

**Bier Block Anesthesia for Distal Radius Fracture Reduction in the ED: Is it Safe?**

Lucas Marchand, MD<sup>1</sup>; Lance Jacobson, MD<sup>1</sup>; Zachary Working, MD<sup>1</sup>; Iain Elliott, MD<sup>1</sup>; Erik Kubiak, MD<sup>1</sup>; David Rothberg, MD<sup>1</sup>; Thomas Higgins, MD<sup>2</sup>;

<sup>1</sup>University of Utah, Department of Orthopaedics, Salt Lake City, Utah, USA;

<sup>2</sup>University Orthopaedic Center, Salt Lake City, Utah, USA

**Purpose:** Intravenous regional anesthesia (Bier block) represents a controversial means of emergency department (ED) analgesia secondary to the potential catastrophic complications associated with its use. Common concerns regarding this method of analgesia are related to the fear of systemic reactions of lidocaine, including severe neurologic and cardiac toxicities. It is not known whether Bier block use affects the rate of complex regional pain syndrome (CRPS) or other neurologic sequelae as compared to historical rates reported in the literature. We sought to define the safety profile of Bier block anesthesia as used in the ED for closed manual reduction of distal radius fractures.

**Methods:** A retrospective chart review was carried out on all the patients who presented to our tertiary care institution with a distal radius fracture from November 2009 to November 2014. Demographic information, type of anesthesia used for the reduction (conscious sedation, hematoma block, Bier block), complications associated with Bier block, tourniquet time, neurologic examination at final follow-up, and diagnosis of CRPS were all recorded.

**Results:** A total of 864 patients were treated for a distal radius fracture, of whom 357 underwent manual closed reduction in our ED. Of the 357 patients receiving closed reduction, 37 received conscious sedation, 56 received a hematoma block, and 264 received regional anesthesia via Bier block. Of the 264 identified and included in the study, 4 patients (1%) were noted to have experienced minor complications. These included chest pain (negative cardiac workup), tinnitus and peri-oral numbness (no further neurologic sequelae noted), intolerable tourniquet pain that prevented a Bier block from being used, and acute onset carpal tunnel syndrome that resolved following splint exchange (n = 1 for all complications). Open reduction and internal fixation (ORIF) was required in 125 (47%) of the 264 patients. Average tourniquet time was 30 minutes (range, 20-45). The review identified 5 patients (2%) who went on to develop CRPS, with 2 of the 5 receiving ORIF. All other patients in the series had normal neurologic examinations at their last scheduled follow-up (average follow-up = 109 days).

**Conclusion:** This series demonstrated that Bier block anesthesia is a safe means of providing analgesia when performing manual closed reduction of distal radius fractures. At our institution Bier block anesthesia was used in 74% (264 of 357) of closed reductions. Only four minor complications were noted in the series with no major neurologic or cardiac toxicities documented. Importantly, only one patient was noted to have significant tourniquet pain; the remainder of the patients in the series had adequate analgesia for manual reduction. The rate of CRPS in this series was noted to be less than historically reported rates in the literature for distal radius fractures (10% to 30%). Additionally, no major long-term adverse neurologic deficits were noted at follow-up evaluation.