



Suprainguinal Versus Infrainguinal Fascia Iliaca Compartment Block for Postoperative Analgesia in Lower Limb Orthopedic Surgery: A Comparative Cross-Sectional Study

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Abstract

Background: Effective postoperative analgesia is essential for optimal recovery following lower limb orthopedic surgery. The fascia iliaca compartment block (FICB) is widely used for perioperative pain control, with both suprainguinal and infrainguinal approaches described. However, comparative evidence regarding their analgesic efficacy remains limited. **Aim:** To compare the effectiveness of suprainguinal and infrainguinal fascia iliaca compartment block for postoperative analgesia in lower limb orthopedic surgery. **Materials and Methods:** This hospital-based comparative cross-sectional study included 200 patients undergoing lower limb orthopedic surgery, allocated into suprainguinal (n = 100) and infrainguinal (n = 100) FICB groups. Ultrasound-guided FICB was performed postoperatively in all patients. Postoperative pain scores using the Visual Analog Scale (VAS), duration of analgesia, time to first rescue analgesic, total rescue analgesic requirement, patient satisfaction, and block-related complications were recorded and analyzed using appropriate statistical tests. **Results:** Baseline demographic and clinical characteristics were comparable between the two groups. The suprainguinal FICB group demonstrated significantly lower VAS pain scores at 2, 6, 12, and 24 hours postoperatively ($p < 0.001$). Duration of analgesia and time to first rescue analgesic were significantly longer in the suprainguinal group, with fewer patients requiring rescue analgesia within the first 12 hours ($p < 0.001$). Higher patient satisfaction and vomiting were observed in the suprainguinal group, with comparable safety profiles between both techniques. **Conclusion:** Ultrasound-guided suprainguinal fascia iliaca compartment block provides superior and prolonged postoperative analgesia with reduced analgesic requirements and high patient satisfaction compared to the infrainguinal approach, without compromising safety.

Keywords: Fascia iliaca compartment block. Suprainguinal approach. Postoperative analgesia.



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INTRODUCTION

Effective postoperative analgesia is a cornerstone of perioperative care in lower limb orthopedic surgeries, as inadequate pain control can delay mobilization, prolong hospital stay, and increase the risk of complications such as thromboembolism and chronic pain syndromes. Regional anesthesia techniques have gained prominence in recent years due to their ability to provide targeted analgesia while reducing systemic opioid requirements and their associated adverse effects, including nausea, vomiting, sedation, and respiratory depression. Among these techniques, the Fascia Iliaca Compartment Block (FICB) has emerged as a simple, safe, and effective method for analgesia in surgeries involving the hip, femur, and knee.[1]

The fascia iliaca compartment contains major nerves supplying the anterior thigh, namely the femoral nerve, lateral femoral cutaneous nerve, and occasionally the obturator nerve. By depositing local anesthetic beneath the fascia iliaca, FICB facilitates the spread of the drug to these nerves, thereby providing effective sensory blockade. Traditionally, the infrainguinal approach has been widely used owing to its ease of performance and familiarity among anesthesiologists. However, anatomical studies have suggested that the infrainguinal technique may result in inconsistent blockade of the lateral femoral cutaneous and obturator nerves due to limited cranial spread of local anesthetic.[2]

In response to these limitations, the suprainguinal approach to the fascia iliaca compartment block has

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been introduced. This technique involves injection of local anesthetic above the inguinal ligament, allowing more proximal and predictable spread within the iliac fossa. Cadaveric and imaging studies have demonstrated that the suprainguinal approach may achieve more reliable blockade of all three target nerves, potentially resulting in superior analgesia and reduced need for rescue analgesics in the postoperative period. With the increasing use of ultrasound guidance, both suprainguinal and infrainguinal approaches can be performed with greater accuracy and safety, minimizing complications such as vascular puncture or local anesthetic systemic toxicity.[3][4]

Aim

To compare the effectiveness of suprainguinal and infrainguinal fascia iliaca compartment block for postoperative analgesia in patients undergoing lower limb orthopedic surgery.

Objectives

1. To compare postoperative pain scores between suprainguinal and infrainguinal fascia iliaca compartment block techniques.
2. To evaluate the duration of analgesia and requirement of rescue analgesics in both groups.
3. To assess the overall analgesic efficacy and safety profile of the two approaches.

MATERIALS AND METHODS

Source of Data

Data were collected from patients undergoing elective and emergency lower limb orthopedic surgeries at a tertiary care teaching hospital.

Study Design

This was a hospital-based comparative cross-sectional study.

Study Location

The study was conducted in the Department of Anaesthesiology in collaboration with the Department of Orthopaedics at a tertiary care hospital.

Study Duration

The study was carried out over a period of 18 months, including patient recruitment, data collection, and analysis.

Sample Size

A total of 200 patients were included in the study, with 100 patients allocated to the suprainguinal FICB group and 100 patients to the infrainguinal FICB group.

Inclusion Criteria

- Patients aged 18–75 years
- Patients of either gender
- ASA physical status I–III
- Patients undergoing lower limb orthopedic surgeries (hip, femur, or knee)
- Patients who provided written informed consent

Exclusion Criteria

- Patient refusal
- Allergy to local anesthetic agents
- Infection at the injection site
- Coagulopathy or bleeding disorders
- Pre-existing neurological deficits in the lower limb
- Severe hepatic, renal, or cardiac disease

Procedure and Methodology

All patients were assessed preoperatively and explained the visual analog scale (VAS) for pain assessment. After completion of surgery under spinal, patients received ultrasound-guided fascia iliaca compartment block using either the suprainguinal or infrainguinal approach as per group allocation. A standardized volume and concentration of local anesthetic 0.2% Ropivacaine 20ml were used in all patients. Postoperative pain scores were assessed at regular intervals, and rescue analgesia 1gram intravenous Paracetamol was administered when VAS score exceeded 4.

Sample Processing

Collected data were entered into a predesigned proforma and later transferred to a computerized database for statistical analysis after verification and cleaning.

Statistical Methods

Data were analyzed using appropriate statistical software. Continuous variables were expressed as mean $\pm$ standard deviation and compared using Student's t-test. Categorical variables were expressed as frequency and percentage and analyzed using Chi-square test or Fisher's exact test. A p-value <0.05 was considered statistically significant.

Data Collection

Demographic data, type of surgery, block technique used, postoperative pain scores, duration of analgesia, rescue analgesic requirement, and any complications were systematically recorded for each patient using a structured data collection form.

RESULTS

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants (N = 200)

Parameter	Suprainguinal FICB (n = 100) Mean $\pm$ SD / n (%)	Infrainguinal FICB (n = 100) Mean $\pm$ SD / n (%)	Mean Difference / χ^2	95% CI	Test of Significance	p value
Age (years)	54.7 $\pm$ 11.3	55.2 $\pm$ 10.9	-0.5	-3.4 to 2.4	Independent <i>t</i> test	0.742
Male gender	63 (63.0)	61 (61.0)	0.08		χ^2 test	0.764
BMI (kg/m ²)	24.9 $\pm$ 3.6	25.2 $\pm$ 3.4	-0.3	-1.2 to 0.6	Independent <i>t</i> test	0.512
ASA I	38 (38.0)	36 (36.0)	0.12		χ^2 test	0.781
ASA II	44 (44.0)	47 (47.0)			χ^2 test	0.657
ASA III	18 (18.0)	17 (17.0)			χ^2 test	0.842
Type of surgery – Hip	46 (46.0)	48 (48.0)			χ^2 test	0.773
Type of surgery – Femur	34 (34.0)	31 (31.0)			χ^2 test	0.648
Type of surgery – Knee	20 (20.0)	21 (21.0)			χ^2 test	0.861

Table 1 compares the baseline demographic and clinical characteristics of patients receiving suprainguinal and infrainguinal fascia iliaca compartment block. The mean age of patients in the suprainguinal group was 54.7 $\pm$ 11.3 years, which was comparable to 55.2 $\pm$ 10.9 years in the infrainguinal group, with no statistically significant difference ($p = 0.742$). Male patients constituted 63.0% in the suprainguinal group and 61.0% in the infrainguinal group, showing similar gender distribution ($p = 0.764$). The mean body mass index was also comparable between the two groups (24.9 $\pm$ 3.6 kg/m² vs 25.2 $\pm$ 3.4 kg/m²; $p = 0.512$). Distribution of ASA physical status grades I, II, and III did not differ significantly between the groups ($p > 0.05$). Similarly, the type of lower limb orthopedic surgery performed hip, femur, or knee was evenly distributed between the two groups with no statistically significant differences.

Table 2: Comparison of Postoperative Pain Scores (VAS) Between Study Groups (N = 200)

Time Interval	Suprainguinal FICB Mean $\pm$ SD	Infrainguinal FICB Mean $\pm$ SD	Mean Difference	95% CI	Test of Significance	p value
VAS at 2 hours	1.9 $\pm$ 0.7	2.6 $\pm$ 0.9	-0.7	-0.9 to -0.5	Independent <i>t</i> test	<0.001
VAS at 6 hours	2.3 $\pm$ 0.8	3.4 $\pm$ 1.0	-1.1	-1.4 to -0.8	Independent <i>t</i> test	<0.001
VAS at 12 hours	2.8 $\pm$ 0.9	4.1 $\pm$ 1.1	-1.3	-1.6 to -1.0	Independent <i>t</i> test	<0.001
VAS at 24 hours	3.6 $\pm$ 1.0	4.7 $\pm$ 1.2	-1.1	-1.4 to -0.8	Independent <i>t</i> test	<0.001

Table 2 presents the comparison of postoperative pain scores assessed using the Visual Analog Scale (VAS) at different time intervals. Patients receiving suprainguinal FICB consistently demonstrated significantly lower pain scores at all postoperative time points compared to those receiving infrainguinal FICB. At 2 hours postoperatively, the mean VAS score was 1.9 $\pm$ 0.7 in the suprainguinal group versus 2.6 $\pm$ 0.9 in the infrainguinal group ($p < 0.001$). This difference persisted at 6 hours (2.3 $\pm$ 0.8 vs 3.4 $\pm$ 1.0), 12 hours (2.8 $\pm$ 0.9 vs 4.1 $\pm$ 1.1), and 24 hours (3.6 $\pm$ 1.0 vs 4.7 $\pm$ 1.2), with all comparisons showing statistically significant differences ($p < 0.001$).

Table 3: Duration of Analgesia and Rescue Analgesic Requirement (N = 200)

Parameter	Suprainguinal FICB Mean $\pm$ SD / n (%)	Infrainguinal FICB Mean $\pm$ SD / n (%)	Mean Difference / χ^2	95% CI	Test of Significance	p value
Duration of analgesia (hours)	14.8 $\pm$ 2.9	9.6 $\pm$ 2.4	5.2	4.5 to 5.9	Independent <i>t</i> test	<0.001
Time to first rescue analgesic (hours)	15.6 $\pm$ 3.1	10.3 $\pm$ 2.7	5.3	4.6 to 6.0	Independent <i>t</i> test	<0.001
Patients requiring rescue analgesia within 12 h	27 (27.0)	69 (69.0)	32.6		χ^2 test	<0.001

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Total rescue doses in 24 h (number)	1.3 ± 0.6	2.6 ± 0.9	-1.3	-1.5 to -1.1	Independent <i>t</i> test	<0.001
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Table 3 compares the duration of analgesia and rescue analgesic requirements between the two groups. The mean duration of analgesia was significantly longer in the suprainguinal group (14.8 ± 2.9 hours) compared to the infrainguinal group (9.6 ± 2.4 hours), with a mean difference of 5.2 hours ($p < 0.001$). Similarly, the time to first rescue analgesic was significantly prolonged in patients receiving suprainguinal FICB (15.6 ± 3.1 hours vs 10.3 ± 2.7 hours; $p < 0.001$). A significantly lower proportion of patients in the suprainguinal group required rescue analgesia within the first 12 hours postoperatively (27.0% vs 69.0%; $p < 0.001$). Additionally, the total number of rescue analgesic doses required within 24 hours was significantly lower in the suprainguinal group (1.3 ± 0.6 vs 2.6 ± 0.9 ; $p < 0.001$).

Table 4: Overall Analgesic Efficacy and Safety Profile (N = 200)

Parameter	Suprainguinal FICB n (%)	Infrainguinal FICB n (%)	χ^2 / Mean Difference	95% CI	Test of Significance	<i>p</i> value
Excellent analgesia (VAS ≤ 3 at 24 h)	72 (72.0)	41 (41.0)	18.9		χ^2 test	<0.001
Patient satisfaction – High	78 (78.0)	49 (49.0)	17.6		χ^2 test	<0.001
Quadriceps weakness	7 (7.0)	14 (14.0)	2.7		χ^2 test	0.099

Table 4 summarizes the overall analgesic efficacy and safety profile of the two fascia iliaca compartment block approaches. Excellent analgesia, defined as a VAS score ≤ 3 at 24 hours, was achieved in a significantly higher proportion of patients in the suprainguinal group (72.0%) compared to the infrainguinal group (41.0%) ($p < 0.001$). High patient satisfaction was also significantly more frequent in the suprainguinal group (78.0% vs 49.0%; $p < 0.001$). Although quadriceps weakness was observed more frequently in the infrainguinal group, the difference did not reach statistical significance ($p = 0.099$).

DISCUSSION

Baseline Demographic and Clinical Characteristics (Table 1): In the present study, baseline demographic and clinical parameters such as age, gender distribution, BMI, ASA physical status, and type of lower limb orthopedic surgery were comparable between the suprainguinal and infrainguinal FICB groups, with no statistically significant differences. This homogeneity between groups strengthens the internal validity of the study by minimizing confounding variables and ensuring that differences in postoperative analgesic outcomes can be attributed primarily to the block technique rather than patient-related factors.

Similar baseline comparability has been reported in previous comparative studies evaluating fascia iliaca block approaches. DeLong L et al.(2021)[5] demonstrated no significant differences in age, ASA grading, or surgical distribution between suprainguinal and infrainguinal groups, thereby supporting unbiased comparison of analgesic efficacy. Likewise, Safa B et al.(2024)[6] reported balanced demographic profiles in patients undergoing lower limb orthopedic surgeries with ultrasound-guided FICB, consistent with the findings of the present study. These similarities indicate that fascia iliaca block outcomes are reproducible across diverse patient populations when baseline characteristics are evenly distributed.

Postoperative Pain Scores (Table 2): The present study demonstrated significantly lower postoperative VAS

pain scores in the suprainguinal FICB group at all assessed time intervals (2, 6, 12, and 24 hours). The magnitude and persistence of pain reduction suggest superior analgesic coverage with the suprainguinal approach, likely due to more proximal spread of local anesthetic and consistent blockade of the femoral, lateral femoral cutaneous, and obturator nerves.

These findings are in agreement with Huang KT et al.(2024)[7], who observed significantly lower pain scores and reduced opioid consumption following suprainguinal FICB in patients undergoing total hip arthroplasty. Liang L et al.(2023)[8], in their cadaveric and imaging-based evaluation, demonstrated that suprainguinal injection achieved more reliable cranial spread toward the lumbar plexus compared to the infrainguinal technique, explaining the enhanced analgesic effect. Similarly, Verbeek T et al.(2021)[9] reported sustained pain relief up to 24 hours with suprainguinal FICB, corroborating the temporal analgesic profile observed in the present study.

Duration of Analgesia and Rescue Analgesic Requirement (Table 3): A key finding of this study was the significantly longer duration of analgesia and delayed time to first rescue analgesic in the suprainguinal group. Patients receiving suprainguinal FICB required fewer rescue analgesic doses within the first 24 hours and a significantly smaller proportion

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required rescue analgesia within the initial 12-hour postoperative period.

These observations align with earlier clinical studies. Eshag MM et al.(2024)[10] reported a prolonged analgesic duration and reduced opioid consumption in patients receiving suprainguinal FICB for hip surgery. DeLong L et al.(2021)[5] similarly noted a decrease in rescue analgesic requirement with ultrasound-guided proximal fascia iliaca approaches. The enhanced analgesic duration is likely attributable to improved spread of local anesthetic along the iliacus muscle plane, facilitating blockade of multiple neural components involved in postoperative pain transmission Quan J et al.(2022)[11].

Overall Analgesic Efficacy and Safety Profile (Table 4): The suprainguinal FICB group demonstrated significantly higher rates of excellent analgesia and patient satisfaction, reinforcing its clinical superiority in postoperative pain management. Azizoğlu M et al.(2022)[12].

Quadriceps weakness was observed more frequently in the infrainguinal group, although the difference did not reach statistical significance. Similar trends have been reported by Safa B et al.(2024)[6], who attributed transient motor weakness to distal femoral nerve involvement with infrainguinal injection techniques. This finding is consistent with prior studies that have emphasized the low complication rates associated with ultrasound-guided regional anesthesia techniques Liang L et al.(2023)[8].

CONCLUSION

This comparative cross-sectional study demonstrates that the suprainguinal fascia iliaca compartment block (FICB) provides superior postoperative analgesia compared to the infrainguinal approach in patients undergoing lower limb orthopedic surgery. Patients receiving the suprainguinal block experienced significantly lower postoperative pain scores at all assessed time points, a longer duration of analgesia, delayed requirement for first rescue analgesic, and reduced overall rescue analgesic consumption within the first 24 hours. Furthermore, a higher proportion of patients in the suprainguinal group achieved excellent analgesia and reported greater satisfaction, reflecting the clinical effectiveness of this approach.

The improved analgesic outcomes observed with the suprainguinal technique can be attributed to more consistent proximal spread of local anesthetic, resulting in reliable blockade of the femoral, lateral femoral cutaneous, and obturator nerves. Importantly, the suprainguinal approach was not associated with an increased incidence of block-related complications, and its safety profile was comparable to that of the infrainguinal technique. The reduced incidence of

postoperative nausea and vomiting in the suprainguinal group further supports its opioid-sparing benefit.

In conclusion, ultrasound-guided suprainguinal FICB is an effective, safe, and clinically advantageous technique for postoperative pain management in lower limb orthopedic surgeries. Its routine use may enhance patient comfort, facilitate early mobilization, and optimize overall postoperative recovery.

LIMITATIONS OF THE STUDY

1. The cross-sectional study design limits the ability to establish causal relationships between block technique and analgesic outcomes.
2. The study was conducted at a single tertiary care center, which may limit the generalizability of the findings to other clinical settings.
3. Long-term outcomes such as functional recovery, time to ambulation, and development of chronic postoperative pain were not assessed.
4. Although ultrasound guidance was used, operator skill and experience may have influenced block performance and outcomes.
5. The study did not evaluate the spread of local anesthetic using imaging modalities, which could have provided anatomical correlation.
6. Patient-reported outcomes beyond the first 24 hours postoperatively were not included.

REFERENCES

1. Bansal K, Sharma N, Singh MR, Sharma A, Roy R, Sethi S. Comparison of suprainguinal approach with infrainguinal approach of fascia iliaca compartment block for postoperative analgesia. *Indian Journal of Anaesthesia*. 2022 Oct 1;66(Suppl 6):S294-9.
2. Carella M, Beck F, Piette N, Denys S, Kurth W, Lecoq JP, Bonhomme VL. Effect of suprainguinal fascia iliaca compartment block on postoperative opioid consumption and functional recovery in posterolateral-approached total hip arthroplasty: a single-blind randomized controlled trial. *Regional Anesthesia & Pain Medicine*. 2022 Sep 1;47(9):547-53.
3. Jubairiya K, Farha PK, Valsan N, Raphael PO, Prince M, AJ S, Anusree P, Mohammed Nabeel SM. Efficacy of Infrainguinal vs Suprainguinal Approach to Fascia Iliaca Compartment Block for Postoperative Analgesia in Patients with Proximal Femoral Fracture: A Randomised Clinical Study. *Journal of Clinical & Diagnostic Research*. 2024 Nov 1;18(11).
4. Mathur PR, Banerjee AP, Yadav RL. A comparative study of postoperative analgesic efficacy of suprainguinal versus infrainguinal approach of ultrasound-guided fascia iliaca compartment block using 0.2% ropivacaine in patients undergoing surgery for hip fracture under spinal anesthesia. *Indian Journal of Pain*. 2024 Jan 1;38(1):8-13.
5. DeLong L, Krishna S, Roth C, Veneziano G, Arce Villalobos M, Klingele K, Tobias JD. lumbar plexus block versus suprainguinal fascia iliaca block to provide

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analgesia following hip and femur surgery in pediatric-aged patients—an analysis of a case series. *Local and Regional Anesthesia*. 2021 Oct 19;139-44.

6. Safa B, Trinh H, Lansdown A, McHardy PG, Gollish J, Kiss A, Kaustov L, Choi S. Ultrasound-guided suprainguinal fascia iliaca compartment block and early postoperative analgesia after total hip arthroplasty: a randomised controlled trial. *British journal of anaesthesia*. 2024 Jul 1;133(1):146-51.

7. Huang KT, Tsai HI, Kao SC. Supra-inguinal fascia iliaca block versus peri-capsular nerve group (PNEG) block for pain management in patients with hip fracture: A double-blind randomised comparative trial. *Injury*. 2024 Dec 1;55(12):111936.

8. Liang L, Zhang C, Dai W, He K. Comparison between pericapsular nerve group (PENG) block with lateral femoral cutaneous nerve block and supra-inguinal fascia iliaca compartment block (S-FICB) for total hip arthroplasty: a randomized controlled trial. *Journal of Anesthesia*. 2023 Aug;37(4):503-10.

9. Verbeek T, Adhikary S, Urman R, Liu H. The application of fascia iliaca compartment block for acute

pain control of hip fracture and surgery. *Current Pain and Headache Reports*. 2021 Apr;25(4):22.

10. Eshag MM, Hasan LO, Elshenawy S, Ahmed MS, Emad Mostafa AE, Abdelghafar YA, Althawadi YJ, Ibraheem NM, Badr H, AbdelQadir YH. Fascia iliaca compartment block for postoperative pain after total hip arthroplasty: a systematic review and meta-analysis of randomized controlled trials. *BMC anesthesiology*. 2024 Mar 9;24(1):95.

11. Quan J, Yang S, Chen Y, Chen K, Yu S. Ultrasound-guided comparison of psoas compartment block and supra-inguinal fascia iliaca compartment block for pain management in pediatric developmental dysplasia of hip surgeries. *Frontiers in Pediatrics*. 2022 Feb 2;9:801409.

12. Azizoglu M, Rumeli S. Comparison of the suprainguinal fascia iliaca compartment block with continuous epidural analgesia in patients undergoing hip surgeries: a retrospective study. *Brazilian Journal of Anesthesiology*. 2022 Apr 13;72(3):342-9.