Peripheral nerve catheter techniques

William Harrop-Griffiths is Consultant Anaesthetist at St Mary’s Hospital, Paddington. His interests include regional and vascular anaesthesia.

The placement of a catheter in the sheath of a nerve plexus or close to a peripheral nerve allows the anaesthetist to provide continuous regional anaesthesia and analgesia. The main benefit to the patient is excellent analgesia that can be prolonged for days. The anaesthetist needs experience and expertise in single-shot peripheral nerve blocks, specialized equipment and the courage to fail.

Catheterization equipment

Currently available catheterization equipment is based on a ‘catheter through needle’ or ‘cannula over needle, catheter through cannula’ technique. Until recently, the latter technique prevailed. However, the introduction of equipment based on the passage of the catheter through an insulated Tuohy-tipped needle (Figure 1) will promote the catheter through needle technique. In most approaches to peripheral nerves, the needle inevitably forms an angle with the target nerve; no approach is completely parallel. For some approaches, such as the interscalene brachial plexus block or the Labat posterior approach to the sciatic nerve, this angle is nearly a right angle. The Tuohy tip of the block needle throws the catheter out at an angle as it emerges from the tip of the needle. This improves the success rate of catheterization.

Preparation for catheterization
The following are recommended:
- full explanation for the patient, including the risks and benefits of the planned technique
- intravenous access and appropriate monitoring
- full aseptic technique
- plenty of time (catheters are often difficult to place and time pressure makes things more difficult).

General principles
- Use a technique with which you are familiar. If you are good at axillary blocks but seldom perform vertical infraclavicular blocks, choose the former approach for catheterization.
- Needles used for catheterization are generally larger than those used for single-shot blocks. Making a hole in the skin with a No 11 scalpel blade or a 19 G hypodermic needle aids the passage of the needle through the patient’s skin.
• Move the needle slowly and be particular about getting it in the right place. Use strict current criteria if using a nerve stimulator and do not accept thresholds that are higher than your usual target. Successful catheterization depends on being exactly in the right place.
• Consider injecting fluid down the needle before passing the catheter because it often aids the passage of the catheter. This can be the local anaesthetic solution with which you plan to initiate the block. However, if you do this, it will be difficult to confirm the correct position of the catheter (see below).
• To keep the catheter in place and run a successful postoperative infusion, secure the catheter firmly with any combination of adhesive tape, sutures, dressings and catheter clamps. Also ensure that the ward nurses have been trained in the postoperative care of the catheter and are familiar with the infusion equipment and the potential complications of the technique.

Confirmation of correct placement
• You can use ‘feel’. In the same way that you know when you have placed an epidural catheter correctly, with experience you acquire the same feel for peripheral nerve catheters.
• If local anaesthetic has not been injected before catheter insertion, and a successful block results from its injection, the catheter must be correctly positioned.
• If you use a stimulating catheter it is possible to connect the nerve stimulator to it and, by eliciting the appropriate muscle contractions, confirm that the catheter is in the correct place.

Drugs and doses
Any local anaesthetic or combination of local anaesthetics, with or without adjuncts, can be infused down a catheter. However, many continuous regional anaesthetists now favour plain ropivacaine 0.2%. For most peripheral catheter locations in adult patients a background infusion rate of 6–10 ml/hour can be used with additional patient-requested boluses (optional) of 3–5 ml with a lockout period of 30 minutes.

The future
The development of disposable elastomeric pumps will simplify the management of catheter infusions and allow the extension of the use of continuous regional analgesia into the home setting. ◆