E-ISSN 2250-0944
ISSN 2250-1150
doi: 10.31838/ijprt/15.02.447

Research Article

A Case Series on Ultra Sound Guided Peng Block for Postoperative Analgesia in Patients Undergoing Proximal Femur Nailing

Dr M Suchitra[1], Dr. Vineet Reddy G[2], Dr.Asha latha[3], Dr.Subhashree J[4*]
[1,2,3,4]Assistant professor, Dept. of Anaesthesiology, BIRRD(T) Hospital, Tirupati.
Corresponding author: Dr. Subhashree J. Email: drswapnaa@gmail.com
Received: 05.10.25, Revised: 11.11.25, Accepted: 26.11.25

ABSTRACT
Background: Hip fracture is most common major injury in the elderly and important cause of mortality and morbidity. Pain free rehabilitation followed by early mobilization are required for clinical and functional recovery after proximal femur fracture. PEricapsular Nerve Group (PENG)should always be conducted in addition to spinal or general anesthesia to prolong postop analgesia. PENG block appears to be less invasive more effective compared to other methods. **Materials &Methods**: we conducted a case series of 20 cases of age group 50-75 undergoing elective surgery posted for PFN.they were given ultrasound guided PENG blockwith 20 ml of 0.25% bupivacaine for post op analgesia**. Results** Pain intensity was measured using NRS score every 2nd hour for upto 12 hours postoperatively. Most of the patients reported NRS score of 2-3 up to 8 hours representing mild pain and NRS score of 4 representing moderate pain in the next 4 hours. **Conclusion**: PENG block provides good postop analgesia in the first 12 hrs of immediate postop period in patients underwent PFN.

Keywords: Pericapsular Nerve Group (PENG) Block, Postop analgesia, NRS score, Proximal femoral Nailing, Bupivacaine

INTRODUCTION

Femoral fractures are common in elderly patients associated with high morbidity and mortality [1]. PENG block is an safe ultrasound guided regional anesthesia technic that provides effective postop analgesia which reduces perioperative morbidity by lowering the incidence of post op delirium and duration of hospital stay [1]. Adequate and early mobilization followed by effective and pain-free rehabilitation and a multimodal perioperative analgesia, which minimizes the need for opioids and related adverse effects, such as delirium, are critical for clinical and functional recovery in the elderly patient population [1]. Perioperative analgesia can be guaranteed by using various techniques, such as intravenous administration of analgesic drugs, including opioids, paracetamol, or non-steroidal anti-inflammatory drugs; neuraxial analgesia [2]; blockade of peripheral nerves; and local analgesic infiltration [3-8].

Opioids are very effective pain control drugs in patients with proximal femur fracture,and they should be used with caution in the elderly due to the risk of impaired kidney function and respiratory depression [9]. Other side effects include nausea, confusion, constipation, urinary retention, and development of tolerance.

Tramadol, an atypical central opioid analgesic, also needs a modified dosage in case of liver or kidney failure and is associated with a higher risk of delirium and seizures [10].Paracetamol is widely used, and due to its safety profile it is the first choice of analgesic drugs in the elderly.

The maximum intravenous dose is 1 g every 6 h, with dose reduction in selected cases; in patients with proximal femoral fracture, scheduled paracetamol administration should continue throughout the perioperative period [4]

NSAIDs should be used with extreme caution in patients with hip fractures, and they are contraindicated in patients with renal dysfunction [5].

Peripheral nerve blocks have an analgesic efficacy equal to that of the epidural technique[11]; the analgesic effect can last longer in relation to the anesthetic agent used,and this facilitates rehabilitation [12]. Various approaches exist for pain control through a peripheral nerve block.

A peripheral nerve block should always be considered in addition to spinal or general anesthesia, so as to prolong the period of opioid-free postoperative analgesia [13-16].

The anterior hip capsule is innervated by the Obturator Nerve (ON), Accessory Obturator

Nerve (AON), and FN, as reported by previous anatomic studies. The anterior capsule is the most richly innervated section of the joint [17], suggesting that these nerves should be the main targets for hip analgesia .

Short et al. have confirmed that branches of the FN (in 100% of cases) as well as to the ON (in 100% of cases) provide the innervation for the anterior hip capsule, to which the OAN contributes in about 53% of cases. In addition, this study has determined the relationship between capsular branches and the bony landmarks [18].

Girón-Arango et al. have developed an ultrasound-guided technique for blocking these branches to the hip, the PENG (pericapsular nerve group) block [17].

MATERIALS AND METHODS

Our study includes case seies of 20 patients undergoing proximal femur nailing for intertrochantric fractures.

Inclusion criteria:

1. Age 50-80 years.
2. ASA Grade I-II

Exclusion Criteria:

1.ASA Grade III & IV
2.patient refusal
3.coagulopathies
4.Allergic to local anesthetics

All patients were given combined spinal and epidural anesthesia with 12.5 mg of levo-bupivacaine intra thecally in sitting position epidural anesthesia was initiated only in the patients who needs the prolongation of anesthesia intraoperatively and not continued in any of the patients post operatively. Peng block was performed postoperatively with ultrasound guided technique high frequency probe in plane approach . The probe was initially placed in a horizontal plane above the anterior inferior iliac spine and rotating the probe approximately 45 degrees to align with the pubic rami and visualizing the ileopectineal eminence, tendon, iliopsoas muscle ,femoral artery and pectineal muscle. A 21 G needle was inserted in the latero medial direction positioning the tip in the muscle –fascial plane between the tendon of the psoas muscle anteriorly and the pubic branch posteriorly. After negative aspiration of 20 ml of 0.25 bupivacaine was injected all patients were received 1g IV paracetamol every 8th hourly post operatively. IV tramadol was used as rescue analgesia when NRS score $\geq$ 4 with in 12 hours.Pain score was assessed using NRS.

NRS scale[19] is a pain assessment tool indicating pain severity on a scale of 0 -10.

TABLE 1: NRS scale

NRS Scale	Severity of pain
0	No Pain
1-3	Mild Pain
4-6	Moderate Pain
7-9	Severe Pain
10	Worst Possible Pain

Duration of analgesia is defined as time from administration of block to the time of first rescue analgesia request.Complaints of nausea, vomting, shivering were noted.

RESULTS

The Age range of patients in this case series was between 46 and 87 years old, mean age was 67.10 with a standard deviation of 10.427 (table 5). Among 20 patients 8(40%) were females while 12(60%) were males (Table 2).

Table 2 Gender

Gender		Frequency	Percent
	F	8	40.0
	M	12	60.0
	Total	20	100.0

Table 3 ASA Grade

ASA grade		Frequency	Percent
	I	3	15.0
	II	17	85.0

	Total	20	100.0

15% of total patients were ASA grade I , while 85% with ASA Grade II.(Table 3).11(55%) out of 20 patients were underwent left PFN and 9(45%) underwent Right PFN

Table 4 Surgical Procedure

Surgical Procedure		Frequency	Percent
	Lt pfn	11	55.0
	Rt pfn	9	45.0
	Total	20	100.0

Pain intensity was measured using NRS score every 2nd hour for upto 12 hours postoperatively. Most of the patients reported NRS score of 2 up to 8 hours representing mild pain and NRS score of 4 representing moderate pain in the next 4 hours.

On evaluation Minimum and maximum duration of first rescue analgesia was 360 & 675 minutes respectively with a mean of 537 minutes with a SD of 94.707 (Table 5).

No side effects/ complications were reported among all the total 20 patients.

Table 5 Age & Duration of 1st rescue analgesia (min)

	N	Range	Minimum	Maximum	Mean	Std. Deviation
Age(years)	20	41	46	87	67.10	10.427
Duration for First rescue analgesia in minutes	20	315	360	675	537.00	94.707

DISCUSSION

Postoperative pain is one of the factors that can increase morbidity and mortality due to patient dissatisfaction, delayed mobilization, and the risk of developing cardiac and pulmonary complications, as well as chronic pain [20].

PEricapsular Nerve Group (PENG) [1].should always be conducted in addition to spinal or general anesthesia to prolong postop analgesia. PENG block appears to be less invasive more effective compared to other methods.

In our study, Pain intensity was measured using NRS score every 2nd hour for upto 12 hours postoperatively. Most of the patients reported NRS score of 2-3 up to 8 hours representing mild pain and NRS score of 4 representing moderate pain in the next 4 hours.

Present study shows Minimum and maximum duration of first rescue analgesia was 360 & 675 minutes respectively with a mean of 537 minutes with a SD of 94.707 (Table 5).

Dicle Deri Turkan, et al.reported that there was a significant reduction in postoperative NRS score with peng block which was similar to our study where there was low NRS score postoperatively[21].

Similarly, Sahoo et al. [22] applied preoperative PENG block in a total of 9 patients undergoing hip fracture surgery and observed that there were low pain levels which was similar to our study ,we have applied the PENG block postoperatively

A recent scoping review, involving 20 articles and 74 patients, showed that the PENG block provides sufficient analgesia or anesthesia [23]. The PENG block has the advantage of being a pericapsular block and is able to involve the articular branches of the FN but also those of the ON and AON. It is a highly selective block that cannot lead to a reduction in quadriceps muscle strength, allowing for early rehabilitation[17].

Huda et al. [24] evaluated six randomized controlled trials comparing patients who underwent PENG block and those who did not in a meta-analysis and investigated, postoperative pain control, and block-related adverse effects in patients undergoing hip surgery with PENG block. In that meta-analysis, the investigators found out that in patients who received PENG block, the time to first rescue analgesia was significantly longer which was similar to our study.

A randomized clinical trial that enrolled 60 patients showed the great efficiency of the

PENG block in patient placement for subarachnoid anesthesia, and also improved comfort and analgesia of the patient in the postoperative period similar to our present study. These results can be explained by the spread of local anesthetic through the involvement of the OAN [25].

Xufeng et al. have shown that this technique reduces the median NRS score by three points as in our study and lessens morphine use highlighting, the greater safety of this technique and suggesting that it could also be an elective technique for hip fracture patients planned for conservative treatment [26].

Pascarella et al. [27] reported that patients who underwent PENG block had lower pain scores similar to our present study.

CONCLUSION

In our study, there is significant decrease in postoperative pain and time to first rescue analgesia was longer who were given PENG block. There were no significant adverse side effects and hence it has been concluded that PENG block is an effective and safe analgesic method and also a significant part of multimodal analgesia in post op pain control in proximal femur fractures. Its safety profile is one of the technique of choice in elderly patients undergoing surgery for Proximal femur Nailing.

REFERENCES

1. Donatiello, V., Alfieri, A., Mazza, M.C. *et al*. PENG block in elderly patients with hip fracture: less is more? A prospective observational monocentric study. *J Anesth Analg Crit Care* **5**, 46 (2025). https://doi.org/10.1186/s44158-025-00265-8
2. Tosounidis, T.H.; Sheikh, H.; Stone, M.H.; Giannoudis, P.V. Pain relief management following proximal femoral fractures: Options, issues and controversies. Injury 2015, 46, S52–S58. [CrossRef]
3. Freye, E.; Levy, J.V. Use of opioids in the elderly–pharmacokinetic and pharmaco dynamic considerations. Anasthesiol. Intensiv. Notfallmed. Schmerzther. 2004, 39, 527–537. [CrossRef]
4. Liukas, A.; Kuusniemi, K.; Aantaa, R.; Virolainen, P.; Niemi, M.; Neuvonen, P.J.; Olkkola, K.T. Pharmacokinetics of Intravenous Paracetamol in Elderly Patients. Clin. Pharmacokinet. 2011, 50, 121–129. [CrossRef]
5. Geusens, P.; Emans, P.J.; De Jong, J.J.; Van den Bergh, J. NSAIDs and fracture healing. Curr. Opin. Rheumatol. 2013, 25, 524–531. [CrossRef] [PubMed]
6. Chau, D.L.; Walker, V.; Pai, L.; Cho, L.M. Opiates and elderly: Use and side effects. Clin. Interv. Aging 2008, 3, 273–278. [CrossRef]
7. Peng, P.W.; Sandler, A.N. A review of the use of fentanyl analgesia in the management of acute pain in adults. Anesthesiology 1999, 90, 576–599. [CrossRef]
8. Di Minno, M.; Milone, M.; Russolillo, A.; Lupoli, R.; Di Minno, A.; Maietta, P.; Iacovazzo, C.; Salvatore, G.; Milone, F. Ropivacaine infusion in diabetics subject with peripheral arterial disease. A prospective study. Exp. Clin. Endocrinol. Diabetes 2012, 121, 91–93. [CrossRef]
9. Janssens, W.H.; Noortgate, N.J.V.D.; Mouton, V.; Desmet, P.; Van Puyvelde, K.; Steen, E.; Maere, C.; Van Mulders, K.; De Raes, E.; Dekoninck, J.; et al. Opioids in geriatric units in 14 Belgian hospitals: Prevalence, dosage and associated factors. Ann. Med. 2024, 56, 2310132. [CrossRef] [PubMed]
10. Sansone, R.A.; Sansone, L.A. Tramadol: Seizures, serotonin syndrome, and coad- ministered antidepressants. Psychiatry 2009, 6, 17–21. [PubMed]
11. Marhofer, P.; Našel, C.; Sitzwohl, C.; Kapral, S. Magnetic resonance imaging of the distribution of local anesthetic during the three-in-one block. Anesth. Analg. 2000, 90, 119–124. [CrossRef] [PubMed]
12. Dyer, S.M.; Crotty, M.; Fairhall, N.; Magaziner, J.; Beaupre, L.A.; Cameron, I.D.; Sherrington, C.; Fragility Fracture Network (FFN) Rehabilitation Research Special Interest Group. A critical review of the long-term disability outcomes following hip fracture. BMC Geriatr. 2016, 16, 158. [CrossRef] [PubMed]
13. Hsu, Y.-P.; Hsu, C.-W.; Chu, K.C.W.; Huang, W.-C.; Bai, C.-H.; Huang, C.-J.; Cheng, S.-W.; Chen, J.-H.; Chen, C. Efficacy and safety of femoral nerve block for the positioning of femur fracture patients before a spinal block—A systematic review and meta-analysis. PLoS ONE 2019, 14, e0216337. [CrossRef]

14. Hartmann, F.V.G.; Novaes, M.R.C.G.; de Carvalho, M.R. Femoral nerve block versus intravenous fentanyl in adult patients with hip fractures—A systematic review. Rev. Bras. Anestesiol. 2017, 67, 67–71. [CrossRef] [PubMed]
15. Milone, M.; Di Minno, M.N.D.; Musella, M.; Maietta, P.; Iacovazzo, C.; Milone, F. Ultrasound-guided transversus abdominis plane block for retroperitoneal varicocele repair. Could it be an anesthesia method? Updates Surg. 2013, 65, 225–230. [CrossRef] [PubMed]
16. Lin, C.; Darling, C.; Tsui, B.C.H. Practical Regional Anesthesia Guide for Elderly Patients. Drugs Aging 2019, 36, 213–234. [CrossRef] [PubMed] 35. Wertheimer, L.G. The Sensory Nerves of the Hip Joint. J. Bone Jt. Surg. 1952, 34, 477–487. [CrossRef]
17. Girón-Arango, L.; Peng, P.W.; Chin, K.J.; Brull, R.; Perlas, A. Pericapsular nerve group (PENG) block for hip fracture. Reg. Anesth. Pain Med. 2018, 43, 859–863. [CrossRef] [PubMed]
18. Short, A.J.; Barnett, J.J.G.; Gofeld, M.; Baig, E.; Lam, K.; Agur, A.M.; Peng, P.W. Anatomic study of innervation of the anterior hip capsule: Implication for image-guided intervention. Reg. Anesth. Pain Med. 2018, 43, 186–192. [CrossRef] [PubMed]
19. Breivik H, Borchgrevink PC, Allen SM, et al. Assessment of pain. Br J Anaesth 2008;101(1):17–24. [DOI] [PubMed] [Google Scholar]
20. Gerbershagen HJ, Aduckathil S, van Wijck AJ, Peelen LM, Kalkman CJ, Meissner W, et al. Pain intensity on the first day after surgery: a prospective cohort study comparing 179 surgical procedures. Anesthesiology. 2013; 118: 934–944.
21. Dicle Deri Turkan, Zeliha Tuncel, Hale Arkan Tuna. Effects of pericapsular nerve group block on patients under spinal anesthesia for total hip arthroplasty: a randomized, controlled, double-blind study. Signa Vitae. 2025. 21(4);70-76.
22. Sahoo, R.K.; Jadon, A.; Sharma, S.K.; Peng, P.W.H. Peri-capsular nerve group block provides excellent analgesia in hip fractures and positioning for spinal anaesthesia: A prospective cohort study. Indian J. Anaesth. 2020, 64, 898–900. [CrossRef]
23. Morrison, C.; Brown, B.; Lin, D.-Y.; Jaarsma, R.; Kroon, H. Analgesia and anesthesia using the pericapsular nerve group block in hip surgery and hip fracture: A scoping review. Reg. Anesth. Pain Med. 2020, 46, 169–175. [CrossRef]
24. Huda AU, Ghafoor H. The use of pericapsular nerve group (PENG) block in hip surgeries is associated with a reduction in opioid consumption, less motor block, and better patient satisfaction: a meta-analysis. Cureus. 2022; 14: e28872.
25. Chaudhary K., Chaudhary K., Bose N., Bose N., Tanna D., Tanna D., Chandnani A., Chandnani A. Ultrasound-guided pericapsular nerve group (PENG) block versus femoral nerve block for positioning during spinal anaesthesia in proximal femur fractures: A randomised comparative study. Indian J. Anaesth. 2023;67:913–919. doi: 10.4103/ija.ija_553_23. [DOI] [PMC free article] [PubMed] [Google Scholar]
26. Lin X., Liu C.W., Goh Q.Y., Sim E.Y., Chan S.K.T., Lim Z.W., Chan D.X.H. Pericapsular nerve group (PENG) block for early pain management of elderly patients with hip fracture: A single-center double-blind randomized controlled trial. Reg. Anesth. Pain Med. 2023;48:535–539. doi: 10.1136/rapm-2022-104117. [DOI] [PubMed] [Google Scholar]
27. Pascarella G, Costa F, Del Buono R, Pulitanò R, Strumia A, Piliego C, et al. Impact of the pericapsular nerve group (PENG) block on postoperative analgesia and functional recovery following total hip arthroplasty: a randomised, observer-masked, controlled trial. Anaesthesia. 2021; 76: 1492–1498.