Section: Anaesthesiology

Original Research Article

COMPARISON OF USG-GUIDED FASCIA ILIACA BLOCK VS FEMORAL NERVE BLOCK AS AN ANALGESIC TECHNIQUE BEFORE POSITIONING FOR SPINAL ANAESTHESIA IN PATIENTS UNDERGOING HIP SURGERIES

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ABSTRACT

Background: Hip fractures, especially in the elderly, are associated with severe pain; therefore, effective analgesia before spinal anaesthesia is essential for improving patient outcomes. This study aimed to compare the analgesic efficacy of ultrasound (USG)-guided fascia iliaca compartment block (FICB) and femoral nerve block (FNB) during positioning for spinal anaesthesia in patients undergoing hip surgery. **Materials and Methods:** This prospective, randomised controlled study included 60 patients aged 18–80 years (ASA I–II) with hip fractures, divided equally into two groups: FICB (n=30) and FNB (n=30). Both groups received 30 mL of 0.25% bupivacaine under USG guidance. Pain intensity was measured using the Visual Analogue Scale (VAS) at specific intervals after the block. The time taken to achieve VAS <4, patient comfort score (0–4), and block performance score (0–2) were also calculated. **Result:** Baseline VAS scores were identical in both groups (9.26). At 4 min, the mean VAS score was 4.46 in the FNB group and 3.96 in the FICB group. At 15 min, the scores were reduced to 1.3 (FNB) and 1.1 (FICB). The mean time to achieve VAS <4 was significantly shorter in the FICB group (4.96 ± 0.81 vs. 5.46 ± 0.86 min; p = 0.0002). Patient comfort scores were also higher in the FICB group (3.86 ± 0.34 vs. 3.7 ± 0.46; p = 0.0001). Block performance scores were comparable (5.13 ± 0.84 for FICB vs. 4.96 ± 0.56 for FNB; p = 0.154). One arterial puncture was observed in the FNB group. **Conclusion:** USG-guided FICB offers superior analgesia, faster onset, and greater patient comfort than FNB, making it a preferable technique for positioning before spinal anaesthesia in hip fracture surgeries.

INTRODUCTION

Hip fractures (proximal femur, including fractures of the neck of the femur, intertrochanteric, and subtrochanteric fractures) are a common orthopaedic emergency, particularly in the geriatric population. These fractures are extremely painful and are associated with significant morbidity and mortality.[1] In individuals with hip fractures, severe pain is linked to higher morbidity. People who are in more pain are more likely to experience delirium, move more slowly, stay in the hospital longer, and report a lower quality of life in terms of their health.[2]

Anaesthesia is important in surgeries for hip fractures; therefore, choosing between general anaesthesia (GA) and regional anaesthesia (RA) can greatly affect the results during and after surgery.[3] GA uses inhaled or intravenous medications to make the patient sleep and pain-insensitive. Although GA provides total control over the patient's airway and a still surgical field, it is linked to possible side effects such as delirium, cardiovascular instability, and postoperative cognitive dysfunction, which are especially dangerous for older patients.[4] However, RA, which includes methods such as spinal, epidural, and nerve block anaesthesia, reduces pain by numbing particular body parts.[5] RA is frequently linked to lower rates of thromboembolic events, decreased opioid use, and fewer chances of postoperative cognitive impairment.[4]

Peripheral nerve blocks, a subset of regional anaesthesia techniques, include approaches such as the femoral nerve block (FNB), 3-in-1 block, and

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fascia iliaca compartment block (FICB), each targeting different nerves supplying the hip and thigh.[6] All three blocks aim at the same nerves using one dose of anaesthetic, but the FNB method delivers it near the femoral nerve. Many studies have shown that giving FNB before surgery helps manage pain and reduces the need for painkillers after surgery, though it must be done just before the operation and depends on the skill of the anaesthesiologist.[6]

FICB targets the femoral and lateral femoral cutaneous nerves with a single injection of local anaesthetic. This method is easier to perform than FNB; however, it may not relieve pain as well as the femoral block. This could be because the anaesthetic is not placed accurately in the traditional method, which depends on using a large amount (30–40 mL). Using ultrasound (USG) helps block all three nerves more often than the traditional method.[8]

Studies have emphasised that FICB is more effective than FNB for pain relief during patient positioning for spinal anaesthesia, and FICB is significantly associated with lower Visual Analogue Scale (VAS) scores.[9,10] In contrast, one study reported that FNB is rapid and provides better pain relief and less opioid requirement than FICB.[11] Although both FNB and FICB are commonly used, their differences in efficacy are unclear, and studies evaluating them are limited. Thus, this study aimed to compare the overall efficacy of USG-guided FICB and FNB in providing pain relief during positioning for spinal anaesthesia in patients with hip fractures.

Objectives: The primary objective of the study was to compare the VAS scores at 1, 2, 3, 4, 5, 10, and 15 min following the block, before positioning for spinal anaesthesia. The secondary objectives included calculating the time taken to achieve a VAS score below 4, patient comfort score during sitting for spinal anaesthesia, and block performance score between USG-guided FICB and FNB.

MATERIALS AND METHODS

This prospective randomised controlled study included 60 patients who attended the Government Rajaji Hospital, Madurai, for 12 months. Before starting the study, it was approved by the Institutional Ethics Committee, and written informed consent was obtained from the patient before enrolment.

Inclusion criteria

The study included patients aged 18–80 years, classified as American Society of Anesthesiologists (ASA) physical status I or II, diagnosed with hip fractures, and scheduled for either elective or emergency surgical procedures.

Exclusion criteria

Patients were excluded if they did not provide consent, had coagulopathy, known coronary artery disease or ischaemic heart disease, head injury, or known hypersensitivity to local anaesthetics.

Methods

The patients were randomly divided into two equal groups of 30 each and received 30 mL of 0.25% bupivacaine. Group FICB received a fascia iliaca compartment block, while group FNB received a femoral nerve block. All blocks were performed in the preoperative area using a high-frequency linear ultrasound probe. Under USG guidance, FNB was performed by first identifying the femoral artery and then locating the femoral nerve as a hyperechoic triangular structure lying lateral to the artery. A 22-G insulated needle was inserted and positioned adjacent to the femoral artery. A small volume of local anaesthetic was injected after locating the needle tip and negative aspiration of blood; the remaining drug was injected after the distribution was visualised.

For the FICB, the needle was inserted lateral to the femoral nerve, targeting the plane between the fascia iliaca and iliacus muscle, which lies deep to the fascia lata. A characteristic double-pop sensation indicating penetration through the fascia lata and fascia iliaca. After confirming negative aspiration, a small test dose of local anaesthetic was injected to verify correct placement, and the full dose was administered under USG guidance to ensure adequate spread within the compartment.

The VAS, a 10 cm line with marked points ranging from 1 (no pain) to 10 (worst possible pain), was used to measure pain intensity at 1, 2, 3, 4, 5, 10, and 15 min after the block and before spinal anaesthesia positioning. The patient comfort score for sitting during spinal anaesthesia was calculated using a 5-point scale (ranging from 0 = uncomfortable to 4 = comfortable with no pain), and the block performance score was calculated using a 3-point scale (0-2), based on the ease and success of the block technique. Additionally, patients were monitored for complications, such as arterial puncture, block failure, and haematoma. Vital signs, including heart rate and mean arterial pressure (MAP), were monitored continuously during the procedure.

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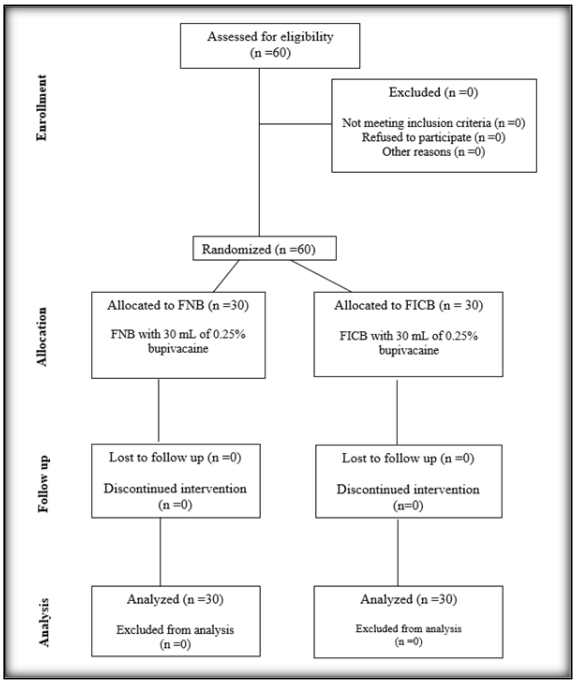

Figure 1: Consort flow diagram

Statistical analysis: IBM SPSS Statistics (version 25) was used to analyse the data. The mean and standard deviation were used to display the quantitative variables. The Chi-square test was used to analyse categorical data. In a two-tailed test, significance was defined as $p < 0.05$.

RESULTS

The majority of patients in both groups were between 41–50 years, with 9 patients each in the FNB group and 8 patients each in the FICB group coming under the 41–45 and 46–50 age groups. Males were predominant in both groups (34 and 36 vs. 16 and 14). The mean age was 45.66 ± 6.34 years in the FNB group and 46.13 ± 6.87 years in the FICB group. The mean weight was 65.4 ± 7.8 kg in the FNB group and 62.66 ± 5.91 kg in the FICB group, while the mean height was 152.73 ± 4.26 cm and 154.43 ± 3.05 cm, respectively. The mean heart rate and MAP were nearly the same in both groups (79 ± 5.9 vs. 79.56 ± 5.63 bpm and 91.8 ± 3.86 vs. 91.16 ± 4.11 mmHg). All parameters, including mean age, weight, height, heart rate, and arterial pressure, were not significant ($p > 0.05$) [Table 1].

Table 1: Comparison of baseline characteristics of patients among groups

	FNB	FICB	p value
Age distribution	45.66 ± 6.34	46.13 ± 6.87	0.443
Weight	65.4 ± 7.8	62.66 ± 5.91	0.903
Height	152.73 ± 4.26	154.43 ± 3.05	0.235
Heart rate	79 ± 5.9	79.56 ± 5.63	0.883
MAP	91.8 ± 3.86	91.16 ± 4.11	0.147

The mean VAS scores at baseline (0 min) were the same in both groups (9.26). By 3 min, scores reduced to 5.03, and at 4 min, the FICB group showed slightly better pain relief (3.96) than the FNB group (4.46). Further reduction was noted at 5 min (FNB: 2.5, FICB: 2.23), 10 min (FNB: 1.73, FICB: 1.36), and 15 min (FNB: 1.3, FICB: 1.1). [Table 2].

Table 2: Mean VAS score among groups

Time in mins	FNB	FICB	P-value
0	9.26	9.26	1.000
1	7.46	7.46	1.000
2	5.96	5.96	1.000
3	5.03	5.03	0.651
4	4.46	3.96	0.003
5	2.5	2.23	0.04
10	1.73	1.36	0.005
15	1.3	1.1	0.126

The mean time to achieve a VAS score below 4 was significantly shorter in the FICB group (4.96 ± 0.808 vs. 5.46 ± 0.86 min, $p = 0.0002$). The patient comfort score was also significantly higher in the FICB group (3.86 ± 0.345 vs. 3.7 ± 0.46, $p = 0.0001$). Although the block performance score was slightly higher in the FICB group (5.13 ± 0.84 vs. 4.96 ± 0.56), the difference was not significant ($p = 0.154$). Only one patient in the FNB group experienced arterial puncture [Table 3].

Table 3: Comparison of analgesic onset, patient comfort, and block performance between groups

	FNB	FICB	P-value
Mean time taken to achieve a VAS score below 4 (mins)	5.46 ± 0.86	4.96 ± 0.808	0.0002
Patient comfort score	3.7 ± 0.46	3.86 ± 0.345	0.0001
Block performance score	4.96 ± 0.56	5.13 ± 0.84	0.154

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DISCUSSION

Effective analgesia before spinal anaesthesia is important for improving patient comfort and procedural success, particularly in hip fracture surgeries. This study aimed to compare the efficacy of USG-guided FICB and FNB in achieving adequate pre-spinal analgesia. Males were predominant in both groups (34 and 36 vs. 16 and 14). The mean age was 45.66 ± 6.34 years in the FNB group and 46.13 ± 6.87 years in the FICB group. The mean weight was 65.4 ± 7.8 kg in the FNB group and 62.66 ± 5.91 kg in the FICB group, while the mean height was 152.73 ± 4.26 cm and 154.43 ± 3.05 cm, respectively. Supporting our results, Jain et al. reported mean ages of 52.48 ± 18.95 years and 48.44 ± 20.61 years in groups A and B, respectively. They reported a mean weight of 61.08±6.15 and 61.64±6.49 kg in groups A and B, respectively, and a predominance of males in both groups (15 and 10 vs. 19 and 6).[9-12] Similarly, Manohara et al. reported a mean age of 76 ± 9 and 72 ± 12years in the FICB and FNB groups, respectively, and a predominance of males in both groups (9 and 6 vs. 8 and 7).[13] Thus, emphasising that elderly males are more prone to hip fractures.

In our study, the mean heart rate was 79 ± 5.9 vs. 79.56 ± 5.63 bpm, and the MAP was 91.8 ± 3.86 vs. 91.16 ± 4.11 mmHg in both groups. Similarly, Ashraf et al. reported a mean heart rate of 76.37 ± 7.91 vs. 73.87 ± 7.74 bpm and MAP of 79.53 ± 5.14 vs. 77.57 ± 5.99 mmHg in both FNB and FICB groups, respectively.[14] Thus, suggesting that there were no significant changes in the mean heart rate or MAP among the groups.

In our study, the mean VAS scores at baseline (0 min) were the same in both groups (9.26). By 3 min, scores reduced to 5.03, and further reduction was noted at 5 min (FNB: 2.5; FICB: 2.23), 10 min (FNB: 1.73; FICB: 1.36), and 15 min (FNB: 1.3; FICB: 1.1). Aligning with our study, Ghimire et al. reported that there was a slightly better pain relief in FICB compared to FNB at 2 minutes (3.4 vs 2.9).[15] Segado et al. reported a much better pain relief in FICB compared to FNB after 2 hours of block administration (0.8 ± 0.4 vs 1.5 ± 0.6).[16] Similarly, Deniz et al. reported a mean VAS score of 2.2 ± 0.8 and 2.8 ± 0.5 in both groups at 2 hours.[17] Thus, indicating that FICB provides better pain relief compared to FNB.

In our study, the mean time to achieve a VAS score below 4 was significantly shorter in the FICB group (4.96 ± 0.808 vs. 5.46 ± 0.86 min, p = 0.0002). The patient comfort score was also significantly higher in the FICB group (3.86 ± 0.345 vs. 3.7 ± 0.46, p = 0.0001). Although the block performance score was slightly higher in the FICB group (5.13 ± 0.84 vs. 4.96 ± 0.56), the difference was not significant (p = 0.154). Additionally, one patient in the FNB group experienced arterial puncture. Similarly, Raju et al. reported that analgesia sets in significantly faster in the FICB group than in the FNB group (113.85 ± 9.83 vs 122.45 ±13.76 seconds, p = 0.02).[18] Further strengthening our findings, Pujaben et al. reported that FICB ensures better comfort for the patients and helps in easy positioning for the spinal anaesthesia.[19] In contrast, studies suggest that no complications were noted pre- or postoperatively in any group.[12,13] Thus, the FICB provides significantly better outcomes than the FNB.

USG-guided FICB offers faster onset of analgesia, greater patient comfort, and comparable block performance to FNB for pre-spinal positioning in patients with hip fractures. While both techniques are effective, FICB has better ease of administration and improved patient experience.

Limitations: The study was limited by its single-centre design and small sample size, which may not represent broader population patterns.

CONCLUSION

USG-guided FICB and FNB are both effective analgesic techniques for facilitating spinal anaesthesia in patients with hip fractures. FICB resulted in lower VAS scores at key time intervals and achieved pain relief faster than FNB. The FICB was associated with higher patient comfort scores and comparable block performance. Future multicentre studies with larger samples are recommended to further confirm these findings and support the development of standardised analgesic protocols.

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