



Pericapsular Nerve Group Block for Surgeries Involving The Hip

Bryan Tune

Associate Professor, California State University, Fresno, California, United States

Correspondence

Bryan Tune

Associate Professor, California State University, Fresno, California, United States

- Received Date: 18 Jan 2022
- Accepted Date: 24 Jan 2022
- Publication Date: 29 Jan 2022

Copyright

© 2022 Science Excel. This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International license.

Introduction

Regional anesthesia has been proven to be a successful modality in the reduction of postoperative pain for numerous types of surgeries. Regional anesthesia for surgeries involving the hip is no exception. Hip fractures are common in the elderly population making regional anesthesia ideal for pain management due to less opioid consumption. The pericapsular nerve group (PENG) block is able to provide analgesic coverage to areas of the anterior hip capsule frequently missed with the fascia iliaca (FI) block, commonly used for hip surgeries [1].

Case Report

A 69-year-old, 82 kg, 158 cm female presented to the emergency department with hip pain after a fall at home. In the emergency department she received a total of morphine 20 mg intravenously for pain. She was transported to the operating room holding area to be evaluated by anesthesia professionals. Family confirmed negative loss of consciousness. Past medical history includes hypertension, diabetes type II, obesity, hyperlipidemia and obstructive sleep apnea. The patient denied smoking, alcohol use and illicit drug use. Her daily medications include: metoprolol, amlodipine, metformin, aspirin and atorvastatin. The patient denies having general anesthesia in the past. Her surgical history includes bilateral carpal tunnel release.

The preoperative assessment included a Mallampati Class II airway and full range of motion with her neck. Regular cardiac rate and rhythm were noted and lung sounds were clear to auscultation. Vital signs were unremarkable. The plan for a motor sparing PENG block with general anesthesia was discussed. Questions were answered, consent was reviewed and signed.

In the preoperative holding area, the patient was placed in the supine position and the inguinal area cleansed with chlorhexidine. Maintaining sterility, an ultrasound machine with a curvilinear low frequency probe was used to visualize landmarks. 1% Lidocaine was injected superficially for local anesthesia. A 150 mm peripheral nerve block needle was primed with saline and a syringe with 0.5% ropivacaine 20 mL with dexamethasone 4 mg was prepared. Utilizing ultrasound, landmarks (anterior inferior iliac spine, iliopubic eminence, femoral artery and iliopsoas tendon) were difficult to identify. The patient did not tolerate the awake placement of the PENG block due to pain with local anesthetic injection, and requested to be anesthetized first. The decision was made to induce the patient with general anesthesia in the operating room, and reattempt the PENG block under anesthesia.

After transport to the operating room, the patient was induced with midazolam 2 mg, lidocaine 100 mg, fentanyl 100 mcg, propofol 100 mg and rocuronium 30 mg and a 7.0 endotracheal tube was inserted into the trachea under direct laryngoscopy. PENG block landmarks were identified with ultrasound, 2 ml of normal saline was administered as a test dose to visualize and confirm spread, aspiration of blood was negative and 0.5% ropivacaine 20 mL with dexamethasone 4 mg was administered, with incremental aspiration every 5 mL. The PENG block was performed under general anesthesia without complications. Vital signs remained unchanged from baseline and no additional intravenous analgesics were administered for the duration of the surgery. On the morning of post-operative day 1 the patient reported a pain score of 2 out of 10. Over the previous night the patient had received acetaminophen 1000 mg orally and fentanyl 50 mcg. She had full motor function of her leg on exam, but had yet to ambulate.

Citation: Tune B. Pericapsular nerve group block for surgeries involving the hip. *Sur Res J.* 2022;2(1):1-2.

Discussion

Peripheral nerve block regional anesthesia has shown to be beneficial for analgesic management of hip fractures and hip surgeries. The PENG block for hip surgery is an excellent adjuvant for opioid reduced or opioid free analgesia, Reducing or eliminating opioids in hip fractures often results in better pain analgesia and decreased incidence of morbidity [1]. Based on a Cochrane review utilizing peripheral nerve blocks for total hip arthroplasties compared to systemic analgesia alone; patients who received a peripheral nerve block experienced reduced post anesthetic delirium, cognitive impairment, pruritis, nausea and vomiting, and an overall decreased hospital length of stay [2].

It is not uncommon for hip fractures to occur in the elderly after minor falls or as the result of osteoporosis pathology. Treating pain in the elderly is often challenging due to multiple comorbidities and their increased sensitivity to side effects of systemic analgesics [1]. Delirium is a common problem in the elderly related to untreated pain and/or intravenous opioids [1]. Peripheral nerve blocks for the elderly suffering from hip fractures and requiring surgical intervention, reduce the need for systemic analgesics, prevent delirium and decrease overall pain [1].

Commonly utilized peripheral nerve blocks for hip fractures include the femoral nerve (FN) block or the fascia iliaca (FI) nerve block. The FN block provides coverage of the anterior thigh and medial leg below the knee. The FN block covers both sensory and motor nerve fibers [3]. The FI blocks the FN via infiltration from large volume of local anesthetic within the FI plane [3]. This block most often infiltrates the lateral FN, but rarely the obturator nerve [3]. The FI block is strictly dependent on spread of the local anesthetic through the fascia. The spread of local anesthetic determines which nerves will be blocked [3]. In addition, the lateral FN provides cutaneous innervation to the anterolateral thigh [3]. Despite the large area of pain coverage distal to the hip, pain is not completely absent in patients with hip surgeries [4].

In 2018, an anatomic study of innervation of the anterior hip capsule was conducted. The study focused on thirteen cadaveric hemi-pelvises. It was found that the anterior hip capsule was innervated by articular branches of the FN and obturator nerve in all thirteen cadavers. Additionally, the anterior hip capsule received innervation from the accessory obturator nerve in seven of thirteen cadavers [5]. The study concluded that articular branches from all three nerves share a relationship with the inferomedial acetabulum and the space between the anterior inferior iliac spine and iliopubic eminence. The conductors of this study, suggested this space as a potential site for radio frequency denervation [5].

Conductors of the study on innervation of the anterior hip capsule introduced the pericapsular nerve group (PENG) block to obliterate pain pathways to the hip which originate from the articular branches of the FN, obturator nerve and accessory obturator nerve [6]. The articular branches provide most innervation to the lateral and medial aspects of the hip capsule and course deep into the iliopsoas muscle [5]. The peripheral nerve blocks traditionally used for the hip FN block and FI nerve block, do not provide enough proximal or deep coverage to reach the articular branches [6]. The PENG block, conducted via ultrasound to find the appropriate landmarks by which the articular branches course, is able to successfully block the articular branches of the FN, obturator nerve and accessory obturator nerve [5].

Due to the recent discovery and usage of the PENG block, there are few documented studies with adequate sample sizes. Pain was assessed in three patients with hip fractures, on a ten-point scale prior to the PENG block and 30 minutes after administration of the PENG block. The patients portrayed a 4-8 point decrease in their pain scores 30 minutes post PENG block administration [6]. When conducted on two patients with below-the-knee amputations in combination with sciatic nerve block, twenty minutes after infiltration the amputation was started without the need for sedation or any additional analgesics [7]. Further documentation for successful PENG blocks include two patients with dislocated hip joints [8]. Both patients received significant analgesia after a dislocated hip joint, allowing surgeons to manually reposition the hip without sedation or additional analgesics [8].

One case report identifies the successful use of a continuous PENG perineurial catheter block for a total hip arthroplasty when spinal anesthesia was contraindicated for a patient with a diagnosis of bilateral aseptic femur necrosis. Sensory blockade was achieved within fifteen minutes to the medial and anterior thigh and surgery proceeded under light general anesthesia [4]. Immediately following surgery the patient reported a pain score of 0/10, eight hours postoperatively the pain score was 2/10 and the infusion of ropivacaine was increased. At twenty-four and forty-eight hours postoperatively the patients pain score was 0/10 [4]. Besides the local anesthetic infusion, analgesic medications totaled 100 mg of tramadol intravenously [4]. There is clear evidence that supports the use of a PENG block for hip fractures in both the emergency department and operating rooms for primary analgesia. As seen in this case, ultrasound experience and anatomical proficiency are required for success but the ability to avoid opioid analgesia carries tremendous benefits to the patient and the institution.

References

1. Ritcey B, Pageau P, Woo MY, Perry JJ. Regional Nerve Blocks For Hip and Femoral Neck Fractures in the Emergency Department: A Systematic Review. *CJEM*. 2016;18(1):37-47.
2. Guay J, Johnson RL, Kopp S. Nerve blocks or no nerve blocks for pain control after elective hip replacement (arthroplasty) surgery in adults. *Cochrane Database Syst Rev*. 2017;10(10):CD011608.
3. Ultrasound-Guided Fascia Iliaca Block. NYSORA. <https://www.nysora.com/regional-anesthesia-for-specific-surgical-procedures/lower-extremity-regional-anesthesia-for-specific-surgical-procedures/ultrasound-guided-fascia-iliaca-block/>.
4. Published May 23, 2019.
5. Santos O, Pereira R, Cabral T, Lages N, Machado H. Is Continuous PENG Block the New 3-in-1? *J Anesth Clin Res*. 2019;10(6):1000898.
6. Short AJ, Barnett JGG, Gofeld M, et al. Anatomic Study of Innervation of the Anterior Hip Capsule: Implication for Image-Guided Intervention Regional Anesthesia & Pain Medicine 2018;43:186-192.
7. Giron-Arango L, Peng P, Brull R, Perlas A. Pericapsular Nerve Group (PENG) Block for hip analgesia. A report of three cases. ASRA 2018 World Conference.
8. Ueshima H, Otake H. Below-knee amputation performed with pericapsular nerve group and sciatic nerve blocks. *J Clin Anesth*. 2019;54:45.
9. Ueshima H, Otake H. Pericapsular nerve group (PENG) block is effective for dislocation of the hip joint. *J Clin Anesth*. 2019;52:83.