clamp extension.

3. Aseptically locate and access port. Confirm correct positioning of the needle within the port reservoir by aspiration of blood (“flashback”). If there is doubt regarding proper needle placement, have a radiographic dye procedure done to confirm placement.
4. Flush port with 10 ml sterile normal saline. Clamp the extension set and remove the syringe.
5. Connect syringe containing the drug to extension set. Release clamp and begin to administer injection.
6. Examine the injection site for signs of extravasation; if noted, immediately discontinue the injection and initiate appropriate intervention.
7. When the injection is completed, clamp the extension set.
8. Flush after each injection with 10 ml of sterile normal saline to help prevent interaction between incompatible drugs.
9. Flush port with 5 ml heparinized saline after every use and at least once every 4 weeks.
10. Remember that some patients may be hypersensitive to heparin or suffer from heparin induced thrombocytopenia and these patients must not have their port locked with heparinized saline.  
**Note:** The needle hub should not be left open to air while it is in the port. Do not manipulate the needle once it is in the septum.
11. 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.

### **Continuous Infusion Procedure**

**Caution:** DO NOT USE A SYRINGE SIZE SMALLER THAN 10 ml. **Prolonged** 25 psi infusion pressure may cause damage to a patient’s vessels and viscus, and therefore is not recommended.

### **Equipment:**

- Prescribed I.V. solution
- Extension set with clamp
- 10 ml syringe filled with sterile normal saline

- PowerLoc\* Safety Infusion Set, or other non-coring safety needle. Choose a needle length based on reservoir depth, tissue thickness, and the thickness of any dressing beneath the bend of the needle.
- I.V. pole
- I.V. pump (if ordered)
- Transparent dressing
- 2 in. x 2 in. (5 cm x 5 cm) gauze pads

### **Procedure:**

Review Site Preparation and Accessing Implanted Port sections before proceeding with this section.

1. Explain procedure to patient and prepare injection site. Remember to check patient's records, and ask patient, to determine whether they have any known allergies to chemicals or materials that will be used during the injection procedure.
2. Attach PowerLoc\* Safety Infusion Set or other non-coring safety needle to extension set and syringe filled with sterile normal saline. Expel all air and clamp the extension set.
3. Aseptically locate and access port. Confirm correct positioning of the needle within the port reservoir by aspiration of blood ("flashback"). If there is doubt regarding proper needle placement, have a radiographic dye procedure done to confirm placement.
4. Secure needle with transparent dressing to help prevent inadvertent dislodgement. **Note:** For continuous access, change non-coring needle and transparent dressing every week.
5. Open clamp and flush port with sterile normal saline. Clamp extension set and remove syringe.



6. Connect fluid delivery system (I.V. set or infusion pump as indicated). **Note:** Always use luer lock connections on all tubings and connections. Never use a slip tip connection. Pumps must incorporate a functional automatic pressure limiting switch which will shut pump off before pressure exceeds 25 psi.
7. Release clamp and initiate infusion. Examine the infusion site for signs of extravasation; if noted, or if patient experiences pain, immediately discontinue infusion and initiate appropriate intervention.
8. When infusion is completed, clamp extension set and then remove the fluid delivery system.
9. Flush after each infusion with 10 ml sterile normal saline to help prevent interaction between incompatible drugs.
10. Flush port with 5 ml heparinized saline after every use and at least once per 4 weeks. Remember that some patients may be hypersensitive to heparin or suffer from heparin induced thrombocytopenia (HIT) and these patients must not have their port locked with heparinized saline. **Note:** The needle hub should not be left open to air while it is in the port. Do not manipulate the needle once it is in the septum.
11. 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.

## Blood Sampling Procedure

### Equipment:

- Extension set with clamp
- PowerLoc\* Safety Infusion Set or other non-coring safety needle. Choose a needle length based on reservoir depth, tissue thickness, and the thickness of any dressing beneath the bend of the needle.
- Syringe filled with sterile normal saline
- Syringe (2) or evacuated blood collection vials (2)
- Sterile normal saline

**Procedure:**

Review Site Preparation and Accessing Implanted Ports sections before proceeding with this section.

1. Explain procedure to patient and prepare injection site.
2. Aseptically locate and access port with PowerLoc\* Safety Infusion Set or other non-coring safety needle. Confirm correct positioning of the needle within the port reservoir by aspiration of blood (“flashback”). If there is doubt regarding proper needle placement, have a radiographic dye procedure done to confirm placement.
3. Flush port with sterile normal saline.
4. Withdraw at least 5 ml of blood and discard syringe.
5. Aspirate desired blood volume into second syringe or evacuated blood collection system.
6. Once sample is obtained, perform saline lock procedure by immediately flushing the system with 20 ml of sterile normal saline.
7. Transfer sample into appropriate blood sample tubes.
8. Perform heparin lock procedure. Remember that some patients may be hypersensitive to heparin or suffer from heparin induced thrombocytopenia (HIT) and these patients must not have their port locked with heparinized saline.
9. 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.

**Heparin Lock Procedure for Open-Ended Catheters**

To help prevent clot formation and catheter blockage, implanted ports with open-ended catheters should be flushed with 10 ml sterile normal saline using a turbulent push-pause flushing method after each use followed by 5 ml of heparinized saline. Clamp the tubing while infusing the last 0.5 ml of fluid to reduce potential for blood back-flow into the catheter tip, which could encourage catheter clotting. If the port remains unused for long periods of time, the 5 ml heparin solution should be changed

at least every four weeks. **Caution:** Remember that some patients may be hypersensitive to heparin or suffer from heparin induced thrombocytopenia (HIT) and these patients must not have their port locked with heparinized saline.

### Determining Port Volumes

For PowerPort\* implanted ports, you will need to check the patient's chart to determine the length of catheter used for each individual patient. For PowerPort\* implanted port catheters, multiply the catheter length in cm by 0.02 ml, then add 0.6 ml for the port reservoir:

#### Example:

Catheter length: \_\_\_\_\_ cm x 0.02 ml/cm + 0.6 ml (port septum) = \_\_\_\_\_ ml volume, total priming volume for patient port and catheter.

### Recommended Flushing Volumes:

FLUSHING VOLUMES - Open-Ended Catheters	
PROCEDURE	VOLUME (100 U/ml)
When port not in use	5ml heparinized saline every 4 weeks
After each infusion of medication or TPN	10ml sterile normal saline then 5ml heparinized saline
After blood withdrawal	20ml sterile normal saline then 5ml heparinized saline
After power injection of contrast media	10ml sterile normal saline then 5ml heparinized saline

### Equipment:

- PowerLoc\* Safety Infusion Set, or other non-coring safety needle. Choose a needle length based on reservoir depth, tissue thickness, and the thickness of any dressing beneath the bend of the needle.
- 10 ml syringe filled with sterile heparinized saline (100 U/ml)

**Note:** Other concentrations of heparinized saline (10 to 1000 U/ml) have been found to be effective. Determination of proper concentration and volume should be based on patient's medical condition, laboratory tests, prior history and doctors orders.

- **Note:** Alcohol should not be used to soak or de clot polyurethane catheters because alcohol is known to degrade polyurethane catheters over time with repeated and prolonged exposure.

## Procedure:

Review Site Preparation and Accessing Implanted Port sections before proceeding with this section.

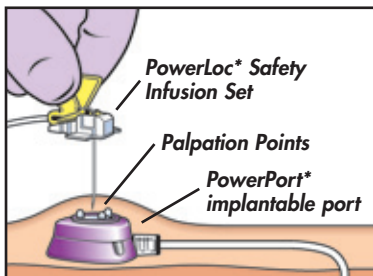
1. Perform aseptic site preparation.
2. Locate port septum by palpation.
  - a. Locate base of port with non-dominant hand.
  - b. Triangulate port between thumb and first two fingers of non-dominant hand. Aim for center point of these three fingers.
3. Insert needle perpendicular to port septum. Advance PowerLoc<sup>®</sup> Safety Infusion set through the skin and 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. **Caution:** Remember that some patients may be hypersensitive to heparin or suffer from heparin induced thrombocytopenia and these patients must not have their port locked with heparinized saline.
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. If using a PowerLoc<sup>®</sup> safety infusion set, activate safety mechanism while withdrawing the needle until you feel a “click” at which time the needle should be captured within the safety mechanism of the PowerLoc<sup>®</sup> safety infusion set.

## Power Injection Procedure

1. Access the port with a PowerLoc<sup>®</sup> Safety Infusion Set. Make certain that needle tip is inserted fully within the port.

### Warning:

A PowerLoc<sup>®</sup> Safety Infusion Set must always be used to access the PowerPort<sup>®</sup> implanted port for power injecting contrast media.



**Note:** Follow institutional protocol to verify correct catheter tip position prior to power injection.

2. Attach a syringe filled with sterile normal saline.
3. Instruct the patient to assume the position they will be in during the power injection procedure, before checking for patency. Aspirate for adequate blood return and vigorously flush the port with at least 10 ml of sterile normal saline.  
**Warning:** Failure to ensure patency of the catheter prior to power injection studies may result in port system failure.
4. Detach syringe.
5. After confirming the presence of a PowerPort\* device and confirming patency, affix PowerLoc\*'s safety infusion set purple sticker to the PowerLoc\* safety infusion set to inform CT that a power-injectable system is in place.
6. Warm contrast media to body temperature.  
**Warning:** Failure to warm contrast to body temperature prior to power injection may result in port system failure.
7. 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.
8. Attach the power injection device to the PowerLoc\* safety Infusion Set ensuring connection is secure. All connections should be luer lock connections.

**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\* device:

PowerLoc* Safety Infusion Set Gauge Size	19 Ga.	20 Ga.	22 Ga.
PowerLoc* Safety Infusion Set Gauge Color	Cream	Yellow	Black
Maximum Flow Rate Setting	5 ml/sec	5 ml/sec	2 ml/sec

9. 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:** Exceeding the maximum flow rate may result in port system failure and/or catheter tip displacement.

10. Disconnect the power injection device. Always flush port following power injection with 10 ml of sterile normal saline followed by 5 ml heparinized saline.
11. Perform heparin lock procedure for open-ended catheters. **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 heparinized saline.
12. 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. Pull the PowerLoc\* safety infusion set top wings away from lower wings until you feel a click, at which time the needle should be captured within PowerLoc\* safety mechanism.

## ***Troubleshooting Guide***

### **I. 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 beyond the tip of the catheter, it may be pulled into and obstruct the catheter opening when aspiration is attempted, but not resist 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.
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.
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.

## **II. Patient with Fever and/or Infection:**

### **Symptoms:**

- Inflammation at incision site
- Fever
- Positive site culture and/or blood cultures

### **If signs of infection are present:**

- Notify physician

### III. 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.

#### Equipment:

- PowerLoc\* Safety Infusion Set, or other non-coring safety needle. Choose a needle length based on reservoir depth, tissue thickness, and the thickness of any dressing beneath the bend of the needle.
- Syringe containing port priming volume of a fibrinolytic agent.
- Syringe filled with sterile normal saline.

#### Procedure:

Review Site Preparation and Accessing Implanted Ports sections before proceeding with this section.

1. Explain procedure to patient and prepare injection site.
2. Aseptically locate and access the desired septum with needle attached to syringe, void of air and filled with port priming volume of fibrinolytic agent. **Warning:** If accessing a PowerPort\* port with PowerLoc\* Safety Infusion Set do not affix the PowerLoc\* Safety Infusion Set sticker that indicates the system can be power injected. Power injecting a blocked catheter could lead to catheter damage and patient injury.
3. Gently instill fibrinolytic solution. Use a gentle pull-push action on the syringe plunger to maximize solution mixing within port and catheter. **Warning:** Occluded catheters may not accept all of the solution. If strong resistance is felt, do not attempt to force into catheter.
4. Leave solution in place according to drug manufacturers recommendation and/or doctor's orders.
5. Attempt to aspirate solution and the clot(s).
6. If the clot(s) cannot be aspirated, repeat procedure.
7. Once the blockage has been aspirated and discarded, flush catheter with at least 20 ml of sterile normal saline.

8. Flush the catheter with 5 ml of heparinized saline. Remember that some patients may be hypersensitive to heparin, or suffer from heparin induced thrombocytopenia (HIT). These patients must not have their ports flushed with heparinized saline.
9. 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.

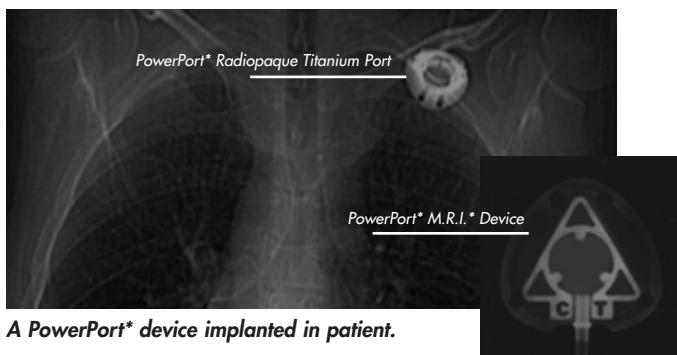
## **I.V. Catheter Occlusion: DO NOT POWER INJECT AN OCCLUDED DEVICE**

### **A. Possible Causes**

1. Blood clot completely obstructing lumen.
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.
5. Improper catheter length for patient size.
6. Catheter can be blocked from lipid and/or protein deposition.

### **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.
3. Obtain physician’s order for a chest x-ray to determine the position of the catheter to rule out “Pinch-off”. The patient’s arms should be down the patient’s side to rule out “Pinch-off” syndrome.



- 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.

## V. 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: <sup>2,3</sup>

Grade	Severity	Recommended Action
Grade 0	No distortion	No action.
Grade 1	Distortion present <b>without</b> luminal narrowing	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.
Grade 2	Distortion present <b>with</b> luminal narrowing	Removal of the catheter should be considered.
Grade 3	Catheter transection or fracture	Prompt removal of the catheter.

## VI. 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.

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.

## References

1. Bard Access Systems; "Your Port Access Advantage: What Patients and Nurses Say About Ports", 2005, 0710420.
2. Hinke, D.H.; Zandt-Stastny, D.A.; Goodman, L.R.; et al. Pinch-off Syndrome: A complication of implantable subclavian venous access devices. *Radiology* 177: 353-356, 1990.
3. Ingle, Rebecca,; Nace, Corinne, Venous Access Devices: Catheter Pinch-off and Fracture, 1993, Bard Access Systems, Inc.
4. Venousaccess.com
5. www.nursingcenter.com
6. Camp-Sorrell, Dawn; "Access Device Guidelines: Recommendation for Nursing Practice and Education." 2004

## Further Reading

- See PowerPort\* port instructions for use, PowerPort\* port CT Guide and/or PowerPort\* port Patient Guide for more details
- Bard Access Systems is proud to offer "Your Port Access Advantage"\* patient education module for helping patients select their best access option. See [www.portadvantage.com](http://www.portadvantage.com) for more details.
- See [www.powerportadvantage.com](http://www.powerportadvantage.com)




See a Bard Access Systems 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 Access Systems, Inc. to see if additional product information is available.

Revised date: November 2007

 Contrast Enhanced Computed Tomography Information

This product and package does not contain natural rubber latex.

 This device does not contain DEHP

 **MR Conditional**

Non-clinical testing has demonstrated the device is

MR Conditional. It can be scanned safely under:

- static magnetic field of 3 Tesla or less
- spatial gradient field of 330 Gauss/cm or less
- maximum specific absorption rate (SAR) of 6 W/kg for 30 minutes of scanning.

In non-clinical testing, the device produced a temperature rise of less than 0.5 °C at a maximum specific absorption rate (SAR) of 6 W/kg for 30 minutes of MR scanning in a 3T Siemens Trio with software version VA25.

For Minimal Image artifact

- MR image quality may be compromised if the area of interest is in the same area or relatively close to the position of the device. Therefore, it may be necessary to optimize MR imaging parameters for the presence of this metallic implant.



