

A retrospective case series of PENG block combined with femoral & lateral cutaneous nerves block as novel regional anesthesia approach for hemiarthroplasty & dynamic hip screw (DHS)

Abstract

Hip fracture is a frequent trauma particularly common in elderly patients, associated with a high risk of morbidity and mortality. The innervation of the hip joint is complex, and it is challenging for the anesthesiologists to provide effective anesthesia, even analgesia. The pericapsular PENG block is a promising block aiming to block articular sensory branches of anterior capsule supplied by femoral, obturator, and accessory obturator nerves. In this case series, The PENG block combined with femoral, and lateral femoral nerves block was successfully used as regional anesthesia technique with sedation for hemiarthroplasty and dynamic hip screw surgeries. The ultrasound-guided Novel regional anesthesia approach is described, and post-operative pain scores and opioid requirements are monitored till 48 h post-operative.

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Introduction

A hip fracture is a break in the upper portion of the femur (thighbone). Most hip fractures occur in elderly patients whose bones have become weakened by osteoporosis with multiple comorbidities & under anticoagulants which make general anesthesia & even neuraxial block challenging with high risk. Hip fractures can be very painful. For this reason, prompt surgical treatment is recommended with efficient & safe post-operative analgesia especially these patients are not always good candidate for NSAIDs & opioids.

Treating the fracture and getting the patient out of bed as soon as possible will help prevent medical complications such as bed sores, blood clots, and pneumonia. In very old patients, prolonged bed rest can also lead to disorientation, which makes rehabilitation and recovery much more difficult. The necessity to get a novel anesthesia approach safe and effective become imperative.

Anatomy

The hip is a ball-and-socket joint. The ball is the head of the femur, which is the upper part of the thighbone, The socket is called the acetabulum. The acetabulum is part of the pelvis bone, It has a rounded shape that fits around the femoral head. divided in two parts anterior which is nociceptive & posterior part mainly proprioceptive. The anterior hip capsule received innervation from the sensory branches of femoral nerve (FN), obturator nerve (ON) and accessory obturator nerve (AON) (Figure 1-3).

Description

Hip fracture is a major and increasing concern for public health and timely hip fracture repair surgery is associated with lower morbidity and mortality. Most of the patients are fragile and need safe anesthesia approach with good postoperative analgesia. In this study PENG block combined with femoral nerve (FN) block and lateral femoral cutaneous nerve (LFCN) block as sole anesthetic technique

for hemiarthroplasty & dynamic hip screw (DHS) worked as excellent option for anesthesia & post-operative analgesia without use of opioids or NSAIDs in post-operative period with early ambulation and discharge.

Materials and methods

We retrospectively evaluated a continuous series of 8 patients with different type of hip fractures; 6 patients underwent DHS surgery & 2 patients underwent hemiarthroplasty,

The patient ages ranged from 73 to 91 years

Fully aseptic technique

All of the patients received the same regional anesthesia protocol (PENG block + FN block + LFCN block)

In a supine position, Ultrasound machine with curved transducer (low-frequency 3.5Mhz – 11.5 MHz) was used.

The transducer was placed in the transverse plane over the anterior inferior iliac spine (AIIS) and moved inferiorly & medially to visualize the pubic ramus. The psoas tendon, femoral artery and ilio pubic eminence (IPE) were then visualized (Figure 4). Using in-plane technique 10 cm echogenic 22-gauge needle was advanced from lateral to medial direction, and 20 ml of local anesthetic was deposited between the psoas tendon anteriorly and pubic ramus posteriorly

- PENG block: levobupivacaine 20 ml 0.25% 20 ml + 4 mg dexamethasone
- Femoral nerve block: levobupivacaine 0.5% 10 ml + 2 mg dexamethasone
- Lateral femoral cutaneous nerve block 0.5% 5 ml + 2 mg dexamethasone

Sedation used during all the surgery with propofol TCI mode 0.5 – 1 µg/ml.

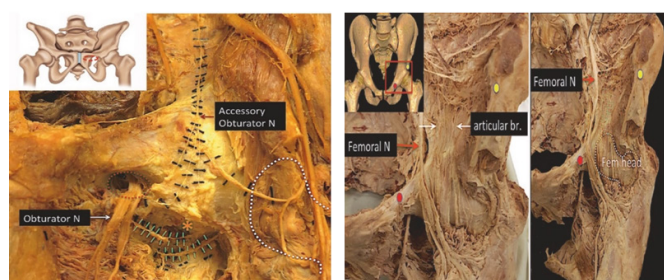


Figure 1 Sensory innervation of the anterior hip joint capsule (permission from Pr. Philip Peng).

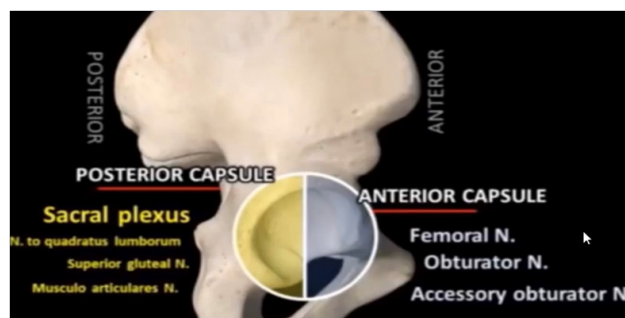


Figure 2 Anterior & posterior hip capsule innervation.

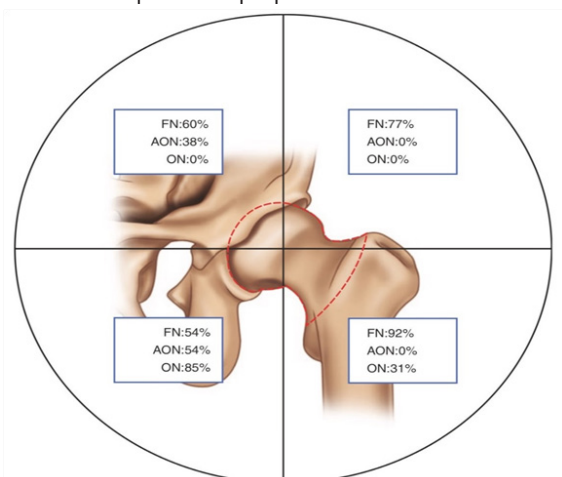


Figure 3 Contribution of various articular branches to the anterior hip capsule (with permission from Pr. Philip Peng).

Dose of local anesthetic adjusted according the weight for the patients (less than 60 kg, 2mg /kg given). Before the end of the surgery all the patients received 1 g paracetamol and 6 patients received 30 mg ketorolac (except 2 patients chronic kidney disease) as multimodal analgesia (Figure 5-7).

Results

All the patients (100%) didn't receive any opioids intraoperatively, good hemodynamic stability with heart rate (HR) variation between 54 – 78 bpm. In postoperative period, patients followed till 48 hrs post-surgery, all of them used only paracetamol 1g IV Q 6 Hour regular.

No PONV was seen with our group.

The numeric rating scale (NRS) of pain in the post-anesthesia care unit (PACU) and at 6, 12, 24 & 48 hr. after surgery were obtained. In

addition, opioids, NSADs & paracetamol usage was obtained for the first 6, 12, 24 & 48 hr. postoperatively (Table 1).

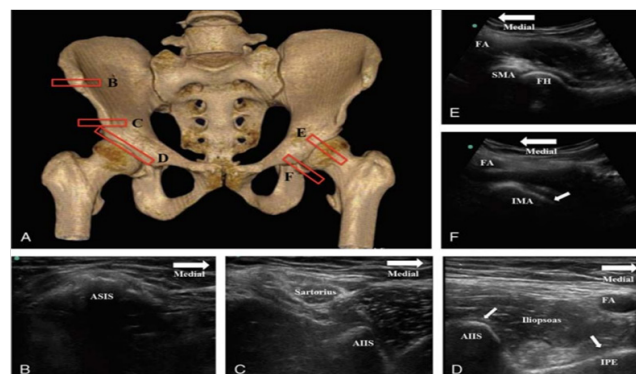


Figure 4 Ultrasound landmarks for image-guided injections of articular branches of anterior hip capsule.

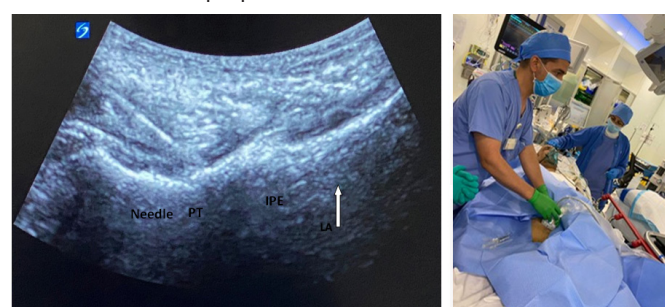


Figure 5 needle position beneath the psoas tendon (PT) with spread of local anesthetic (LA), iliopubic eminence (IPE).

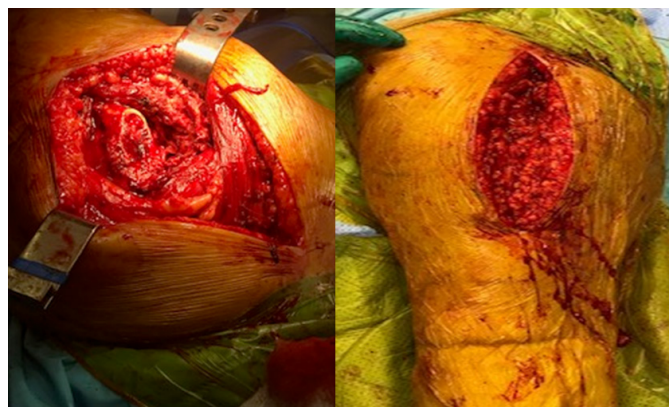
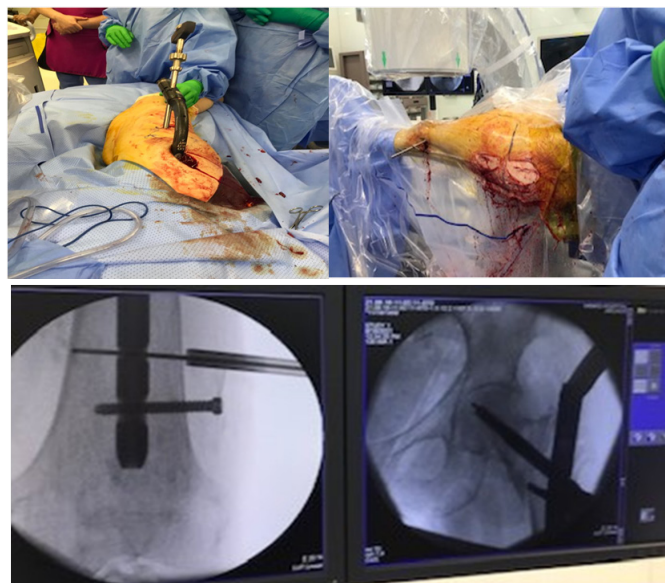


Figure 6 Hemiarthroplasty under regional anesthesia (PENG block + FN block + LFCN block).

In addition, post operative analgesia within the first 48 hrs was efficient, with good quality and early ambulation. Opioids & NSAIDs which can be harmful for elderly patients were not used in our group. There are some limitations to this case series such as small sample

size, retrospective study Design. At the same time, this case series explores a new approach for hemiarthroplasty & DHS surgery. Using PENG block combined with femoral & lateral femoral cutaneous nerves block to provide effective anesthesia and analgesia. Large sample size studies and randomized controlled trials are needed to further understand this new technique and bring good evidence.



Figures 7 Dynamic hip screw (DHS) under regional anesthesia (PENG block + femoral nerve block + lateral femoral cutaneous nerve block).

Table 1 Post-operative pain scores (numeric rating score NRS) of hemiarthroplasty and DHS patients

Case	Age	PACU	6 hrs.	12 hrs.	24 hrs.	48 hrs.
1	73	0	3	3	2	0
2	81	0	0	0	3	0
3	76	0	0	0	0	0
4	78	0	0	2	2	3
5	91	2	2	3	2	2
6	76	0	0	0	0	0
7	84	0	2	3	0	2
8	80	0	0	3	0	0

Conclusion

As a novel regional anesthesia approach for hip fracture, PENG block combined with femoral nerve (FN) block & lateral femoral cutaneous nerve (LFCN) block can be a good alternative option for elderly patients who will undergo hemiarthroplasty & dynamic hip screw (DHS).

Acknowledgments

None.

Conflicts of Interest

None.

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