Spring 5-10-2019

Popliteal Blocks for the Treatment of Distal Injuries in the Lower Extremity in the Emergency Department

Jacob Turner

Executive Summary

Author

Jacob P. Turner, RN BSN

Introduction of the Problem

Trauma is the fourth leading cause of death overall for all ages and is the number one cause of death for individuals up to the age of 45. Almost 40 million patients receive medical care in an emergency department for trauma every year (CDC, 2017). Up to 91% of trauma patients in the emergency department are in pain, and two-thirds are discharged with moderate to severe pain (Berben et al., 2008). Most often these injuries are treated with procedural sedation that commonly include opioids. However, regional anesthesia (RA) can reduce pain in these patients without many of the major complications associated with opioids. By rethinking the approach to pain management for acute fractures in trauma patients, patient care outcomes can be improved with the use of RA.

Literature Review

Opioid addiction is a national epidemic and has developed into a very complex problem over the past few decades. Addiction can lead to both physical and psychological dependence on drugs. In 2010 the Center for Disease Control (CDC) attributed 16,500 deaths out of approximately 40,000 drug overdoses to opioid use (Beneitez & Gil-Alegre, 2017). Over-prescription of opioids is a major contributor to the current opioid epidemic and emergency departments are a large component of this over prescription. Emergency departments were a large contributor to the under management of pain identified in the 1990's. From 1993 to 2005 there was a 60% increase in opioid

prescriptions in emergency departments and emergency department physicians were ranked 3rd among specialists prescribing opioids to patients age 24-39 (Lyapustina et al., 2017). Approximately 1 million of 6.3 million emergency department prescribed opioids are considered to be used for reasons other than pain control (Lyapustina et al., 2017).

There are many side effects associated with opioid use and include constipation, nausea, vomiting, sedation, respiratory depression, cardiac effects and hemodynamic changes, immunologic changes, hormonal changes, hyperalgesia, bladder dysfunction, pruritic, and sleep disturbances (Benyamin et al., 2008). Some side effects that are of considerable concern when dealing with acute injuries in the emergency department are sedation, respiratory depression, and hemodynamic changes. When a patient presents with hypotension and is not stable, adequate pain management with opioids is often delayed until the patient is stable (Gadsden & Warlick, 2015).

Alternatives like peripheral nerve blocks can be used to aid in pain management for acute injuries like ankle and wrist fractures. The use of these peripheral nerve blocks, such as the supraclavicular and popliteal blocks, have the potential to replace opioid administration in these situations completely, thereby omitting any of the detrimental associated side effects of opioid administration.

Indications for the use of the supraclavicular block are injuries of the distal arm or hand. The supraclavicular block is performed where the brachial plexus is most compact in the distal trunk/proximal division level (Hanumanthaiah, Garstka, Sabanayagam, Szucs, & Iohom, 2013; Neal et al., 2009). Regional anesthesia for hand and arm surgery has been shown to be superior to general anesthesia in terms of analgesia and reduced

opioid-related side effects in the first 24 hours after surgery, per RCT's (Neal et al., 2009).

Contraindications to the supraclavicular nerve block include but are not limited to patient refusal or lack of patient consent, pneumothorax on opposite side, infection at the insertion site, allergy to local anesthetics, and severe clotting disorders (Sadowski et al., 2014). There are complications associated with peripheral nerve blocks and specifically supraclavicular nerve blocks. These complications include pneumothorax, Horner's syndrome, phrenic nerve block, nerve injury, puncture of blood vessels, infection at insertion site, and local anesthesia system toxicity (LAST) (Sadowski et al., 2014). Ultrasound-guided blocks have significantly reduced many of these complications such as pneumothorax, Horner's syndrome, phrenic nerve block, nerve injury, and puncture of blood vessels.

There is an abundance of evidence that supports the effectiveness of supraclavicular blocks for use in surgery and post-operative pain control, however, there is little level one evidence (randomized control trials) directly related to the use of supraclavicular blocks in the emergency department. A review of the literature for regional nerve blocks in non-operative settings concluded that brachial plexus blocks proved to be a useful alternative to procedural sedation for upper extremity fracture manipulation in emergency departments, however, this review of literature did not evaluate supraclavicular blocks as a regional anesthesia modality for comparison (Tran, Bernucci, Tiyaprasertkul, & Finlayson, 2014). It was noted that the simplicity of the procedure, rapid onset of motor and sensory blockade, and lack of procedural sedation culminated in reduced effective length of stay for patients in the emergency room

(Wankhade et al., 2017). Further case reports reviewed demonstrate that the supraclavicular brachial plexus block provides exceptional analgesia in a time efficient manner, while also negating the need for procedural sedation and its associated side effects; thus, providing an excellent alternative to procedural sedation.

A peripheral nerve block that can be used for pain management for ankle injuries is the popliteal block. Popliteal blocks are commonly used preoperatively and post-operatively before surgery for pain control. Commonly, ankle injuries requiring surgery are repaired with a spinal or general anesthetic. A popliteal block can be used to help reduce the amount of anesthesia required for the patient during surgery (Goldstein, Montero, Jain, Egol, & Tejwani, 2012). Pain can be reduced for hours after a surgery if a popliteal block is administered postoperatively. Opioid administration is the most common treatment for pain management after ankle surgery (Goldstein, Montero, Jain, Egol, & Tejwani, 2012). Popliteal blocks can also be utilized in the emergency department for pain control when ankle injuries are first presented.

Ankle injuries are a common complaint of patients reporting to the emergency department requiring pain control. Often ankle injuries require manipulation in order to stabilize the injury and prepare the injury for further treatment. Ultrasound-guided popliteal blocks are a safe and effective technique to provide pain control for ankle injuries. Popliteal blocks have several benefits over general anesthesia. They provide intraoperative anesthesia, muscle relaxation, and analgesia that lasts in the post anesthesia care unit. A popliteal block provides prolonged postoperative analgesia than spinal anesthesia, which suggests that a regional popliteal block has potential for improved pain control and a reduction of opioid use. Additional benefits of popliteal blocks include a reduction in postoperative nausea and vomiting, reduced post anesthesia care unit stay, and a reduction in nursing care interventions in the post anesthesia care unit. Popliteal blocks provide better pain control up to eight hours post-operatively compared to general

anesthesia. Administration of popliteal blocks in multiple patients with ankle injuries in the emergency department have reported complete resolution of pain after 15 minutes in multiple case reports (Herring, et al., 2011).

IRB Information

There is no IRB requirement through Passavant Hospital per hospital administration, and an exempt IRB will be attained through Southern Illinois University Edwardsville before project implementation.

Project Methods

The purpose of this project was to develop and introduce a regional anesthesia protocol for acute upper and lower extremity fractures in the emergency department (ED) setting at a tertiary care center in southern Illinois, with the long-term goal of a reduction in opioid administration. This project was a non-experimental single group exploratory design.

The initial implementation process for the protocol was given through an educational PowerPoint presentation. This information session was performed in a face to face setting with a survey at the conclusion. The PowerPoint presentation was presented to all available anesthesia personnel and emergency department personnel. The PowerPoint included information on the opioid epidemic, incidence of trauma and upper extremity/lower extremity injuries, a review of literature, popliteal block protocol, supraclavicular block protocol, and the goals and objectives of the project.

Prior to implementation, this project's proposal was submitted for evaluation and deemed exempt by Southern Illinois University Edwardsville's Institutional Review Board (IRB).

Impact on Practice

The supraclavicular and popliteal block protocols will expand the role of the CRNAs in the emergency department at this facility. The administration of these block protocols can impact outcomes for patients with upper extremity injuries below the shoulder and ankle fractures by decreasing the number of narcotics taken by these patients while simultaneously improving pain control with less side effects. Decreasing the number of narcotics taken will help minimize undesirable side effects such as delirium, respiratory depression, nausea, vomiting, drowsiness, hypotension, itching, cough suppression, dry mouth, constipation, and urinary retention.

These protocols will standardize care for patients receiving a supraclavicular or a popliteal block. Utilization of both the supraclavicular and popliteal block protocol will lead to future reductions of opioid administration for pain control for patients with upper extremity injuries below the shoulder or ankle fractures. There is potential to decrease narcotic use and have a positive effect on the opioid epidemic, which subsequently is a major focus for many government organizations and healthcare facilities.

Conclusions

Opioid addiction has become a crisis in the United States with rapidly increasing use of prescription and non-prescription opioid drugs. Opioid use is related to major adverse effects including respiratory depression, hypotension, nausea, and vomiting. This project educated key personnel on the use of regional anesthesia and associated protocols to treat acute upper and lower extremity injuries in the emergency department, therefore reducing the administration of opioids for these injuries.

Author Contact Information

University e-mail: jacturn@siue.edu

Personal e-mail: jpturner211@gmail.com

Telephone: (309) 303-7523