

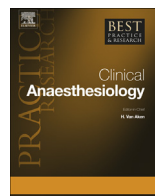


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Peripheral nerve catheters and local anesthetic infiltration in perioperative analgesia



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Abstract: Peripheral nerve catheters (PNCs) and local infiltration analgesia (LIA) represent valuable options for controlling perioperative pain. PNCs have been increasingly utilized to provide both surgical anesthesia and prolonged postoperative analgesia for a wide variety of procedures. PNCs can be more technically challenging to place than typical single-injection nerve blocks (SINB), and familiarity with the indications, contraindications, relevant anatomy, and appropriate technical skills is a prerequisite for the placement of any PNC. PNCs include risks of peripheral nerve injury, damage to adjacent anatomic structures, local anesthetic

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toxicity, intravascular injection, risks associated with motor block, risks of unnoticed injury to the insensate limb, and risks of sedation associated with PNC placement. In addition to these common risks, there are specific risks unique to each PNC insertion site. LIA strategies have emerged that seek to provide the benefit of targeted local anesthesia while minimizing collateral motor block and increasing the applicability of durable local anesthesia beyond the extremities. LIA involves the injection and/or infusion of a local anesthetic near the site of surgical incision to provide targeted analgesia. A wide variety of techniques have been described, including single-injection intraoperative wound infiltration, indwelling wound infusion catheters, and the recent high-volume LIA technique associated with joint replacement surgery. The efficacy of these techniques varies depending on specific procedures and anatomic locations. The recent incorporation of ultra-long-acting liposomal bupivacaine preparations has the potential to dramatically increase the utility of single-injection LIA. LIA represents a promising yet under-investigated method of postoperative pain control.

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Introduction

For centuries, management of moderate-to-severe pain has relied on opioid analgesics. While effective, these medications have significant disadvantages, including respiratory depression, sedation, nausea, constipation, tolerance, dependence, and potential addiction. In addition, the widespread use of opioid analgesics to manage chronic pain has created increasing numbers of opioid-tolerant patients whose pain can be particularly difficult to control in the perioperative setting. There is an obvious need for analgesic techniques in the perioperative setting that do not rely on opioids. Indeed, the American Society of Anesthesiologists' practice guidelines for acute pain management recommend the use of a multimodal analgesic strategy incorporating nonsteroidal anti-inflammatory drugs, anticonvulsants, acetaminophen, and peripheral and neuraxial blockade, in addition to traditional opioid analgesics [1]. Peripheral nerve catheters (PNCs) and local infiltration analgesia (LIA) represent valuable options for controlling perioperative pain and can be particularly useful in the opioid-tolerant patient.

PNCs in perioperative analgesia

PNCs have been described for decades, but only recently has their potential to improve perioperative analgesia been fully realized. Initial descriptions of PNCs focused on their ability to extend the duration of single-injection nerve block (SINB) for surgical anesthesia [2,3]. As techniques for placement have improved, PNCs have been increasingly utilized to provide both surgical anesthesia and prolonged postoperative analgesia for a wide variety of procedures [4,5]. The benefit of PNCs lies in their ability to provide reliable analgesia as well as avoidance of potentially hazardous side effects of systemic analgesics such as opioids and nonsteroidal anti-inflammatory agents [6]. As the safety and efficacy of PNC techniques have been established, their utility has been extended from the hospital to the ambulatory setting with portable local anesthetic infusion systems [5].

All PNCs involve the directed placement of an indwelling small-gauge catheter at the site of a targeted nerve. Through this catheter, a local anesthetic is infused to provide analgesia to a desired region of the body. The most frequent sites of insertion for PNCs include the brachial plexus and femoral and sciatic nerves, as well as the paravertebral space, transversus abdominis plane, and lumbar plexus. Despite the broad potential applicability provided by these diverse insertion sites, PNCs may be inappropriate based on patient or surgical characteristics. Among others, coagulopathy, infection,

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