

feel and see the
standard of care*

Power Port^{*}
IMPLANTABLE PORT

Power Loc^{*}
Safety Infusion Set Family

CT Guide

BARD
ACCESS SYSTEMS



Table of Contents

Power Injection

Important Information For Power Injection	1
Power-Injection Checklist	2
Power-Injectable Port & Needle Identification	2
Power Injection Procedure	4

PowerPort* Device

Description - PowerPort* Implantable Port	5
Indications For Use	6
Warnings	6
Precautions	7
Use & Maintenance Instructions	7
Accessing Implantable Ports	8
MRI Scans	9

PowerLoc* Safety Infusion Set Family† Devices

Description - PowerLoc* Safety Infusion Set Family† Devices	9
Indications For Use	9
Contraindications	9
Insertion	10
Removal	11
MRI Scans	12

Troubleshooting Guide

Troubleshooting Guide	12
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References

References	15
Further Reading	15

Power Injection

Important Information For Power-Injection

- A PowerLoc* Safety Infusion Set Family† device (SIS) 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* device 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* device 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* device.

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

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

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

Warning: If local pain, swelling or signs of extravasation are noted, the injection should be stopped immediately.

Warning: The PowerPort* device 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.

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* devices can be distinguished from non-power injectable ports through the following means:

- Patient implant record
 - Check patient's chart for a PowerPort* device patient record sticker

A. Patient Chart



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

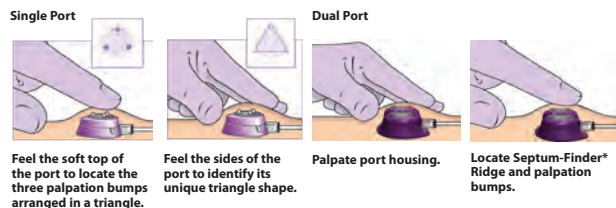
B. ID Items



† PowerLoc*, PowerLoc* Clear, and PowerLoc* MAX Safety Infusion Sets (SIS)

- 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.

C. Port Palpation



- 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 aid in identification of a flipped port with reduced artifact.

D. Radiopaque Identifier*



Single Lumen MRI Symbol Single Lumen Titanium Symbol Dual Lumen Symbol

- 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*/PowerLoc* system.

E. Verification Tag for the PowerLoc* Safety Infusion Set Family† needle



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

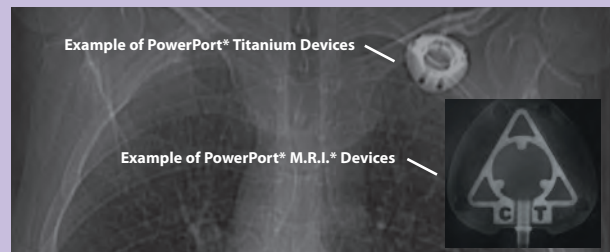
Note: If a patient does not have a PowerPort* device, the sticker must not be used, as it could lead to power injecting through a non-power port.

For additional assistance on recognizing a power injectable port/infusion set system, contact Bard's Clinical Information Hotline at 800-443-3385.

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.



A PowerPort* device implanted in patient.

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-end† 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:

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

12. Disconnect the power injection device.
13. Flush the PowerPort* device with 10 mL of sterile normal saline. For dual lumen PowerPort* devices 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 heparinized saline.

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* Device

Description - PowerPort* Implantable Port

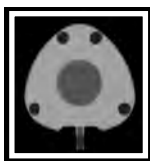
The PowerPort* Implantable Port is an implantable access device designed to provide repeated access to the vascular system. Port access is performed by percutaneous needle insertion using a non-coring needle. [Power injection is performed using a PowerLoc* Safety Infusion Set Family† device only.](#) The PowerPort* device 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* device's triangular shape and/or radiopaque identifier (CT marker) may also be visible under X-ray.



PowerPort* isp
Titanium Device



PowerPort*
Titanium Device



PowerPort*
M.R.I.* Device



PowerPort*
Titanium Device
with CT Marker



PowerPort* duo M.R.I.*
Device

The unique radiopaque identifier featured on the PowerPort* devices aide in identification of a flipped port.



PowerPort* duo M.R.I.*
Flipped Device



PowerPort*
M.R.I.* Flipped
Device



PowerPort*
Titanium Device
with CT Marker
(Flipped)

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* 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

- Intended for Single Patient Use. DO NOT REUSE. Bard Access Systems, 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.** Flushing 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* device.

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

- The PowerPort* device 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 Family† device.

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 ChloroPrep* preoperative 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* 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.

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* devices:

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 Groshong* catheters, a sterile normal saline lock may be used.](#)

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.

Procedure for dual lumen PowerPort* devices:

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 the device is MR conditional. It can be scanned safely under:

- Static magnetic field of 3 tesla or less
- Maximum specific absorption rate (SAR) of 4 W/kg for 30 minutes of scanning
- Spatial gradient field of 330 Gauss/cm or less

In non-clinical testing, the PowerPort* device produced a temperature rise of less than 0.5°C at a maximum specific absorption rate (SAR) of 4 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.

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* device. All PowerLoc* Safety Infusion Set Family† devices have been tested and verified for power injection with PowerPort* devices.
- 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* device:** A Bard PowerPort* device can be identified by any two of the following methods: Palpation bumps, triangular shape, radiopaque CT identifier, PowerPort* device patient ID card or PowerPort* device 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.
- Vigorously flush the device using a 10 mL or larger syringe and sterile normal saline prior to and immediately following the completion of power injection studies.
- The PowerLoc* Safety Infusion Set Family† device indication for power injection of contrast media implies the ability of the system 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.

Insertion

1. Prepare the port site for sterile accessing following institutional protocol.
2. Prime infusion set using aseptic technique following institutional protocol.

† PowerLoc*, PowerLoc* Clear, and PowerLoc* MAX Safety Infusion Sets

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.

PowerLoc* Device



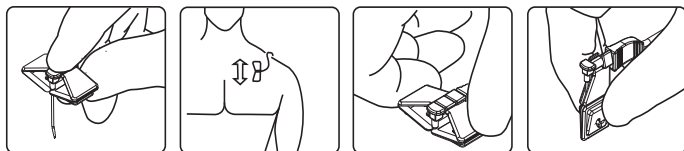
Access: Insert needle perpendicular to the port septum. Note: It is not necessary to push downward on front of device while accessing the port.

Orient wings in single or dual ports as shown.

Deaccess: Firmly pull the wings up until you hear or feel a "click".

Safe: Visually observe the orange dot. Dispose of set in a sharps container.

PowerLoc* Clear Device



Access: Grasp grip area between thumb and middle finger. Press down with index finger.

Orient wings in single or dual ports as shown.

Deaccess: Grasp wing edges with thumb and inside knuckle of index finger, lift and squeeze until you hear, see, or feel a "click".

Safe: Dispose of set in a sharps container.

PowerLoc* MAX Device



Access: Insert needle perpendicular to the port septum. Note: The textured handle and base are not connected. You may position the base on the skin as needed.

Orient wings in single or dual ports as shown.

Deaccess: Firmly pull the textured handle up until you feel a firm stop and the needle is locked in the safety position.

Safe: Dispose of set in a sharps container.

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.

MRI Scans



MR Conditional

Non-clinical testing has demonstrated the devices are MR conditional. They can be scanned safely under:

- Static magnetic field of 3 tesla or less
- Maximum specific absorption rate (SAR) of 4 W/kg for 15 minutes of scanning
- Spatial gradient field of 360 Gauss/cm or less

In non-clinical testing, the **PowerLoc*** device 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** device 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** device 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.

For Minimal Image Artifact

- 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.

PowerLoc* Family Device	Image Artifact Distance
PowerLoc*	5.5 cm
PowerLoc* Clear	6.0 cm
PowerLoc* MAX	7.3 cm

Troubleshooting Guide

1. 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.

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.

IV. 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. (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 de clot polyurethane catheters because alcohol is known to degrade polyurethane catheters over time with repeated and prolonged exposure.

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: ^{1,2}

Grade	Severity	Recommended Action
Grade 0	No distortion	No action.
Grade 1	Distortion present without 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 with 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.

References

1. 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.
2. Ingle, Rebecca; Nace, Corinne. "Venous Access Devices: Catheter Pinch-off and Fracture." 1993, Bard Access Systems, Inc.
3. Camp-Sorrell, Dawn. "Access Device Guidelines" 2nd Edition Oncology Nursing Society, 2004.

Further Reading

- See PowerPort* device IFU, PowerPort* device Nursing Guide, PowerPort* Patient Guide, PowerLoc* Safety Infusion Set Family† device IFU, and PowerLoc* Safety Infusion Set Family† device wall chart 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.powerportadvantage.com

See your 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: December 2009

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CT Contrast Enhanced Computed Tomography Information

This product and packaging do not contain natural rubber latex

This device does not contain DEHP

BARD

ACCESS SYSTEMS



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