International Journal of Life Sciences, Biotechnology and Pharma Research Vol. 14, No. 2, February 2025 Online ISSN: 2250-3137
Print ISSN: 2977-0122

DOI: 10.69605/ijlbpr_14.2.2025.34

ORIGINAL RESEARCH

Ultrasound guided comparative study of pericapsular nerve group block vs fascia iliaca block in preoperative positioning in elderly patients with hip fractures - a double blinded randomized controlled trial

[1]Dr. R Sathiyamoorthy, [2]Dr. Prema N, [3]Dr. P Meena

[1]Junior Resident, [2]Senior Resident, Department of Anesthesia, Govt Krishnagiri Medical College and Hospital, India
[3]Assistant Professor, Department of Anesthesia, Govt Thiruvannamalai Medical College and Hospital, India

Corresponding Author
Dr. R Sathiyamoorthy
Junior Resident, Department of Anesthesia, Govt Krishnagiri Medical College and Hospital, India

Received: 26 December, 2024 Accepted: 17 January, 2025 Published: 07 February, 2025

ABSTRACT

Introduction: Anesthesia is given to millions of patients every year in relation with wide range of medical, surgical and obstetric procedures. Appropriate patient position will aid in the proper physiologic function during pathophysiologic processes and provide the access to certain anatomical locations during surgical procedures. Multiple factors have to be taken into account when choosing the patient's position. These factors like patient age, weight, and past medical history, including respiratory, circulatory disorders has to be considered. Aim of this study is to compare Pericapsular nerve group block with Fascia iliaca block for preoperative patient positioning in hip fracture surgery using Visual analog score and also to compare hemodynamic parameters. **Methodology:** The study was designed as the double-blinded Randomized controlled trial and was conducted in the Department of Anesthesiology. The study was conducted in patients posted for hip fracture surgery under Neuraxial blockade in 56 patients. Group P – Patients who recieved pericapsular nerve group block (PENG BLOCK) Group F - Patients who received FASCIA ILIACA BLOCK. Each group had 28 patients. Numerical Rating Scale (NRS) and Visual Analog Scale (VAS) were used for assessing the pain. Hemodynamic Parameters-HR, SPO2, SBP, DBP, MAP before administration of central neuraxial block were also analyzed. **Results:** Our study showed that the difference between the two groups in VAS score at after block and after positioning was found to be statistically significant. About 42.9% of the participants who received the Fascia Iliac block were in grade 3, followed by grade 2 (32.1%), then grade 1 and grade 4. About 78.6% of those given PENG block are in grade 1, followed by grade 2 (14.3%), grade 3 (7.1%). No patient showed grade 4 VAS. The difference between the two groups in no of attempts was not statistically significant. The difference between the two groups in terms of ease of spinal position was statistically significant. Hemodynamic parameters were better in PENG block. **Conclusion:** The study was conducted to compare the efficacy of ultrasound guided PENG block and Fascia Iliac block in patients with hip fractures posted for surgery. The study result showed that PENG block was effective than the other group in terms of improved pain score assessed by means of VAS and better hemodynamic profile compared to fascia iliaca group.

Keywords: pericapsular nerve group block, fascia ilica bloc, VAS scale.

INTRODUCTION

All types of analgesia, unconsciousness, paralysis, and forgetfulness are included under anesthesia. Preoperative, intraoperative, and postoperative pain management should all be addressed. The stress reaction brought on by perioperative pain triggers the autonomic nervous system, which in turn impacts multiple organs. Intravenous medications such as NSAIDS, opioids, epidural analgesia, peripheral nerve blocks, and local infiltration of anesthetics are among the different methods utilized for pain management. Neuraxial blockade cannot be performed successfully unless the patient is positioned appropriately.

By preventing impulse transmission distally in a nerve terminal, peripheral nerve blocks prevent the cortex from sensing pain. Nerve blocks have been shown to

DOI: 10.69605/ijlbpr_14.2.2025.34

be effective in treating acute pain in the extremities, providing anesthesia for procedures in the extremities, and serving as an alternative to opioids for pain management. For example, brachial plexus, popliteal, sciatic, femoral, celiac, ulnar, median, and radial nerve blocks are the most often performed nerve blocks.

In order to facilitate patient positioning for neraxial blockade and to give great postoperative analgesia, nerve blocks are increasingly employed to deliver efficient analgesia. One of the most common nerve blocks used to give analgesia while a patient is being positioned is fascia iliaca. One more recent type of nerve block is the PENG block, which is most frequently used for postoperative analgesia and to help with patient placement.

Hip fractures are common orthopedic issues that have a high morbidity and death rate, particularly in the aged population. For the majority of patients, early surgical reduction and fixation is the recommended course of action.

The most popular anesthetic technique for treating these fractures is neuraxial blocking. Severe fracture-related pain makes it difficult to position oneself optimally for these treatments, which makes it difficult to access the subarchnoid region. Recovery and increasing opioid use might result from inadequate surgical analgesia, which limits limb mobility.

Peripheral nerve blocks have been considered widely as technological advancements that has improved accuracy, efficacy, and safety. Peripheral nerve blocks was actually performed by eliciting paresthesia's to localize peripheral nerves, followed years later by using the techniques of nerve stimulation. More recently, ultrasound guidance has helped the anesthesiologists' to improve their abilities to visualize nerve structures and other surrounding structures (like, vasculature and pleura).[1,2]

For patient positioning prior to surgery, lower extremity blocks, such as fascia iliaca blocks, are a common analgesic treatment. PENG block is a more contemporary block that offers hip fracture patients adequate analgesia for preoperative patient placement. Targeting the terminal sensory articular nerve branches of the femoral, obturator, and auxiliary obturator nerves, the pericapsular nerve group (PENG) block has recently been proposed as a potential treatment for pain resulting from hip or pelvic fractures. For preoperative patient positioning for successful neuraxial blockade, we evaluated the analgesic efficacy of ultrasound-guided fasica iliaca block with peng block.

Proper physiologic function during pathophysiologic processes and neuraxial bloakade can be facilitated by appropriate patient posture. When deciding on the patient's position, several considerations must be made. It was necessary to take into account the patient's age, weight, and previous medical history, which included respiratory and circulatory conditions. Our study's objective is to evaluate the effectiveness of fascia iliaca versus ultrasound-guided pericapsular nerve group block. In order to facilitate central neuraxial blockage in terms of ease of positioning by VAS score, older patients with hip fractures should have their preoperative patient positioning blocked. Also to compare the hemodynamic parameters as well.

MATERIALS AND METHODS

The study was designed as the double-blinded Randomized controlled trial and was conducted in the Department of Anesthesiology, orthopedic operation Theatre at a tertiary care teaching hospital for a period of 18 months. The study was conducted in patients posted for hip fracture surgery under Neuraxial blockade depending upon the inclusion and exclusion criteria. Considering an estimated mean difference (μ_1 - μ_2) between NRS score after 10 min in PENG block and Fascia Iliaca block as 3 the sample size required for each group was 28 and the total sample size for the study was 56.

Patients of age above 50 years of either sex, ASA grade class I and II, patients posted electively for hip fracture surgery under SAB and BMI <30 were included. Patients refusal for procedure, Infection at the site of injection , Allergy to the study drugs used. Aand with systemic illness were excluded.

Group P – Patients who recieved pericapsular nerve group block (PENG BLOCK) Group F - Patients who received FASCIA ILIACA BLOCK. Each group had 28 patients. The study population were randomly divided in two groups with each group divided in to 28 each using simple randomization double blinded closed envelope technique. Institutional ethical committee was obtained. Informed consent were obtained from the patients on whom the block was performed.

Preoperatively patients were assessed. After explaining the procedure to the patient, informed written consent were obtained. They were assessed for any contraindications. Overnight fasting was advised. Numerical Rating Scale (NRS) and Visual Analog Scale (VAS) were used for assessing the pain. The scale was elaborately explained to the patient preoperatively. Hemodynamic Parameters - HR, SPO2, SBP, DBP, MAP before administration of central neuraxial block were also analyzed. Patients' sitting angle comfort was analyzed before administration of central neuraxial block after administering peng block and fascia iliaca block. Ease for positioning was categorized using patient sitting angle as Good, Average and Poor. Number of attempts taken to perform successful central neuraxial blockade between the two groups were compared.

Demographic data, (age, weight, height, body mass index) were compared using one-way analysis of variance (ANOVA), and sex distribution were compared by using Chi-square test. Quantitative data were given in descriptive statistics like mean, percent-

DOI: 10.69605/ijlbpr_14.2.2025.34

ages. Inferential statistics like 1.Vas score, 2.Ease of positioning for SAB, 3.No of attempts to perform blockade, 4.time for CSF flow, 5.anaesthesiologist satisfaction were made using t test and chi square test.

RESULTS

The study was conducted among 56 participants. 28 were given Fascia Iliac Block (GROUP F) and 28 were given PENG block (GROUP P). The Mean (SD) age of patients were 66yrs, the difference between the two groups in terms of age were statistically insignificant with p value (0.40). The mean difference between the two groups in terms of gender were statistically not significant with a p value of 1.00. The mean difference between the two groups in terms of height, weight, and BMI were comparable and statistically insignificant.

Table 1: Ease of Positioning for Central Neuraxial Block

S. No	Patient sitting angle	Group F		Group P	
		N	%	N	%
1	Good	2	7.1%	23	82.1%
2	Average	20	71.4%	3	10.7%
3	Poor	6	21.4%	2	7.1%
	Total	28	100%	28	100%
p <0.0001 – Statistically significant difference is present (Fischer exact test)					

The difference between the two groups in patient sitting angle was statistically significant p value (<0.0001).

The difference between the two groups in VAS score at after block and after positioning was found to be statistically significant p value (<0.05).

Table 2: VAS score after positioning

S. No	Grade	Group F		Group P	
		N	%	N	%
1	1	4	14.3%	22	78.6%
2	2	9	32.1%	4	14.3%
3	3	12	42.9%	2	7.1%
4	4	3	10.7%	0	0%
	Total	28	100%	28	100%
p value <0.001 – Statistically significant (Fischer exact test)					

The difference between the two groups in terms of SPO2 at 0 min, 5 min, 10 min, 15 min, 20 min, 30 min and after positioning was not statistically significant p value (>0.05).

The difference between the two groups with respect to HR at 0 , 5, 15, 20 minutes was not statistically significant but the difference between the two groups with respect to HR at 10 min, 30 min and after positioning was statistically significant with a p value of <0.001.

The difference between the two groups with respect to SBP at 0, 5, 10, 30 minutes were not statistically significant but the difference between the two groups in terms of SBP at 15 min, 20 min and after positioning was statistically significant p value (<0.05).

The difference between the two groups with respect to DBP at 0, 5mts were not statistically significant but the difference between the two groups with respect to DBP at 10 min, 15 min, 20 min, 30 min and after positioning was statistically significant p value (<0.0001).

The difference between the two groups in MAP at 10 min, 15 min, 20 min, 30 min and after positioning was statistically significant with a p value of <0.001.

DISCUSSION

An essential component of anesthesiology, pain management requires proper attention. Both during and after surgery, pain management must be addressed. The stress reaction brought on by perioperative pain triggers the autonomic nervous system, which in turn impacts several organ systems. Peripheral nerve blocks are thought to prevent impulses from traveling distally in a nerve terminal, preventing the cortex from sensing pain. To make it easier to position patients for spinal anesthesia, several regional blocks were used. Blocking the articular branches leading to the hip joint is the basis of the more modern regional approach known as pericapsular nerve group block (PENG). Another common nerve block used for preoperative patient placement is fascia iliaca.. In this study, we compared the analgesic efficiency of ultrasound guided PENG block versus Fascia iliaca block to facilitate the patient positioning in Central Neuraxial blockade.

The study results showed that the mean age of patients was 66 years for both groups. The mean weight of

DOI: 10.69605/ijlbpr_14.2.2025.34

patients who received fascia iliaca block and peng block was 74.11 kg and 73.25 kg respectively. The mean height of patients who received fascia iliaca block and peng block was 168cm and 168 cm respectively. The mean BMI of patients received fascia iliaca block and peng block was 26.2 and 25.6 respectively. The two groups were comparable with respect to age, gender, weight, height, BMI.

The VAS score at baseline, after block and after positioning was noted and compared. The mean VAS baseline score among patients who received FIB and peng block was 6 and 6 respectively. The mean VAS after block score among patients who received FIB was 5 and 2 respectively. The mean VAS after positioning score among patients who received FIB and PENG block was 4 and 0.6 respectively. The difference between the two groups in VAS score at after block and after positioning was found to be statistically significant.

About 42.9% of the participants who received the FIB were in grade 3, followed by grade 2 (32.1%), then grade 1(14%) and grade 4(10%). About 78.6% of those given PENG block were in grade 1, followed by grade 2 (14.3%), grade 3 (7.1%). No patient showed grade 4 VAS. The difference between the two groups in VAS grade after positioning was statistically significant. A study done by D Yin Lin et al.,[3] showed that the PENG group patients found to have less pain when compared with the FIB group.

According to a study by Celine Allard et al.,[4] there were no statistically significant differences between FNB and peng block in terms of the duration of hospital stay, the occurrence of morphine-related side effects, the delay to ambulation, or the level of post-operative pain. According to a study by Mosaffa F et al.,[5], the VAS score was considerably lower in the PENG block group than in the FICB group after 15 minutes of blocks and 12 hours following surgery. According to a study by Alrefaey et al.,[6], the PENG block was linked to statistically significant reductions in pain levels in comparison to the control group. A study by Natarajan P et al [7], PENG block showed better postoperative analgesia, with minimal requirement of rescue analgesics in 24h when compared to FICB in patients having surgeries for hip fracture under spinal anesthesia.

A study done by Senthil KS et al.[8] showed that there was no significant difference in the duration of analgesia and dynamic pain grades between the peng block and fasicia iliaca block, but there was notable difference in Visual Analog Pain score. A study done by Aliste J et al.[9] showed that no clinically significant intergroup differences were found between Peng and fascia Iliaca block with respect to postoperative pain scores. In conclusion, as with most of the studies, our study results also showed that the pain control was better in PENG group with the p value <0.001, which was statistically significant.

Our study results showed that the difference between the two groups in VAS score at after block and after positioning was found to be statistically significant with p value of <0.001. The difference between the two groups in VAS grade after positioning was statistically significant with the p value of <0.001.

The Mean no of attempts to perform central neuraxial block among patients received FIB and peng block was 1.24, and 1.28 with p value (>0.05) which was statistically insignificant. About 71.4% of those received FICB had average ease of spinal position. About 82.1% of those received PENG block had good ease of spinal position. The difference between the two groups in ease for spinal position was statistically significant with a p value of <0.05. About 82.1% of those given peng block were satisfied.

The difference between the two groups in terms of SPO2 at 0 min, 5 min, 10 min, 15 min, 20 min, 30 min and after positioning was not statistically significant p value (>0.05).

The difference between the two groups with respect to HR at 0 , 5, 15, 20 minutes was not statistically significant but the difference between the two groups with respect to HR at 10 min, 30 min and after positioning was statistically significant with a p value of <0.001.

The difference between the two groups with respect to SBP at 0, 5, 10, 30 minutes were not statistically significant but the difference between the two groups in terms of SBP at 15 min, 20 min and after positioning was statistically significant p value (<0.05).

The difference between the two groups with respect to DBP at 0, 5mts were not statistically significant but the difference between the two groups with respect to DBP at 10 min, 15 min, 20 min, 30 min and after positioning was statistically significant p value (<0.0001).

The difference between the two groups in MAP at 10 min, 15 min, 20 min, 30 min and after positioning was statistically significant with a p value of <0.001 whereas the study done by Alrefaey et al.,[6] showed significant difference at 20 min and after positioning with a p value of <0.001.

CONCLUSION

Based on our research, we found that in older patients with hip fractures, pericapsular nerve group block was superior to fascia iliaca block in terms of positioning ease for central neuraxial block. Additionally, prior to the administration of central neuraxial block, pericapsular nerve group block improved the hemodynamic profile of patients with hip fractures.

BIBILIOGRAPHY

1. Sivakumar RK, Panneerselvam S, Cherian A, Rudingwa P, Menon J. Peri- neural vs. intravenous dexmedetomidine as an adjunct to bupivacaine in ul-trasound guided fascia iliaca compartment block for femur surgeries: A ran- domised control trial. Indian J Anaesth. 2018 Nov;62(11):851-857.
2. Ma YH, Wu J, Jia B, Xue JX, Wang TL. [Continuous

DOI: 10.69605/ijlbpr_14.2.2025.34

fascia iliaca compart- ment block combined with oral analgesics for pre-operative pain control in elderly hip fracture patients]. Zhonghua Yi XueZaZhi. 2018 Mar 13;98(10):723-727

3. Lin DY, Morrison C, Brown B, Saies AA, Pawar R, Vermeulen M, Ander- son SR, Lee TS, Doornberg J, Kroon HM, Jaarsma RL. Pericapsular nerve group (PENG) block provides improved short-term analgesia compared with the femoral nerve block in hip fracture surgery: a single-center double- blinded randomized comparative trial. RegAnesth Pain Med. 2021 May;46(5):398-403.
4. Allard C, Pardo E, de la Jonquière C, Wyniecki A, Soulier A, Faddoul A, Tsai ES, Bonnet F, Verdonk F. Comparison between femoral block and PENG block in femoral neck fractures: A cohort study. PLoS One. 2021 Jun 4;16(6):e0252716.
5. Mosaffa F, Taheri M, ManafiRasi A, Samadpour H, Memary E, Mirkheshti A. Comparison of pericapsular nerve group (PENG) block with fascia iliaca compartment block (FICB) for pain control in hip fractures: A double-blind prospective randomized controlled clinical trial. Orthop Traumatol Surg Res. 2022 Feb;108(1):103135.
6. Alrefaey AK, Abouelela MA. Pericapsular nerve group block for analgesia of positioning pain during spinal anesthesia in hip fracture patients, a ran domized controlled study. Egyptian Journal of Anaesthesia [Internet]. 2020 Jan 1 [cited 2022 Sep 9];36(1):234–9.
7. Natrajan P, Bhat RR, Remadevi R, Joseph IR, Vijayalakshmi S, Paulose TD. Comparative Study to Evaluate the Effect of Ultrasound-Guided Pericapsular Nerve Group Block Versus Fascia Iliaca Compartment Block on the Postop- erative Analgesic Effect in Patients Undergoing Surgeries for Hip Fracture under Spinal Anesthesia. Anesth Essays Res. 2021 Jul-Sep;15(3):285-289.
8. Senthil KS, Kumar P, Ramakrishnan L. Comparison of Pericapsular Nerve Group Block versus Fascia Iliaca Compartment Block as Postoperative Pain Management in Hip Fracture Surgeries. Anesth Essays Res. 2021 Oct- Dec;15(4):352-356.
9. Aliste J, Layera S, Bravo D, Jara Á, Muñoz G, Barrientos C, Wulf R, Brañez J, Finlayson RJ, Tran Q. Randomized comparison between pericapsular nerve group (PENG) block and suprainguinal fascia iliaca block for total hip arthroplasty. RegAnesth Pain Med. 2021 Oct;46(10):874-878.