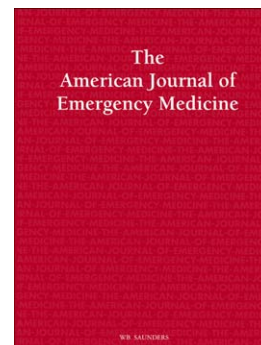


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Brian Johnson MD, MPH, Andrew Herring MD, Swapnil Shah MD, Michael Krosin MD, Daniel Mantuani MD, Arun Nagdev MD

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Door-to-block time: prioritizing acute pain management for femoral fractures in the emergency department

Brian Johnson, MD, MPH¹
Andrew Herring, MD^{1,2}
Swapnil Shah, MD³
Michael Krosin, MD³
Daniel Mantuani, MD¹
Arun Nagdev, MD^{1,2}

¹ Department of Emergency Medicine, Alameda Health System, Highland Hospital, Oakland, CA

² Department of Emergency Medicine, University of California, San Francisco, San Francisco, CA

³ Department of Orthopedics, Alameda Health System, Highland Hospital, Oakland, CA

Address manuscript correspondence to:

Brian Johnson, MD, MPH
Department of Emergency Medicine
Highland Hospital–Alameda Health System
1411 East 31st Street
Oakland, CA 94602-1018
Phone: 510- 437-4564
Fax: 510-437-8322
Email: bjohnson@alamedahealthsystem.org

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Ultrasound-guided femoral nerve blocks (UGFNBs) are considered the gold standard for acute pain management in traumatic femoral fractures (1). Emergency physicians (EP) are ideally positioned to perform the UGFNB in a timely manner but often are forced to delay block placement because of unresolved or ambiguous practice expectations on the part of collaborating orthopedic, anesthesiology, and trauma surgery services (2). The use of a multidisciplinary consensus protocol to expedite acute interventions in the emergency department (ED) is a well-established strategy with proven success in improving outcomes in sepsis, acute coronary syndromes, and stroke (3-5). Despite the clear benefits, such a protocol has not yet been described for emergency regional anesthesia in acute trauma patients.

Traditionally, optimal pain control for long bone fractures has been equated with intravenous opioids, however mounting evidence suggests that even in the best case circumstance of an aggressively titrated, intravenous opioid analgesic protocol, pain relief is inferior to a multimodal approach integrated with regional anesthesia (6). There is a clear imperative to better integrate regional anesthesia into emergency trauma care as mounting pressure both from regulatory agencies and hospital administration are trending towards prioritizing pain management as a core measure of patient satisfaction evaluation (7).

The primary challenges to widespread ED adoption of the femoral nerve block in acute femoral shaft fractures are not technical, but rather in effectively organizing the logistics of timely block placement within the setting of an acutely injured ED patient. Our experience as a large, level II trauma center with approximately 3,500 annual trauma activations suggests that the crucial step towards establishing consistent and timely placement of UGFNBs is development of a collaborative protocol between the departments of orthopedics and emergency medicine. Here, we present the Highland Hospital femoral fracture protocol (Table 1) and an

illustrative case where an UGFNB for acute pain control was placed immediately after the initial trauma surgery evaluation in a patient with a diaphyseal femur fracture.

Illustrative case. A 24 year-old male gunshot victim presented to the ED with a mid-shaft fracture of his right femur. After the secondary survey and confirmation of fracture with a portable X-ray, the patient was determined to have no signs of neurologic or vascular injury, or compartment syndrome. A single injection UGFNB was performed in the trauma bay by the EP before further evaluation. The patient then proceeded to undergo full trauma evaluation and treatment and eventual Steinmann pin placement. Twenty minutes after the UGFNB, the patient's pain was reduced to 2/10. Throughout the 5-hour ED stay, the patient remained comfortable with well-controlled pain.

Interdepartmental collaboration promotes timely blockade. In common ED practice, the femoral nerve block is often placed only after completion of the entire trauma evaluation, usually one to two hours after arrival (8). This delay is not surprising. Calling upon your consultant in the middle of a busy ED shift to agree upon a procedure they are not familiar with can be difficult and time consuming. In our experience, the establishment of a femoral fracture protocol agreed upon at the departmental level by the relevant services is a prerequisite to achieve consistent, timely placement of femoral blocks for femur fractures.

There are predictable challenges in implementing an ED femoral fracture protocol. Although most EPs and anesthesiologists are credentialed for regional anesthesia, experience with ultrasound-guidance varies widely (9). Procedural training should be multidisciplinary and focus on ultrasound techniques, needling skills and anatomy and be incorporated with a system

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to maintain competency and quality assurance. A nerve block cart that contains the requisite needles, syringes, indelible markers, sterile ultrasound gel and antiseptic skin prep promotes efficiency. Concern for delay in diagnosis of a thigh compartment syndrome due to UGFNB masking early signs is a common concern. However, without a presenting history or evidence of crush injury or vascular compromise, the risk of missed compartment syndrome due to a femoral block is extremely low (10,11). Ultrasound-guidance that allows real-time visualization of the needle tip to help avoid nerve injury and local anesthetic toxicity should be used when possible. Finally, communication with the patient, nursing staff and consultants once the femoral block is placed is extremely important. Post-block care should include marking the injured leg with an indelible marker and appropriate padding. The EP should communicate the expected anatomical distribution of the femoral nerve block that includes the femur, skin and muscles of the anterior and medial thigh, knee joint and medial aspect of the lower leg.

The UGFNB as an early, integrated component of acute trauma care for femur fractures requires systems level, interdepartmental planning. EPs must lead the way in identifying technical, logistical, and cultural hindrances towards implementation – many of which we have described here. Our experience has shown that a multidisciplinary protocol for ED femur fractures can decrease the time to block from hours to minutes.

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Table 1

Emergency Department (ED) femoral fracture protocol

Goal

Promote optimal emergent pain management for femoral fractures presenting to the ED.

Inclusion criteria

Patients presenting to the ED with obvious deformity of the upper leg consistent with femoral fracture confirmed either by bedside ultrasound or x-ray.

Exclusion criteria*

1. Clinical features suggestive of acute compartment syndrome of the thigh. This includes tense or firm compartment on palpation, expanding hematoma of the thigh, or neurologic deficit in femoral distribution.
 2. Neurological deficit in the femoral distribution; specifically, loss of touch sensation on the anterior thigh.
 3. Any sign of vascular injury, coagulopathy, or hemodynamic instability.
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ED Care

1. Immediate consultation with on-call orthopedist to discuss activation of femoral block protocol with goal of ultrasound-guided femoral block placed within 15 minutes of arrival to ED.
 2. Implementation of balanced analgesia including acetaminophen, Cox-2 NSAID, and titrated intravenous opioids in addition to nerve blockade.
 3. Appropriate positioning, splinting, ice, and elevation of injured leg.
 4. Documented transfer of block-related care to inpatient service.
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* In addition to standard regional anesthesia contraindications, such as, inability to provide consent, allergy to local anesthetic, coagulopathy, preexisting neurologic injury or neuromuscular disease.

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