WARNING

DO NOT remove the injection portal.

DO NOT change the caps.

ALWAYS use povidone iodine ointment for the threads on the cap.

DO NOT use povidone iodine liquid or alcohol on the threads.
Use of Hickman Catheters for Intraarticular Administration of Antibiotics

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Use of Hickman catheters to administer antibiotics intra-articularly for treatment of a septic total joint arthroplasty produces a direct route to a joint, so special care must be taken to avoid injection of contaminants or microbes. We thoroughly instruct both the patient and participating health care professionals of the importance of following strict precautions in the care and use of the catheters to prevent problems.

☐ Directions for insertion of Hickman catheters:

**Hickman Catheter Description:**

We use *BARD* Hickman catheters with clamps near the end. These clamps prevent fluids from escaping through the portals secondary to the pressure changes that occur in the joint as it moves.

A spring-loaded, plunger-type portal for injection is applied to the end of the catheter to accept a Luer-Lok syringe for antibiotic injection. This portal component is the same type used as the adaptor valve to hepleock an IV (Alaris Medical Systems, Inc. #2000E). The portal component is coated with betadine ointment and applied in surgery and **never** should be removed. It is covered with a male/female Luer-Lok Cap (#70804) end-cap which is removed to inject antibiotics.

The end-cap should always be in place when antibiotics are not being administered.

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Procedure:
We always insert two catheters in case one is lost to a mishap. These are placed within a couple of centimeters from each other. To insert a Hickman catheter, a Burlisher clamp is passed from inside the joint and through the muscle, laterally. The clamp is used to tent the skin. A small nick is made over the tented skin to allow the clamp to exit (figure A). This incision through the epidermis is small to minimize the chance of local infection and fluid back-tracking around the catheter. While protruding from the skin, the Burlisher should grasp the tubular end of the catheter, which is then pulled into the joint (figure B).

Another way to insert the Hickman catheter is to attach it to a trocar from the 1/8th inch Hemovac set. This is passed from outside to inside the knee and the catheter is pulled into the knee. The fluffy, tissue ingrowth cuff on the catheter should be seated under the dermis, about 5mm into the subcutaneous tissue.

Usually a Burlisher clamp must be reinserted from the outside around the catheter and spread just a little to make the opening big enough to allow the cuff to pass under the skin. The rest of the tube should be placed directly into the joint, with a length of four to five centimeters in the joint. Be careful not to leave too much catheter in the joint because the tube can become trapped where the components articulate.
The Hickman catheters are held in place, initially, with the use of silk sutures sewn to the skin. Use two sutures to secure each catheter (one on each side of the cath.) so the Hickmans will not move around and leak. We release these sutures from the skin two to three weeks post-op, but do not try to remove them from the catheters themselves (to avoid damaging the catheters).

The catheters are flushed intraoperatively after being secured to the skin to ensure that the tubes are patent and that no leaks are present. A generous dollop of Betadine ointment is placed over each tube entry site, and then the entire site is covered with a gauze dressing. Betadine ointment also is placed over the portal sites before the end-caps are applied. The Hickmans should not be incorporated into the surgical wound dressing so as to minimize the chance of cutting the catheters when removing the dressings.

**Therapy:**
Antibiotic incompatibility can be a problem resulting in crystal precipitation into the joint and subsequent irritation, so the IV antibiotics given should be compatible with the antibiotics used intraoperatively in the irrigation AND those used for postoperative intraarticular therapy. For example, cephalosporins and vancomycin precipitate when mixed, and produce an inflammatory response. These two antibiotics should never be mixed in the wound or when infusing. For that reason, patients receiving IV cephalosporins should NOT receive intraarticular vancomycin, and vice versa. If there is a question regarding antibiotic compatibility, have your pharmacist mix the drugs together and allow to sit for a few days. If no precipitation occurs, then the mixture is good from that standpoint.

During the surgical debridement the wound is constantly irrigated with 3000 ml Sterile NS with Vancomycin 3 gm, Polymyxin B 100,000 Units, Bacitracin 100,000 Units.

We give one IV dose of a compatible antibiotic intraoperatively after deep tissue samples are taken. Then, the IV antibiotics are continued in a normal dosing pattern for 24 hours. The intraarticular antibiotics are started immediately post-op concurrently with the intravenous.
The largest fluid volume we use intra-articularly during each therapeutic injection is 5cc except in rare cases of antifungal agents, which must be infused with larger volumes. We never inject any substance other than antibiotics to reduce the chance of introducing infectious materials. **The catheters are not flushed with saline after injection of the antibiotics.** This is very important. The antibiotic should be left in the catheter to protect it from bacterial colonization.

- Example of antibiotic order: Vancomycin 400mg in 5cc of sterile NS intraarticular twice daily.

Do NOT mix a concentration of GREATER than 500mg vancomycin in 5cc sterile NS to avoid precipitation.

For potentially toxic medications (e.g. vancomycin) we check the serum **trough** daily until stable, then once weekly. We adjust the antibiotic dose to keep the trough at low-normal levels knowing that the intra-articular and surrounding tissues are receiving hundreds of times higher concentration than is recorded by the lab in the peripheral blood.

**Removal:**
The Hickman catheters are removed in the OR following six weeks of intraarticular antibiotic therapy. This is done under local anesthetic. An incision about 2cm long is necessary to remove the catheter. The fluffy ingrowth cuff then is carefully separated from the surrounding tissues using a knife or scissors. Care is taken not leave any of the fibrous cuff in the wound. Finally, the skin edges are excised after the tubes are removed. After removing the Hickmans the sites will drain joint fluid for a few hours, even after closure with silk simple interrupted sutures. Apply a bulky dressing with instructions on proper care so the patient can go home safely. The sutures are removed at two weeks.
Hickman Care Instructions:
We thoroughly instruct both the patient and participating health care professionals in the importance of following strict precautions to prevent problems. We post the following orders at the bedside while the patient is in the hospital, and we send them with the patient when they go home:

☐ Do NOT incorporate catheter tubes into dressing, to prevent inadvertently cutting when removing dressing.

☐ Clean the tube entry sites into the skin as needed, using sterile cotton tipped applicators (CTA) and 70% Isopropyl Alcohol. Employ aseptic techniques with minimal rubbing.

☐ Cover each tube entry site into the skin with a dollop of Betadine ointment, then cover with a 4X4 cotton sponge dressing. This can be changed every three or four days barring complications. Use triple antibiotic ointment on the skin if the patient is sensitive to Betadine. Betadine ointment is used on the caps even if the patient’s skin is sensitive to it.

☐ Alternate catheter use with each injection.

☐ A spring loaded, plunger-type portal tip should be used at all times on the Hickman catheters. These should never be removed unless they become clogged. Betadine ointment is applied over the threads of the injection portal, and a screw on end-cap is applied. Do not fill the cap with Betadine ointment to avoid clogging the injection portal component. If a portal component becomes clogged, it can be removed and replaced using sterile technique by a technician who is very familiar with the specific protocol of changing these devices.
TRAINED TECHNICIAN ONLY. Protocol for changing portal component. This should be done only if the component becomes clogged. First, the clamp is clamped down tightly. Then the clogged component is removed. A generous amount of Betadine ointment is applied to the threads of the Hickman catheter end. The new portal component is removed from its package and the thread protector is removed. The portal component is applied to the threaded end of the catheter and the tightened down firmly. Then the threads on the injection end are coated with a generous amount of Betadine ointment, the excess ointment is to be scraped from the top of the injection portal, and the cap is replaced.

To inject, remove the cap, attach the Luer-Lok syringe to the portal, then release the clamp and inject.

Inject antibiotic solution slowly to prevent precipitation of the antibiotic in the knee, then close the clamp.

Remove the syringe.

Apply a generous amount of Betadine ointment to the portal threads only and do not fill the cap. Scrape the excess ointment from the top of the injection portal. Replace the cap. Remember, Betadine ointment is to be used on the threads of the injection portal even if the patient’s skin is sensitive to Betadine.

After each antibiotic dose, apply a generous amount of fresh Betadine ointment over the portal threads and scrape the excess from the top before applying the screw on the end-cap.

Use aseptic techniques with the end-caps. If the inner surface of the cap is contaminated, then replace with new sterile caps, and always apply fresh Betadine ointment to the injection portal threads. Dropping the cap does not necessarily contaminate the inner surface of the cap. It can be used if it is still clean.
Ensure that the clamp at the distal end of the catheter is used inside the labeled area to prevent a tear in the catheter. Mark each catheter to distinguish one from the other (e.g.: “A”, “B”).

Do not allow catheter lines to hang freely from the leg. Tape the ends to the patient to prevent accidental removal.

Call immediately if drainage develops around the Hickman sites, the line becomes occluded, or a tear develops in the line (we D/C these lines immediately instead of taking the chance of secondary problems).