Continuous peripheral nerve blocks for postoperative pain

Continuous peripheral nerve block was first described in 1946 as a means of prolonging brachial plexus block for upper limb surgery, involving a needle through a cork which was taped to the patient. The indications (and fixation methods) have since evolved to current use in hospital and at home for acute, chronic and cancer pain. This article explores its benefits and drawbacks.

The case for

Single-shot peripheral nerve blocks are limited by their duration of action and rebound pain. High concentrations and volumes are often required, with consequent effects on motor function and undesirably dense sensory block. Continuous peripheral nerve blocks enable lower concentrations and volumes.

Continuous peripheral nerve blocks enhance postoperative function, from respiratory mechanics to joint mobility, promoting earlier mobilization and discharge. They provide superior analgesia to patient-controlled analgesia (Richman et al, 2006), wound and intra-articular catheters, the latter causing chondrolysis. Patients are more amenable to rehabilitation, and their opioid-sparing effect reduces the incidence of nausea, pruritis and sedation, with patients reporting better sleep and satisfaction.

Continuous peripheral nerve blocks offer a safe alternative to central neuraxial blocks such as epidurals. By dampening the stress response and avoiding sedative opioids, they are especially useful in complex patients with multiple comorbidities.

Moderate to severe pain is reported by up to 70% of inpatients, and 40% of ambulatory cases. Significant postoperative pain predicts development of chronic post-surgical pain; continuous regional techniques may halt the development of neuropathic pain (Andreae and Andreae, 2012). This is supported by paravertebral infusions, where patients reporting post-mastectomy pain at 12 months reduced from 47% to 13% (Ilfeld et al, 2015).

Ambulatory catheters reduce the rate of readmission as a result of pain, and are extensively used in paediatric practice.

The case against

Peripheral nerve catheters are associated with neurological complications, ranging from a nuisance (transient paraesthesia) to life-changing (paraplegia and death). Serious complications are rare, but ever present.

Neurological complications caused by traumatic or chemical damage with continuous peripheral nerve blocks are comparable to single shot techniques. The incidence ranges from 0–1.4%, 0.2% at 6 weeks and 0.07% at 9 months (Ilfeld, 2011). Those with pre-existing neuropathies are at increased risk.

A continuous peripheral nerve block may mask surgical complications such as compartment syndrome, although it does not prevent breakthrough pain (Walker et al, 2012). It may adversely affect motor function, for instance quadriceps weakness with femoral nerve catheters, hindering mobilization and increasing the risk of falls. Diaphragmatic weakness accompanying interscalene catheters is detrimental in respiratory conditions; indeed, patient-reported dyspnoea is common (27%) with ambulatory catheters.

Bacterial colonisation is very common with continuous peripheral nerve block catheters (Ilfeld, 2011), although it rarely leads to sepsis. There is an increased risk in immunocompromised patients, diabetics, males, catheters >48 hours duration, trauma and the intensive care environment and where perioperative antibiotics are not used.

Local anaesthetics systemic toxicity and cytotoxicity remain inherent risks.

Considerable skill is required to site continuous peripheral nerve block catheters, as evident by multiple reports of misplacements, some with catastrophic consequences (Yanovski et al, 2012), and a high rate of secondary block failure. Catheter-related problems include inadvertent removal, dislodgement and maybe migration. Catheters may rupture, kink, knot, loop and get entrapped, occasionally requiring surgical extraction or retention.

Conclusions

Continuous peripheral nerve blocks are effective for the control of postoperative pain in hospital and at home. With appropriate infrastructure and patient selection, they can supplement, and even surpass, conventional analgesic regimens. However, they are not without risks, so patient-specific risks, benefits and preferences govern practice. **BJHM**

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