

Comparison of supra- inguinal fascia iliaca versus Pericapsular nerve block for ease of positioning during spinal anaesthesia: A randomised Double- blinded trial

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Abstract

Background: Regional analgesic techniques such as supra-inguinal fascia-iliaca Compartment block (S-FICB) and pericapsular nerve group (PENG) block have been found to be effective in providing good pain relief in hip-fracture patients. However, comparative studies Between PENG and S-FICB are lacking. The aim of this study was to compare the analgesic Efficacy of S-FICB and PENG block and assess their efficacy in optimal patient positioning for Spinal Anaesthesia. **Methods:** A prospective randomised double-blind study was conducted in 60 patients randomly divided to receive either S-FICB or PENG block under ultrasound guidance. Primary outcome measures were numerical rating scale (NRS) pain score at rest and on passive 15° limb lifting, 30 minutes after the block and ease of spinal positioning. The secondary outcome Measures were NRS over 24 hours, amount of tramadol used (number of rescue doses), patients' Satisfaction and block-related complications. The results were analysed using statistical software (MedCalc version 19.2.1). Continuous and categorical data were analysed using appropriate Statistical analysis and $P < 0.05$ was considered significant. **Results:** Post-block, the NRS score Decreased significantly in PENG and S-FICB groups at rest and movement ($P < 0.0001$). The EOSP Score was significantly better in PENG group ($P < 0.005$). First analgesic request and pain relief in the first 24-hour period were similar between the groups ($P = 0.538$). **Conclusion:** PENG block Provided better pain relief and ease of positing during SA in patients with fractured hip scheduled for hip surgery.

Key words: Spinal Anaesthesia, Fascia iliaca, hip fractures, nerve block, pain management.

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Introduction

Severe pain associated with fractured hip often Results in difficulty during positioning for Spinal Anaesthesia (SA). Among many regional analgesic techniques, the fascia-iliaca compartment Block (FICB) is popular among anaesthesiologists to provide immediate as well as postoperative analgesia In hip fractures. Recently, the pericapsular nerve Group (PENG) block has been proposed to provide effective analgesia in hip-fracture patients. However, comparative studies between PENG and FICB are lacking. Therefore, we decided to conduct

a Prospective randomised double- blind study comparing ultrasound- guided supra- inguinal FICB (S- FICB) and PENG block in fractured hip patients. The objectives were to compare the immediate and postoperative Analgesic efficacy of S- FICB and PENG block. The Hypothesis was that PENG block will provide superior Analgesia and thus ease of positioning during subarachnoid block.

Methods

This study was conducted from May 2022 to January 2023 at Govt.Thiruvavur Medical College hospital. The permission to conduct this study was taken from the hospital ethical committee. Informed written consent was taken and patients who gave the consent to participate in the study were included.

Inclusion Criteria

- All the patients age above 40years
- Hip fracture with persistent pain and scheduled for surgery under Subarachnoid block.
- ASA Physical status I & II & III
- Either sex

Exclusion Criteria

- Any contraindications to Subarachnoid block
- History of ischemic heart disease
- Patients on opioids for chronic pain and patients with significant cognitive impairment.

Patients who had surgery on the hip or spine within three months or had no pain while sitting by themselves.

Equal groups

- (1) S- FICB (n = 30, patients who received Ultrasound- guided supra- inguinal fascia iliaca Block)
- (2) PENG (n = 30, patients who received Ultrasound- guided pericapsular nerve group Block).

Computer- generated random numbers and group Assignment was done by sequentially numbered opaque Envelopes. The envelope was opened just before the procedure by the anaesthesiologist performing the block. The observer (another anaesthesiologist) and Patients were unaware of the group and procedure performed. Patients were taken to the operating room and standard monitors such as electrocardiogram, Non- invasive blood pressure and pulse oximetry were attached.

Pre- procedure pain was assessed during rest as well as on movement (15° passive elevation) of the affected limb and recorded on numeric pain rating Scale (NRS) [0 = no pain; 10 = worst imaginable Pain]. The blocks were performed in supine position and strict sterile technique was followed. Both the Blocks were performed as per the standard technique described earlier. After the block, patients were continuously monitored by non- invasive blood pressure every 5 minutes, Continuous ECG and pulse oximetry and for signs of Local anaesthetic toxicity for 30 minutes. Thirty minutes after the blocks, analgesia was measured by NRS at rest and on passive limb elevation. The Ease of spinal positioning (EOSP) was assessed on the Scale of 0–3 (0 = unable to position, 1 = patient had Abnormal posturing due to pain and required support for positioning, 2 = mild discomfort but does not require support for positioning, 3 = optimal condition Where the patient was able to position himself without Pain). The amount of fentanyl used, NRS scores and scores for EOSP were recorded. All observations Were done by another anaesthesiologist who was unaware of the regional block performed. Under Strict aseptic precaution, Subarachnoid block was given. The rescue analgesia was provided with 50 mg tramadol on demand or when NRS was >4. All patients

were followed up postoperatively at 4, 6, 8, 12 and 24 hours. Primary outcome measures were NRS at rest and on Passive 15° limb lifting, 30 minutes after the block and EOSP. The secondary outcome measures were NRS Over 24 hours, amount of tramadol used (number of Rescue doses), patients' satisfaction and block- related complications.

The sample size was calculated based on the study of 20 patients where the EOSP score (mean \pm SD) Was 2.65 ± 0.67 . [5]

To detect the clinically significant difference in EOSP score of 0.5 between the means of two groups at 95% confidence interval and 80% power, 56 patients were required at $P < 0.05$. To consider $>10\%$ Attrition, 60 patients were finally included in the Study. The formula used in the study was as follows: $K = n_2/n_1 = 1$, $n_1 = (\sigma_1^2 + \sigma_2^2/K) (z_{1-\alpha/2} + z_{1-\beta})^2 / \Delta^2$, $n_1 = (0.672 + 0.672/1) (1.96 + 0.84)^2 / 0.52$, $n_1 = 28$, $n_2 = K \times n_1 = 28$ in each group.

$\Delta = [\mu_2 - \mu_1]$ = absolute difference between two Means; σ_1 , σ_2 = variance of means; n_1 = sample size of Group 1; n_2 = sample size of group 2; α = probability of Type- 1 error (0.05); β = probability of type- 2 error (0.2); Z = critical Z value for a given α or β ; k = ratio of Sample size for group 2 to group 1.

The results were analysed using the statistical software (MedCalc version 19.2.1.).

Results

The demographic variables were comparable between the two groups. The pre- block NRS in both the groups were comparable at rest and on movement ($P = 0.214$ and 0.872 , respectively) [Table 2]. Thirty minutes post- block, the NRS score decreased significantly in PENG group mean (IQR), 6 and 9 to 3 and 4 and, in S- FICB group 5 And 8 to 4 and 5 at rest and movement, Respectively ($P < 0.0001$). The mean \pm SD (95% CI) EOSP score in the S- FICB group was 1.39 ± 0.49 (1.22–1.55) and in the PENG group 2.15 ± 0.6 (95% CI, 1.94–2.35; $P < 0.0001$) [Table 3]. The Mean \pm SD doses of rescue analgesics (tramadol) Were 1.3 ± 0.8 in the S- FICB group and 1.6 ± 0.86 .

Table 2: Comparison of pre-block and 30min post-block NRS in the S-FICB and PENG group patients

Group	Pre block NRS		Post block NRS	
	Rest	Movement	Rest	Movement
B	5	8	4	5
PENG	6	9	3	4
P-Value	0.214	0.872	0.000	0.004

Table 3: Comparison of EOSP, doses resur analgesic in S-FICB and PENG group patients

	PENG	S-FICB	P-Value
EOSP Score	2.16 ± 0.6	1.38 ± 0.49	0.0001
Number of doses of rescue analgesic (Tramadol) in 24h	1.4 ± 0.8	1.5 ± 0.86	0.146

In the PENG group ($P = 0.146$) [Table 3]. Time To first analgesic request (in hours) mean \pm SD (95% CI) was 11.8 ± 0.84 (10.21–13.54) and 11.21 ± 0.70 (9.83–12.59) in the S- FICB and PENG groups, respectively ($P = 0.524$) [Table 3]. The Median (IQR) NRS scores were assessed and recorded at rest and on movement at 4, 6, 12 and 24 hours in Both the groups. In

both the groups, 3% Of patients were dissatisfied and 97% were highly Satisfied or satisfied (P = 0.897). No patient needed any additional fentanyl boluses in both the groups. None of the patients reported any block- related complications.

Discussion

In this study, both S- FICB and PENG block provided a significant reduction in NRS pain scores. However, Immediate reduction in NRS pain scores was significantly better in the PENG block compared to FICB At rest. The better pain control possibly contributed to significantly higher EOSP scores in the PENG block. The pain scores at various time points were comparable In both the groups except, at 12 hours where NRS was lower in the PENG group at rest and higher at 24 hours during movement compared to the FICB group.

Subarachnoid block is preferred for surgery in hip fracture cases that are often elderly with additional medical Co- morbidities. Optimal sitting position is one of the prerequisites for smooth conduct of SA as the Majority of hip- fracture patients experience severe Pain and benefit from regional blocks. Currently, FICB and PENG block are two commonly used Regional techniques to provide analgesia during spinal Positioning and for postoperative pain relief. Both the PENG and FICB techniques provide effective analgesia for patient positioning but the majority of the data from The PENG block are in the form of case series.[4,5,14- 16] Similarly, S- FICB is a relatively new approach And comparative data is insufficient to draw any conclusion. The claimed advantage of FICB is that it is Considered a 3- in- 1 block involving femoral nerve (FN), Lateral femoral cutaneous nerve (LFCN) and obturator Nerve (ON). However, the results were inconsistent due to either variability in the volume of local anaesthetic or the technique of FICB. Shariat et al.[17] reported No significant difference in postoperative pain score And 24- hour opioid consumption between FICB with 0.5% ropivacaine and sham block with 0.9% normal Saline in THA. In their study, the proximal spreading of local anaesthetic (LA) was not achieved because The infra- inguinal technique and transverse plane Were used rather than the longitudinal plane.[18,19]Supra- inguinal technique (S- FICB) blocks the three nerves more consistently than the infra- inguinal Approach.[20] Kumar et al.[21] observed that S- FICB has A superior postoperative analgesic efficacy compared To infra- inguinal approach of FICB along with significantly less morphine consumption in the first 24 hours.

Conclusion

To conclude, PENG block provided better pain relief and ease of positing during Spinal Anaesthesia in patients with Fractured hip scheduled for hip surgery.

Declaration of patient consent

The authors certify that they have obtained all Appropriate patient consent forms. In the form, the Patient(s) has/have given his/her/their consent for His/her/their images and other clinical information to Be reported in the journal. The patients understand That their names and initials will not be published and Due efforts will be made to conceal their identity, but Anonymity cannot be guaranteed.

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Conflicts of interest -There are no conflicts of interest.

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