How to Make an Analgesic Wound Catheter

Materials needed:
- Ruler
- Scissors
- Polyethylene tubing (inner diameter, 0.03 inch [0.86 mm]; outer diameter, 0.05 inch [1.27 mm]; Intramedic [Becton Dickinson and Company, Sparks, MD] or red rubber catheter (5 French, 16 to 22 inches; not shown)
- Luer stub adapter (20 gauge)
- Match or lighter
- 3-ml syringe
- Hemostat (if a red rubber catheter is being used)
- Insulin syringe needle or 30-gauge needle
- Bacterial filter
- Injection port

Making the catheter:

Step 1: Measure and cut a piece of tubing to fit your needs (e.g., 1 ft [30 cm]) (Figure A).

Step 2: Place the Luer stub adapter at one end. This will be the “top” of the catheter. Seat the tubing as far as possible onto the adapter without any buckling. If the tubing buckles, it will usually leak later; therefore, remove the adapter, cut the catheter back a little, and start again.

Step 3: If using polyethylene tubing, light the lighter or match and quickly pass the “bottom” of the catheter (i.e., the end without the stub adapter) over the flame (Figure B). It does not take long to heat the tubing. Immediately pinch the heated end between two fingers to flatten and seal it. If using a red rubber catheter, clamp the bottom with a mosquito hemostat and heat the box-lock of the hemostat to melt the rubber and so seal the catheter.

Step 4: Test the seal just created by twisting the 3-ml syringe onto the stub adapter and trying to push air through the catheter. If the air leaks out, the bottom is not sealed well. Repeat step 3 until the bottom is completely sealed.

Step 5: Fenestrate the bottom end of the catheter over the desired length, using the insulin syringe or 30-gauge needle. For example, for a 1-ft catheter, start the fenestrations 3 inches (8 cm) from the bottom and work down to the bottom, staggering the holes about ⅛ inch (5 mm) apart. Push the needle “through and through” to create the holes (Figure C). Rotate the catheter as you create each hole so that the holes are not in a line along one side of the catheter. When properly made, the catheter will leak droplets of anesthetic along the entire working surface (Figure D).

Step 6: Sterilize the catheter (gas or ethylene oxide sterilization) and label it with the total length of the catheter and the length of the fenestrations (e.g., 1 ft [3 in]). If a red rubber catheter is used, the catheter can be made at the time of surgery using sterile technique; however, a naked flame must not be used near the oxygen supply.

Step 7: Before using the catheter, attach the bacterial filter and injection port to the stub adapter (Figure E).

Using the catheter:

- Place the catheter in the deepest layer of the wound, making sure to position a portion of it over any transected large nerves. The catheter can be held in place with loose suture loops, but it should not be anchored with sutures. It should exit from the most dorsal part of the wound or from near one end of a long horizontal incision.

- Close the wound and administer the entire dose of 0.25% bupivacaine (1 to 2 mg/kg), diluted to an appropriate volume (i.e., a volume that will allow the anesthetic to spread all through the wound, but not so much as to possibly create wound problems). Alternatively, lidocaine can be administered at a continuous rate using a bulb reservoir or syringe pump, although this technique has not been described in cats.41 The syringe pump or bulb reservoir may not be compatible with the bacterial filter.

- When the anesthetic is discontinued, remove the catheter.

Dosing regimen for bupivacaine:

- Initial dose: 1 mg/kg at least 6 hours after surgery.

- Subsequent doses: 1 mg/kg/dose (cats: 0.5 mg/kg) at 6–8-hour intervals for as long as needed (usually 1 to 3 days). If the interval is longer than 6 hours on day 1 or longer than 6 to 8 hours on day 2, the bupivacaine will sting. Minimize this effect by injecting a small amount (approximately 0.25–1 ml)
to numb the area slightly before proceeding with the rest of the injection.

**Possible concerns:**

- **Differential efficacy along wound:** This technique appears to be very efficacious. However, sometimes parts of the wound appear to be receiving less anesthetic than others. This may have to do with catheter placement or obstruction of fenestrations.

- **Obstruction of catheter:** Occasionally, the catheter becomes blocked. This can be minimized by passing a small amount of heparinized saline through the catheter after administering the local anesthetic.

- **Effect of repeated doses and volume on wound healing:** Clinically, we have not encountered any adverse effects.

- **Accumulation of bupivacaine:** We are currently evaluating blood samples to see if bupivacaine accumulates in the systemic circulation. We have not encountered any clinical adverse effects.