

Peripheral Nerve Blocks for Ambulatory Surgery

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KEYWORDS

- Peripheral nerve blocks
- Continuous peripheral nerve blocks
- Ultrasound guidance
- Ambulatory surgery

KEY POINTS

- Peripheral nerve blocks (PNBs) provide significant improvement in postoperative analgesia and quality of recovery for ambulatory surgery.
- Use of continuous PNB techniques extend these benefits beyond the limited duration of single-injection PNBs.
- The use of ultrasound guidance has significantly improved the overall success, efficiency, and has contributed to the increased use of PNBs in the ambulatory setting. More recently, the use of ultrasound guidance has been demonstrated to decrease the risk of local anesthetic systemic toxicity.

INTRODUCTION

Peripheral nerve blocks (PNBs) for ambulatory surgery, and in particular for orthopedic surgery, may be used as either the primary anesthetic or more commonly as an analgesic adjunct to general anesthesia. The benefits of PNBs for ambulatory surgery include reductions in postoperative pain, opioid requirements, and postoperative nausea and vomiting, and possibly decreased time to functional recovery.^{1,2} Poorly controlled pain after ambulatory surgery may lengthen stay in the postanesthesia care unit, and possibly even require hospitalization.^{3–5} Thus, PNBs have also been shown to facilitate postanesthesia care unit bypass and decrease time to achieve discharge criteria after ambulatory upper and lower extremity orthopedic surgery.^{6–9} Recent data indicate that for patients undergoing arthroscopic shoulder surgery in the beach chair position, regional anesthesia with sedation compared with general anesthesia significantly decreases the incidence of critical cerebral deoxygenation events.¹⁰

The benefits of single-injection PNB techniques are primarily determined by the physical properties of the local anesthetic agent (and analgesic adjuncts) chosen for

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a particular procedure. Even with concentrated long-acting local anesthetic agents (eg, bupivacaine 0.5% and ropivacaine 0.5%–7.5%), the duration of postoperative analgesia typically last only for 12 to 24 hours. There are several potential disadvantages when injecting a large volume of concentrated local anesthetic agents, including an increased potential for local anesthetic systemic toxicity and residual dense sensory and motor block (**Box 1**), which is bothersome for some patients. In contrast, although continuous PNBs (CPNBs) do require additional time for placement, they have been shown to consistently provide superior analgesia compared with opioid-based analgesia and single-injection PNB techniques (**Box 2**).^{11–13} It has been demonstrated that CPNBs may be successfully managed in the ambulatory setting if patient selection, patient expectations, and patient education are thoroughly addressed in the perioperative setting (**Box 3, Figs. 1 and 2**).^{13–16}

For PNBs to gain more widespread use in the ambulatory setting, they must not only have predictably high success rates, but also be performed in an efficient manner, with few complications. The use of ultrasound guidance (USG) for PNBs provides improvements in overall block success (defined as surgical anesthesia), block onset, block quality, and decreases in local anesthetic requirements when compared with peripheral nerve stimulation (PNS).^{17–21} More recent evidence provides further support that USG not only increases the success rate of CPNB placement, but also consistently decreases the block procedure time for peripheral nerve catheter placement, even in patients who are obese.^{22,23} Although USG has not been shown to completely eliminate the most feared complications of local anesthetic systemic toxicity and peripheral nerve injury, recent evidence from large databases indicates that its use (compared with PNS techniques) significantly decreases the incidence of local anesthetic systemic toxicity.^{24–26} Accompanying editorials largely support the view that

Box 1

Advantages and disadvantages of single-injection peripheral nerve block techniques

Advantages

- Provides effective analgesia for surgical procedures not expected to have moderate-to-severe postoperative pain for greater than 12–24 hours
- Decreased cost for equipment and supplies: does not require continuous peripheral nerve catheter kits (specialized needles, catheters), infusion pumps, and additional local-anesthetic infusion
- Decreased time for placement
- Single-injection techniques within training of most anesthesiologists
- Does not require dedicated 24-hour availability (acute pain service and/or 24-hour pager availability for outpatient management)

Disadvantages

- Risk of severe rebound pain (“midnight syndrome”) in the ambulatory setting on resolution of single-injection analgesia
- Limited flexibility
 - Short-acting agents provide rapid onset of surgical anesthesia but a limited duration of analgesia (<6–8 hours)
 - Long-acting agents have slower onset of surgical anesthesia
 - Prolonged dense sensory analgesia and motor block may not be desirable in postoperative setting

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