

Regional Anesthesia and Analgesia for Acute Trauma Patients

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KEYWORDS

- Trauma • Trauma pain • Trauma analgesia • Regional anesthesia
- Peripheral nerve block • Neuraxial block

KEY POINTS

- Compared with traditional analgesic modalities, peripheral nerve blockade (PNB) provides trauma patients with superior pain relief targeted to the site(s) of injury.
- PNB use in trauma may decrease morbidity and mortality, promote favorable surgical outcomes, and decrease length of stay in some circumstances.
- PNB skills are increasingly being taught to prehospital and emergency medicine providers with direct benefit to acute trauma patients.
- PNB decreases acute opioid use, avoiding related side effects, important for patient safety and comfort.
- Although data are scarce, early PNB may reduce the incidence or severity of chronic pain and subsequent opioid use, a consideration in the present opioid epidemic.

INTRODUCTION

The role of regional anesthesia in trauma care has grown substantially over the past few decades. Rapid advancements in techniques involving high-fidelity ultrasound and an ensuing proliferation of educational materials have made learning peripheral nerve blockade (PNB) more accessible. Since the first description of an ulnar nerve block with cocaine to enable the pain-free removal of a bullet by Burke¹ in 1884, a multitude of nerve block procedures were developed to provide analgesia and surgical anesthesia for most regions of the body by the mid-twentieth century, although these methods were not developed specifically for use in trauma.²

Disclosure Statement: The authors have nothing to disclose.

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Anesthesiology Clin ■ (2018) ■–■
<https://doi.org/10.1016/j.anclin.2018.04.004>

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Military trauma care units, in particular, used PNB to deliver targeted limb analgesia and enable surgical interventions in resource-scarce environments, often while preserving airway patency, mental status, and hemodynamics. The superior stability and patient comfort permitted easier evacuation of wounded patients to higher levels of care.³ However, with perineural local anesthetic injection came the rare but potentially catastrophic risk of local anesthetic systemic toxicity (LAST) and postblock neurologic injuries, resulting in more limited use and the need to develop safer medications and methods of administration.² Since the 1970s, new techniques and ultrasound guidance have reinvigorated the role PNB plays in perioperative care by anesthesia teams. This expertise has extended to combat and civilian trauma management, with prehospital providers, advanced nurse practitioners, and physicians in the emergency department (ED) beginning to offer these techniques in certain situations, as well.⁴⁻¹⁰

When practicing regional anesthesia in trauma care, advantages and indications beyond acute analgesia have been discovered that warrant further investigation and validation in this patient population. Likewise, unique concerns and considerations have emerged that differentiate PNB application in the acutely injured patient from the elective surgical patient. There remains great potential for clinical research to delineate indications, optimal techniques, and outcomes for use of PNB in trauma. This article reviews the current literature and discusses future directions of regional anesthesia in the acute trauma patient.

ADVANTAGES OF REGIONAL ANESTHETIC TECHNIQUES

The most recognized indication and advantage of regional anesthesia in trauma patients is the provision of acute pain relief and/or dense anesthesia to a specific injured area of the body. Rapid and sometimes complete pain relief achieved via regional block provides compassionate analgesia and is reported to be more effective than traditional approaches using systemic opioids and sedatives.^{11,12} However, there are additional secondary advantages and indications in the trauma population that require more attention and are the focus of ongoing research.

PERIPHERAL NERVE BLOCKS

Despite a lack of robust outcome data, trauma teams are expanding use of PNB techniques, believing that the benefits of selected blocks outweigh risks of systemic analgesics for certain patients. As safe, teachable, and generally reproducible interventions that require little time to perform, PNB can provide excellent analgesia without disruptions in hemodynamics or respiratory status. Other benefits include less opioid intake with reduced opioid-related side effects and sedation, permitting better assessment of mental status changes and acute surgical conditions. Long-term effects from early nerve blockade may include reduction in the incidence and severity of chronic posttraumatic pain syndromes,^{13,14} better surgical outcomes with immobilization of delicate neurovascular repairs,¹⁵ and greater tolerance of aggressive physical therapy.¹⁶ Sympathetic inhibition and decreased catecholamine release from PNB have the potential to improve vascular flow and decrease vasospasm.¹⁷ In austere environments, regional anesthesia allows for quicker triage, earlier readiness for transport, and reduced costs compared with general anesthesia and systemic medications. Finally, perhaps most importantly, PNB seems promising to decrease morbidity and mortality when patients are at increased risk of aspiration, present a difficult airway (with or without a cervical collar), or have multiple comorbid diseases that stratify them at higher risk of complications from general anesthesia or

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