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PENG Block for Perioperative Analgesia in Elderly Intertrochanteric Fractures – A Case Series

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Type of Publication: Case Series

Conflicts of Interest: Nil

Abstract

Hip fractures are very common in elderly population. Many of them require surgical management which results in moderate to severe postoperative pain. This in turn can lead to delayed mobilization, prolonged hospital stays and increased morbidity. In addition, physiological changes and multiple comorbidities in the geriatric age group warrants cautious use of NSAIDS and opioids. Several regional nerve blocks are being used as an adjuvant to neuraxial technique to enhance and augment peri operative analgesia. Peri capsular nerve group (PENG) block is a relatively new block targeting articular branches of the hip joint. In our case series, ultrasound guided PENG block combined with Subarachnoid block (SAB) was given to patients undergoing surgery for intertrochanteric fracture fixation. Their postoperative pain scores and duration of analgesia were analyzed. PENG block was inferred as a safe, easy and effective adjuvant regional nerve block for peri operative analgesia in this setting.

Keywords: PENG block, Morbidity, Neuraxial Technique Subarachnoid Block

Introduction

Intertrochanteric fracture is a significant public health concern, particularly in older adults, with the majority occurring in individuals over 65 years[1]. Frailty is highly prevalent in older hip fracture patients, conferring greater risk of poorer outcomes including increased Length of Stay (LOS), Nursing Home (NH) placement and mortality.[2]

Surgical management is often necessary for hip fractures to achieve optimal outcomes which include restoration of anatomy, pain management, early mobilization, and improved function with options including internal fixation and arthroplasty. Postoperative pain after hip fracture surgery can be severe and of high intensity, especially in the first 24-48 hours with its management posing some serious challenges.[3]

Subarachnoid block (SAB) is preferred in lower limb orthopedic surgeries due to its rapid onset of analgesia, anesthesia and economic feasability.[4] SAB when combined with adjuvant nerve blocks, offers a more effective approach to pain management and may help minimize the reliance on opioid medications.

Girón-Arango et al. in 2018 developed the PENG block, which aims to anesthetize the articular branches of hip joint.[5] The PENG block targets the articular branches and provides innervation to the anterior capsule of the hip joint, including the femoral, obturator and accessory obturator nerves.[6] Evidence suggests that effective pain control using regional anesthetic techniques could have a role in reducing Chronic Post Surgical Pain (CPSP) risk across various clinical scenarios.[7] This case series aimed to evaluate efficacy of adjuvant PENG block in patients undergoing surgery for intertrochanteric femur fractures.

Materials and Methods

This prospective, consecutive case series included ten patients undergoing surgery for Intertrochanteric fracture surgery - Proximal femoral nailing (PFN) in our institute. Informed written consent for the nerve block was obtained on the preoperative day. All patients were given PENG block 15 minutes before administering SAB.

PENG block was performed under strict asepsis under ultrasound guidance. Patient position was supine with hip extension. A high-frequency linear probe was positioned in the plane over the operation side anterior inferior iliac spine and directed inferiorly to visualize the pubic ramus. The femoral artery, iliopubic eminence and psoas tendon were identified. Using the in-plane technique, a 23 Gauge, 90mm Quincke needle was introduced in lateral to medial direction, until the needle tip was positioned between psoas tendon and pubic ramus where 10 ml of 1% lignocaine with adrenaline (1:200000) with 10 ml of 0.25% bupivacaine along with 4 mg dexamethasone was injected.

SAB was given at L3-L4 level with 0.5% heavy bupivacaine (1.2-2 ml) without additives to achieve a sensory level of T10 in all patients. Standard operating time for PFN for all patients was less than 2 hours in our institute. The Numerical Rating Scale (NRS) scores for pain in the post-anesthesia care unit (PACU) were assessed at 0, 2, 4, 6, 8, 12 and 24 hours. Rescue analgesia of IV Tramadol 1mg/kg was given when NRS was 4 or more. The time to first rescue analgesia was noted.

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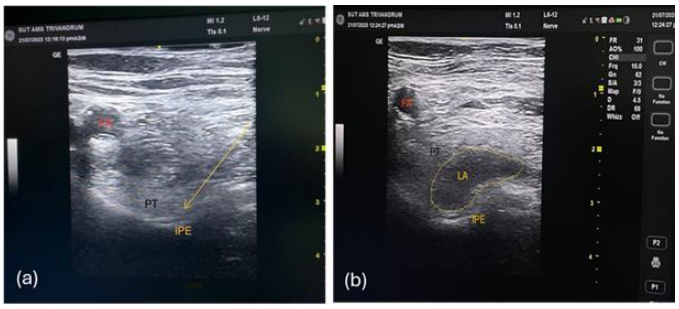
Figure 1: Ultrasound Images of PENG Block



(a) USG guided PENG block and needle track (b) local anesthetic deposited after PENG block.

FA - Femoral Artery, PT- Psoas Tendon, IPE- Iliopubic Eminence, LA- Local Anesthetic

Results

Demographic data

Out of the 10 patients, 9 were female and 1 was male. Age of patients ranged from 68 to 96 years, and mean age was 80 years. All patients were classified ASA physical status 3, with comorbidities spanning across poorly controlled systemic illnesses such as diabetes mellitus, hypertension, obstructive airway disease, coronary artery disease, cerebrovascular accident, Parkinsonism

Figure 2: Bar diagram showing post-operative time at which rescue analgesic was administered

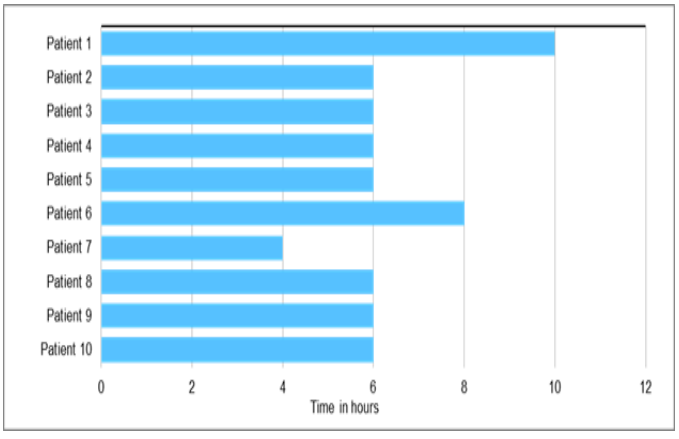
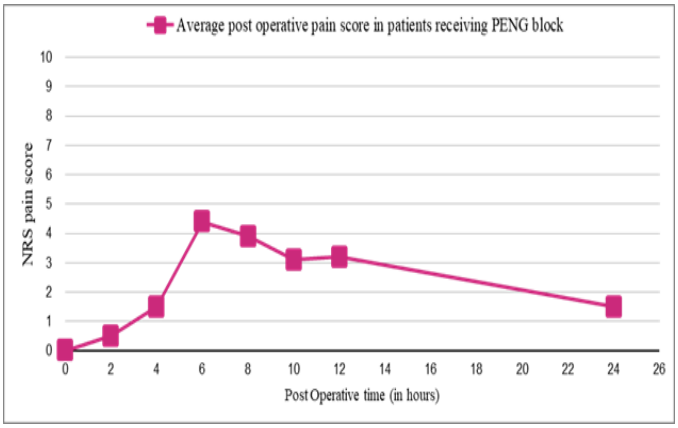


Figure 3: Line diagram showing average post-operative NRS Pain scores at different time periods



Discussion

The hip capsule is divided into 2 sections—anterior and posterior parts. The anterior portion has nociceptive fibers; the posterior part contains mechanoreceptors. High branches of both femoral and obturator nerves and the accessory obturator nerve provide innervation to the anterior hip capsule whereas the posterior and inferior capsules have no sensory fibers.[8]

PENG block enhances analgesic coverage for hip surgery, sparing the motor component.[6] The preservation of quadriceps muscle strength is beneficial for early restoration of the daily function, as well as for minimizing the risk of fall during postoperative exercises.[9] Recent studies have shown that compared to intravenous analgesic treatment or sham block, PENG block provides adequate analgesia for elderly patients after neck and intertrochanteric femur fractures.[10,11] PENG targets the anterior capsule by blocking femoral, obturator, and accessory obturator nerve branches—ideal for hip fractures in intracapsular or intertrochanteric fractures but it does not cover posterior or lateral thigh regions, especially innervated by sacral plexus or branches beyond its reach. In subtrochanteric fractures, the pain origin and nerve input likely extend beyond the

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anterior capsule, making PENG insufficient when used alone.[12]

Hip surgery is often associated with moderate to severe postoperative pain, particularly in patients undergoing surgical treatment. Severe pain increases morbidity associated with hip fracture. Patients who experience greater pain have a higher risk of delirium, are slower to mobilize, have a longer hospital stay and poorer health-related quality of life.[13,14]

In elderly frail patients, postoperative adverse events are higher due to polypharmacy and multiple comorbidities. Patients in this study group belonged to ASA physical status 3, which further increases the risk of perioperative complications.

One in three women and one in eight men aged above 50 are reported to have osteoporosis. This fact, in combination with the longer life expectancy for women, may explain the increased risk for hip fractures among females.[15] In our case series too, there was a preponderance of female patients.

Adequate pain management has been shown to facilitate positioning and ease of administering subarachnoid block[16] and improves postoperative pain scores and recovery.[17,18] Opioid analgesics and NSAIDS which are often given for post-operative analgesia are associated with complications such as respiratory depression, cognitive impairment, postoperative delirium, delayed patient recovery and discharge.[19] Regional anesthesia and analgesic techniques for perioperative pain management have gradually become the clinical focus in elderly patients with hip fractures to facilitate patient recovery. Some literature suggests regional anesthesia given prior to surgical trauma and continued into the postoperative period is effective in attenuating peripheral and central sensitization, hence reducing post-operative pain.[20] A simple, easy-to-perform, adequate analgesia and motor-sparing regional anesthesia technique like PENG is ideal for perioperative pain management of hip fractures.

In our study, we followed up the patients for 24 hours post-surgery and there was significant reduction in the pain score and consumption of opioids in patients who were administered PENG block. In our study group, we observed that patients were pain free for at least 6-8 hours post-surgery and there was significant reduction in opioid consumption.

There are a few limitations to this case series such as lack of blinding and non-follow up of patients for chronic postsurgical pain. The surgical approach for hip fractures, extent and severity of fracture, surgical expertise might affect the intensity of post-operative pain, but this was not documented.

This case series attempted to explore a relatively new and safe block that can be used alone or in combination with other blocks to provide effective analgesia for hip surgeries. However, it may not fully relieve pain of the hip joint in areas supplied by the sciatic nerve.

Further investigation is required to refine the technique, determine the optimal dosage and concentration of local anesthetics and clarify its role within comprehensive pain management strategies.

Conclusion

PENG block is a safe, easy and effective adjuvant regional nerve block for peri operative analgesia in elderly patients undergoing intertrochanteric fracture fixation of hip joint.

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