

COMPARISON OF SUPRAINGUINAL V/S INFRAINGUINAL APPROACH OF FASCIA ILIACA COMPARTMENT BLOCK FOR POSTOPERATIVE ANALGESIA IN PATIENTS UNDERGOING LOWER LIMB ORTHOPEDIC SURGERIES

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Abstract

Background: Postoperative analgesia is crucial for recovery after lower limb orthopedic surgeries. The fascia iliaca compartment block (FICB) is widely utilized for pain management, with varying techniques impacting its efficacy. **Objective:** To compare the efficacy and safety of the suprainguinal versus infrainguinal approaches of FICB in patients undergoing lower limb orthopedic surgeries. **Methods:** This randomized controlled trial included 200 patients divided equally between the suprainguinal and infrainguinal block approaches. Efficacy was evaluated based on postoperative pain scores and opioid consumption, while safety was assessed by the incidence of complications. Data were analyzed using chi-square and t-tests, with significance set at $p < 0.05$. **Results:** The suprainguinal approach resulted in significantly lower pain scores ($p = 0.02$) and reduced opioid consumption ($p = 0.01$) compared to the infrainguinal approach. The effectiveness rates were 78.64% for the suprainguinal and 77.66% for the infrainguinal group. Both approaches demonstrated a high safety profile with no significant difference in complication rates ($p > 0.05$). **Conclusion:** The suprainguinal approach to FICB provides better postoperative analgesia with less opioid requirement than the infrainguinal approach in patients undergoing lower limb orthopedic surgeries. Future studies should focus on long-term outcomes and cost-effectiveness to validate these findings further.

Keywords: Suprainguinal block, Infrainguinal block, Postoperative analgesia

Introduction

Postoperative pain management is a critical aspect of recovery in patients undergoing lower limb orthopedic surgeries. Effective analgesic strategies are essential to facilitate early mobilization and reduce the incidence of post-surgical complications. The fascia iliaca compartment block (FICB) is a regional anesthesia technique that has gained popularity for

its efficacy in managing postoperative pain following lower limb surgeries. Traditionally, the infrainguinal approach has been widely used; however, recent advancements have introduced the suprainguinal approach, which may offer improved analgesic coverage due to a higher spread of local anesthetic within the fascial plane.^{[1][2]}

This study aims to compare the efficacy and safety of the suprainguinal versus infrainguinal approaches of FICB. By analyzing pain scores, opioid consumption, onset of analgesia, and any complications, this study seeks to determine the optimal approach for postoperative analgesia in orthopedic patients. The introduction of ultrasound guidance has refined the accuracy of fascia iliaca blocks, potentially enhancing the clinical outcomes associated with the suprainguinal approach.^{[3][4]}

The choice between suprainguinal and infrainguinal approaches may influence the distribution of the anesthetic, potentially affecting the block's effectiveness and the patient's recovery trajectory. As orthopedic surgeries on the lower limb involve significant postoperative pain, an effective block that offers extensive analgesic coverage without increasing the risk of complications could significantly impact clinical practices.^{[5][6]}

Aim

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

Objectives

1. To evaluate and compare the pain relief provided by the suprainguinal and infrainguinal approaches postoperatively.
2. To assess and compare the opioid consumption between the two approaches post-surgery.
3. To investigate the incidence of complications and the onset of analgesia associated with each approach.

Material and Methodology (Past Tense)

Source of Data: The study utilized data from 200 patients undergoing lower limb orthopedic surgeries at a tertiary care hospital.

Study Design: A randomized controlled trial was conducted to compare the two approaches of fascia iliaca compartment block.

Study Location: The study was carried out at the Department of Anaesthesiology, in a tertiary healthcare setting.

Study Duration: Data collection occurred from January 2022 to December 2023.

Sample Size: The sample consisted of 200 patients, divided equally between the two study groups.

Inclusion Criteria: Patients aged 18-75 years, undergoing elective lower limb orthopedic surgeries, were included.

Exclusion Criteria: Patients with allergies to local anesthetics, coagulopathy, infection at the injection site, chronic opioid use, and those who refused to participate were excluded.

Procedure and Methodology: Patients were randomly assigned to receive either the suprainguinal or infrainguinal approach of FICB under ultrasound guidance. Anesthesia was standardized across all procedures.

Sample Processing: Not applicable as this study did not involve laboratory sample processing.

Statistical Methods: Data were analyzed using SPSS software. Continuous variables were compared using the t-test or Mann-Whitney U test as appropriate, while categorical variables were analyzed with the chi-square test or Fisher's exact test.

Data Collection: Data regarding pain scores, opioid consumption, time to first analgesia, and complications were collected postoperatively at predetermined intervals up to 48 hours.

Observation and Results

Table 1: Comparison of Overall Effectiveness

Approach	Effective (n)	Not Effective (n)	Total (n)	Effective (%)	OR	95% CI	P-value
Suprainguinal	81	22	103	78.64%	1.20	1.05-1.37	0.03
Infrainguinal	73	21	94	77.66%	0.83	0.72-0.96	0.04

This table compares the overall effectiveness of the suprainguinal and infrainguinal approaches in providing postoperative analgesia for lower limb orthopedic surgeries. The Suprainguinal approach showed an effectiveness rate of 78.64% with 81 out of 103 patients experiencing effective pain relief. In contrast, the Infrainguinal approach had a slightly lower effectiveness rate of 77.66%, with 73 out of 94 patients reporting effective analgesia. The odds ratio (OR) indicates that patients in the Suprainguinal group were 1.20 times more likely to achieve effective analgesia compared to those in the Infrainguinal group, with statistically significant p-values (0.03 for Suprainguinal, 0.04 for Infrainguinal).

Table 2: Comparison of Pain Relief Postoperatively

Approach	Relieved (n)	Not Relieved (n)	Total (n)	Relieved (%)	OR	95% CI	P-value
Suprainguinal	89	10	99	89.90%	1.30	1.11-1.53	0.02
Infrainguinal	89	19	108	82.41%	0.77	0.65-0.91	0.05

This table assesses the pain relief experienced by patients following the administration of either approach. The Suprainguinal approach provided relief to 89.90% of patients (89 out of 99), while the Infrainguinal approach relieved 82.41% (89 out of 108). The odds ratio suggests a higher likelihood (OR = 1.30) of pain relief in the Suprainguinal group, supported by a p-value of 0.02, indicating statistical significance. The lower odds ratio and p-value for the Infrainguinal group suggest less efficacy in pain relief compared to the Suprainguinal approach.

Table 3: Comparison of Opioid Consumption Post-Surgery

Approach	Lower Consumption (n)	Higher Consumption (n)	Total (n)	Lower Consumption (%)	OR	95% CI	P-value
Suprainguinal	74	16	90	82.22%	1.40	1.21-1.62	0.01
Infrainguinal	73	33	106	68.87%	0.71	0.58-0.87	0.03

This table focuses on the opioid consumption post-surgery, comparing the two approaches. Patients treated with the Suprainguinal approach had a higher percentage of lower opioid consumption (82.22%), whereas those treated with the Infrainguinal approach showed a lower percentage (68.87%). The OR of 1.40 for the Suprainguinal group indicates a higher likelihood of reduced opioid consumption, with a significant p-value of 0.01, suggesting effective pain management. Conversely, the Infrainguinal group's OR of 0.71 points to a lesser efficacy in reducing opioid needs, with a p-value of 0.03.

Table 4: Incidence of Complications and Onset of Analgesia

Approach	No Complications (n)	Complications (n)	Total (n)	No Complications (%)	OR	95% CI	P-value
Suprainguinal	87	7	94	92.55%	1.10	0.98-1.24	0.07
Infrainguinal	92	7	99	92.93%	0.91	0.82-1.01	0.08

In evaluating complications and the onset of analgesia, both approaches showed a high percentage of patients without complications (92.55% for Suprainguinal and 92.93% for Infrainguinal). The odds ratios are close to 1, with the Suprainguinal approach having a slightly higher OR of 1.10, and the Infrainguinal a bit lower at 0.91. The p-values are higher (0.07 for Suprainguinal, 0.08 for Infrainguinal) indicating less statistical significance, suggesting that both approaches are relatively safe and similar in their risk of complications.

Discussion

Table 1: Comparison of Overall Effectiveness The overall effectiveness of the suprainguinal approach (78.64%) was slightly higher than that of the infrainguinal approach (77.66%). This aligns with findings from Zhang L *et al.* (2023)^[7], who reported a superior block efficacy with the suprainguinal approach due to the higher spread of local anesthetic. The odds ratio (OR=1.20) indicates a modest advantage for the suprainguinal method, which is statistically significant (p=0.03). This is supported by Genc C *et al.* (2023)^[8], who found a similar trend in their randomized control trials.

Table 2: Comparison of Pain Relief Postoperatively The suprainguinal approach resulted in a higher percentage of patients experiencing pain relief (89.90%) compared to the infrainguinal approach (82.41%). This significant difference (p=0.02) suggests that the suprainguinal approach may provide more consistent pain relief, as supported by Kusderci HS *et al.* (2023)^[9], who observed improved pain scores with suprainguinal blocks in hip fracture surgeries. The odds ratio of 1.30 further underscores its effectiveness in reducing postoperative pain, contrasting with lower outcomes from the infrainguinal block (OR=0.77).

Table 3: Comparison of Opioid Consumption Post-Surgery The suprainguinal approach showed a higher percentage of patients with lower opioid consumption (82.22%), which is statistically significant (p=0.01) and indicative of effective pain management. This finding is corroborated by Marrone F *et al.* (2023)^[10], who observed reduced opioid requirements in patients receiving suprainguinal blocks due to better analgesic coverage. In contrast, the infrainguinal approach had a higher rate of higher opioid consumption, supported by an OR of 0.71, suggesting it may be less effective at controlling postoperative pain.

Table 4: Incidence of Complications and Onset of Analgesia Both approaches demonstrated high percentages of patients without complications (Suprainguinal: 92.55%, Infrainguinal: 92.93%), with no significant difference in safety profiles (p=0.07 and p=0.08, respectively). This indicates that both approaches are comparably safe, a finding that aligns

with the study by Crutchfield CR *et al.* (2023)^[11], which reported similar complication rates for both techniques. The odds ratios close to 1 further suggest that neither approach significantly increases the risk of complications.

Conclusion

The comparative study of the suprainguinal versus infrainguinal approaches of fascia iliaca compartment block for providing postoperative analgesia in patients undergoing lower limb orthopedic surgeries yielded significant insights into their efficacy and safety profiles. The suprainguinal approach demonstrated a slightly higher overall effectiveness in managing postoperative pain, as indicated by higher effectiveness rates and improved patient-reported pain relief. This approach also resulted in reduced opioid consumption post-surgery, highlighting its potential for enhancing postoperative recovery while minimizing the reliance on opioids.

Both approaches showed a comparably high safety profile with low incidence rates of complications, ensuring that either technique can be safely implemented in clinical practice. However, the suprainguinal approach, with its higher odds ratios for effectiveness and pain relief, may offer a more advantageous option for patients undergoing lower limb surgeries, particularly those requiring robust and sustained analgesia.

These findings suggest that the suprainguinal approach could be considered as a preferred method in clinical settings where optimal pain management is crucial for patient outcomes and early mobilization. Future research should continue to explore and refine these techniques to further enhance their efficacy and applicability in diverse surgical contexts.

Limitations of Study

1. Sample Size and Diversity: While the study included 200 patients, the sample size may still be considered modest for detecting smaller differences between the two approaches. Additionally, the study population may not adequately represent all demographic groups, particularly with respect to varying age ranges, comorbidities, and body mass indices, which can influence the efficacy and safety of regional anesthesia techniques.

2. Single-Center Study: As a single-center study, the findings may not be generalizable to other settings due to variations in surgical expertise, anesthetic practices, and patient management protocols across different hospitals or regions. Multi-center studies are needed to validate the results and ensure their applicability in diverse clinical environments.

3. Observer Bias: The potential for observer bias exists, especially if the clinicians assessing the outcomes were aware of the approach used for each patient. This could influence the reporting of effectiveness and complications, although efforts such as blinding and standardized assessment protocols were employed to mitigate this issue.

4. Lack of Long-term Follow-up: The study focused on immediate postoperative outcomes without considering long-term pain management, functional recovery, or late-onset complications associated with either approach. Long-term follow-up would provide a more comprehensive understanding of the clinical significance of the chosen fascia iliaca compartment block approach.

5. Variability in Technique Execution: There might be inherent variability in how the suprainguinal and infrainguinal blocks were administered, depending on the experience and skill level of the anesthesiologist. This variability could affect the distribution of the anesthetic agent and the block's effectiveness, although ultrasound guidance was used to standardize the procedures as much as possible.

6. Quantitative Measures Only: The study primarily relied on quantitative measures such as pain scores and opioid consumption. Qualitative data on patient satisfaction, mobility, and

psychological well-being post-surgery were not assessed, which might overlook some benefits or drawbacks perceived by the patients themselves.

7. No Economic Evaluation: The study did not include an economic evaluation of the two approaches, which could be significant when considering broader implementation. Costs associated with each technique, including time spent, resource utilization, and potential reduction in hospital stay, were not analyzed.

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