

# PENG block experiences in high-risk hip fracture geriatric patients: Case Series

 Derya Özkan,<sup>1</sup>  Savaş Altınsoy,<sup>1</sup>  Sevda Gökçe Gürpınar,<sup>1</sup>  Mehmet Faruk Çatma<sup>2</sup>

<sup>1</sup>Department of Anesthesiology and Reanimation, Health Sciences University, Dışkapı Yıldırım Beyazıt Training and Research Hospital, Ankara, Türkiye

<sup>2</sup>Department of Orthopedics and Traumatology, Health Sciences University, Dışkapı Yıldırım Beyazıt Training and Research Hospital, Ankara, Türkiye

## SUMMARY

We aimed to share our experiences with pericapsular nerve group (PENG) block for perioperative analgesia in proximal femoral nailing for four frail elderly patients. PENG block is a novel technique for postoperative analgesia in hip surgery. Ultrasound-guided PENG block in hip fractures can relieve pain, contribute to intraoperative low-dose spinal anesthesia, and maintain postoperative analgesia.

**Keywords:** Hip fracture; pain management; PENG.

## Introduction

Osteoporosis-related hip fractures are a common cause of hospital admission in elderly people aged 65 years and above, forcing this group of patients to often undergo hip surgery. Proximal femoral nailing (PFN) is one of the most frequently applied techniques in hip fractures.<sup>[1]</sup> In recent years, the pericapsular nerve group (PENG) block has emerged as a novel technique for postoperative analgesia in hip surgery, revealing that the anterior hip joint injection of local anesthetic (LA) spreads to include the femoral (FN), obturator (ON), and accessory obturator (AON) nerves with the PENG block.<sup>[2]</sup> We aimed to share our experience with PENG block for perioperative analgesia in four elderly patients with comorbidity (frail index 3)<sup>[3]</sup> undergoing PFN surgery.

## Case Reports

Written informed consent was obtained from four patients. Patients received dexmedetomidine 1 mcg/kg over 10 min, then were transferred to the operating room. As the patients were in the supine position,

the curved probe was placed on the anterosuperior iliac spine and rotated at 45°. When the anterior inferior iliac spine, iliopubic eminence, psoas tendon, and femoral artery were visualized from lateral to medial, PENG block (30 mL 0.25% bupivacaine, 100 mm 20 G needle) was applied using the in-plane technique. The patient, whose pain decreased at the 20<sup>th</sup> minute after the block (numerical rating scale (NRS) 1–2), was placed in the lateral decubitus position with the fractured side down. Spinal anesthesia was performed with 5 mg 0.5% heavy bupivacaine. Sensorimotor pinprick block examination was performed in patients who were turned to the supine position, and surgery was initiated in the supine position.

Reductions were achieved by applying longitudinal traction and internal rotation. The proximal femoral nail was advanced with a 3–4 cm skin incision, 4–5 cm above the trochanteric prominence. After the nail was advanced to the appropriate level, the wire was sent for the neck screw. The height of the neck screw advancing at an angle of 130° was adjusted. The neck screw was fixed by adjusting the tip-apex distance un-

Submitted: 26.04.2022 Accepted: 23.05.2022 Available online: 10.04.2025

**Correspondence:** Dr. Sevda Gökçe Gürpınar. Sağlık Bilimleri Üniversitesi, Dışkapı Yıldırım Beyazıt Eğitim ve Araştırma Hastanesi, Anesteziyoloji ve Reanimasyon Kliniği, Ankara, Türkiye.  
Phone: +90 - 312 - 596 20 00 e-mail: sevdagokceerturkk@gmail.com



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**Table 1. Perioperative details of the patients**

	Age (yr)	Frail index/ comorbidity	Pre-block NRS	Post-block 20 <sup>th</sup> min NRS	NRS at rest PACU/2 <sup>nd</sup> h /12 <sup>th</sup> h /24 <sup>th</sup> h	NRS with movement PACU/2 <sup>nd</sup> h /12 <sup>th</sup> h / 24 <sup>th</sup> h
1	84	3 / systemic hypertension coronary artery disease diabetes mellitus	8	1	0/0/0/0	0/0/2/0
2	68	3 /coronary artery disease history of pulmonary embolism	9	5	2/2/2/2	3/2/4/3
3	70	3 /systemic hypertension chronic obstructive pulmonary diseases	10	4	0/0/0/0	0/2/2/0
4	76	2 /systemic hypertension coronary artery disease history of transient ischemic attack	9	4	0/0/2/0	0/0/2/0

NRS: Numeric Rating Scale; PACU: Postanesthetic Care Unit; Min: Minute.

der manual traction. Distal locking was achieved with a single screw using the system's static locking diverter.

With the onset of surgery, patients were given 1 g paracetamol, 50 mg dexketoprofen, and 8 mg dexamethasone IV. After the operation, on the same day, the patients were mobilized with a walker, with full weight-bearing. The patients were discharged on the second postoperative day. The perioperative details of the patients are shown in Table 1.

Effective anesthesia was achieved in all patients. The maximum sensory block level of the patients was T10. In the perioperative period, hemodynamics were stable in all patients. The surgical time was 65±15 minutes, and an average of 1200±150 mL intravenous volume was administered to the patients. No patient required vasoconstrictor administration. None of the patients needed intensive care and were followed up in the orthopedics service. In the 24-hour follow-up, the maximum NRS scores of the patients were 2 at rest and 4 with movement (thigh lift, knee flexion). No perioperative opioids were required in patients, who were given paracetamol orally twice a day on the second postoperative day.

## Discussion

Many elderly patients suffering from osteoporosis often experience a deterioration in bone microarchitecture, a decrease in physiological reserves, and a loss of bone mass. These frail patients also have co-

morbidities such as hypertension, coronary artery disease, and diabetes mellitus.<sup>[2]</sup> Although general anesthesia represents a safe option for hip surgery, single-shot spinal anesthesia is preferred in terms of reducing morbidity and protecting cognitive function. In addition, reducing intensive care needs and the hospital length of stay with spinal anesthesia may contribute to the postoperative morbidity of frail patients. Although spinal anesthesia is effective and safe, arterial hypotension due to sympathetic blockade is an undesirable condition, especially in the elderly with limited cardiac reserve.<sup>[4]</sup>

While reducing the dose of intrathecal local anesthetic is an option to decrease the effect of sympathetic block, this may cause block failure. Although adding opioids to low-dose local anesthetics can prevent block failure, side effects such as respiratory depression, nausea-vomiting, and itching may occur. Other techniques to prevent sympathetic blockade, such as volume preload or vasoconstrictor therapy, may pose problems in this elderly and comorbid population.

PENG block was developed to provide analgesia in patients with a hip fracture and targets the articular branches of the FN, ON, and AON to the hip capsule. There are reports of PENG blocks being used as surgical anesthetic techniques for hip arthroplasty or hip arthroscopy.<sup>[5,6]</sup> In our cases, the PENG block also provided effective analgesia, which allowed the use of low-dose local anesthetics in spinal anesthesia during PFN surgery.

## Conclusion

In conclusion, PENG block in hip fractures can relieve pain, contribute to intraoperative low-dose spinal anesthesia, and maintain postoperative analgesia. The effective analgesic effect of the PENG block in the perioperative period may contribute to reduced morbidity and improved rehabilitation, especially in frail patients. Prospective randomized controlled studies are needed to assess the effectiveness and safety outcomes of this technique.

**Authorship Contributions:** Concept – SGG; Design – SGG; Supervision – DÖ; Resource – SGG; Materials – SGG; Data collection and/or processing – SA; Analysis and/or interpretation – SGG; Literature review – FMÇ; Writing – SGG; Critical review – DÖ.

**Conflict-of-interest issues regarding the authorship or article:** None declared.

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Use of AI for Writing Assistance:** No artificial intelligence was used.

**Financial Disclosure:** The authors declared that this study has received no financial support.

**Peer-review:** Externally peer-reviewed.

## References

1. Chen DX, Yang L, Ding L, Li SY, Qi YN, Li Q. Perioperative outcomes in geriatric patients undergoing hip fracture surgery with different anesthesia techniques: A systematic review and meta-analysis. *Medicine (Baltimore)* 2019;98:e18220. [\[CrossRef\]](#)
2. Morley JE, Malmstrom TK, Miller DK. A simple frailty questionnaire (FRAIL) predicts outcomes in middle aged African Americans. *J Nutr Health Aging* 2012;16:601-8. [\[CrossRef\]](#)
3. Girón-Arango L, Peng PWH, Chin KJ, Brull R, Perlas A. Pericapsular nerve group (PENG) block for hip fracture. *Reg Anesth Pain Med* 2018;43:859-63. [\[CrossRef\]](#)
4. Tighe SQ. Ultra-low dose spinal anaesthesia for hip fracture surgery. *Anaesthesia* 2016;71:1242-3. [\[CrossRef\]](#)
5. Sandri M, Blasi A, De Blasi RA. PENG block and LIA as a possible anesthesia technique for total hip arthroplasty. *J Anesth* 2020;34:472-5. [\[CrossRef\]](#)
6. Talawar P, Tandon S, Tripathy DK, Kaushal A. Combined pericapsular nerve group and lateral femoral cutaneous nerve blocks for surgical anaesthesia in hip arthroscopy. *Indian J Anaesth* 2020;64:638-40. [\[CrossRef\]](#)