Section: Anesthesiology

Original Research Article

# COMPARISON OF CONTINUOUS EPIDURAL ANALGESIA VERSUS CONTINUOUS FASCIA ILIACA BLOCK FOR POST OPERATIVE ANALGESIA IN PATIENTS UNDERGOING HIP SURGERIES: A RANDOMISED CONTROLLED STUDY

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***Received*** *: 10/02/2026*
***Received in revised form*** *: 28/03/2026*
***Accepted*** *: 14/04/2026*

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**DOI:** 10.70034/ijmedph.2026.2.135

**Source of Support:** Nil,
**Conflict of Interest:** None declared

**Int J Med Pub Health**
2026; 16 (2); 787-790

ABSTRACT

**Background:** Effective postoperative pain management is essential following major hip surgeries to facilitate early mobilisation, reduce complications, and improve functional recovery. While continuous epidural analgesia has long been considered the gold standard, it is associated with haemodynamic instability. The fascia iliaca compartment block (FICB) has emerged as a promising alternative, offering effective analgesia with potentially fewer systemic effects. This study compares the efficacy and safety of continuous epidural analgesia and continuous fascia iliaca block in patients undergoing hip surgeries.

**Materials and Methods:** This prospective randomized controlled study was conducted over 18 months and included 90 patients undergoing elective hip surgeries. Patients were randomly allocated into two groups: Group E (continuous epidural analgesia) and Group F (continuous suprainguinal FICB), with 45 patients in each group. All patients received standardized spinal anaesthesia intraoperatively. Postoperatively, continuous analgesia was maintained via epidural catheter in Group E and ultrasound-guided fascia iliaca catheter in Group F. Pain was assessed using the Visual Analogue Scale (VAS) at predefined intervals. Haemodynamic parameters, rescue analgesic requirement, and adverse effects were recorded. Statistical analysis was performed using independent t-test and Chi-square test, with $p < 0.05$ considered significant.

**Results:** Baseline characteristics were comparable between the two groups ($p > 0.05$). VAS scores were significantly lower in the epidural group from 1 hour to 24 hours postoperatively ($p < 0.001$), indicating superior analgesic efficacy. Rescue analgesic requirement was significantly reduced in Group E (820 ± 215 mg) compared to Group F (1320 ± 260 mg) ($p < 0.001$). Mean arterial pressure was significantly lower in the epidural group throughout the postoperative period ($p < 0.001$), with a higher incidence of hypotension (20.0% vs 4.4%, $p = 0.03$). Heart rate, oxygen saturation, and respiratory rate were comparable between groups. No cases of respiratory depression were observed.

**Conclusion:** Continuous epidural analgesia provides superior and sustained postoperative analgesia with reduced analgesic requirements but is associated with increased risk of hypotension. Continuous fascia iliaca block offers better haemodynamic stability with adequate pain control, making it a valuable alternative, particularly in patients where haemodynamic stability is a concern.

**Keywords:** Epidural analgesia; Fascia iliaca compartment block; Hip surgery; Postoperative pain; Visual Analogue Scale.

## INTRODUCTION

Effective pain control is a cornerstone of post-operative care following major hip surgeries such as hemiarthroplasty, total hip arthroplasty, and internal fixation.[1] These procedures cause significant tissue trauma, leading to moderate to severe acute pain that can hinder early mobilisation, delay rehabilitation, prolong hospital stay, and reduce patient satisfaction. While acute pain is a protective response, inadequate control may contribute to its transition into chronic pain, adversely affecting long-term quality of life. Traditionally, opioids have been widely used for analgesia but are associated with adverse effects such as respiratory depression, nausea, sedation, and risk of dependence.[2] This has led to the adoption of multimodal analgesia strategies aimed at improving pain relief while minimizing opioid use.

Regional anaesthetic techniques play a key role in multimodal analgesia. Continuous epidural analgesia has long been considered the gold standard for lower limb surgeries due to its effective pain control; however, it is associated with complications such as hypotension, motor blockade, and urinary retention.[3] Peripheral nerve blocks like the fascia iliaca compartment block (FICB) have emerged as safer alternatives, providing effective unilateral analgesia with fewer systemic effects. Continuous FICB, particularly via the suprainguinal approach, offers prolonged pain relief, reduced opioid consumption, and better preservation of motor function, facilitating early mobilisation.[4] This study aims to compare continuous epidural analgesia and continuous FICB in patients undergoing major hip surgeries, assessing analgesic efficacy using the Visual Analogue Scale (VAS) along with safety and functional outcomes.

**Objectives**

- To assess postoperative pain using the Visual Analogue Scale (VAS) in patients receiving continuous epidural analgesia or continuous fascia iliaca compartment block following major hip surgery.
- To evaluate haemodynamic parameters, including mean arterial pressure (MAP).
- To assess the incidence of adverse effects.
- To determine the requirement for rescue analgesia.

## MATERIALS AND METHODS

This prospective randomized controlled study was conducted over 18 months at P.E.S. Institute of Medical Sciences and Research, Kuppam. A total of 90 patients undergoing elective hip surgeries were enrolled and randomly allocated into two groups: continuous epidural analgesia (Group E, n=45) and continuous suprainguinal fascia iliaca compartment block (FICB) (Group F, n=45). Patients aged 20–60 years with ASA physical status I–II were included. Exclusion criteria comprised patient refusal, infection at the injection site, coagulopathy, hepatic or renal dysfunction, allergy to local anaesthetics, and patients developing hypotension following epidural activation.

All patients underwent pre-anaesthetic evaluation and received standardized spinal anaesthesia with 0.5% bupivacaine heavy. Following regression to T10 level, patients received the allocated intervention. Group E received epidural catheter placement at L3–L4 with continuous infusion of 0.125% bupivacaine with buprenorphine, while Group F received ultrasound-guided suprainguinal FICB with catheter placement and continuous infusion of 0.125% bupivacaine for 48 hours. Postoperative pain was assessed using the Visual Analogue Scale (VAS), and intravenous paracetamol was administered as rescue analgesia for VAS ≥4. Haemodynamic parameters and adverse effects were monitored at predefined intervals. The study was single-blinded. Statistical analysis was performed using SPSS version 23.0, with independent t-test and Chi-square test applied, and $p < 0.05$ considered statistically significant.

## RESULTS

The baseline characteristics of the study population are summarized in Table 1. The mean age in Group E was 39.47 ± 12.35 years and in Group F was 44.42 ± 11.57 years, with no statistically significant difference between the groups ($p = 0.053$). Age distribution was comparable across all categories. Gender distribution showed 55.6% males in Group E and 42.2% in Group F ($p = 0.21$). Similarly, ASA physical status and type of surgery were comparable between the groups ($p > 0.05$), indicating that both groups were well matched at baseline. [Table 1]

Baseline haemodynamic parameters are presented in Table 2. The mean heart rate, mean arterial pressure (MAP), oxygen saturation ($SpO_2$), and respiratory rate were similar in both groups, with no statistically significant differences ($p > 0.05$), confirming comparable preoperative physiological status.

Haemodynamic changes over time are shown in Table 3. Heart rate, $SpO_2$, and respiratory rate remained stable and comparable between the two groups at all time intervals ($p > 0.05$). However, MAP was significantly lower in Group E compared to Group F from 30 minutes to 24 hours postoperatively ($p < 0.001$), indicating a greater tendency for hypotension in the epidural group. [Table 3]

Postoperative pain scores assessed using VAS are depicted in Table 4. At 0 hours, VAS scores were comparable between the groups ($p = 0.42$). However, from 1 hour onwards, Group E demonstrated significantly lower VAS scores at 1, 6, 12, and 24 hours ($p < 0.001$), indicating superior analgesic efficacy of epidural analgesia compared to fascia iliaca block. [Table 4]

Rescue analgesic requirement and adverse effects are summarized in Table 5. The mean paracetamol

consumption was significantly lower in Group E (820 ± 215 mg) compared to Group F (1320 ± 260 mg) ($p < 0.001$), reflecting better pain control in the epidural group. Hypotension was significantly more frequent in Group E (20.0%) than in Group F (4.4%) ($p = 0.03$). The incidence of nausea/vomiting and bradycardia was comparable between the groups ($p > 0.05$). [Table 5]

**Table 1: Baseline Characteristics of Study Population**

| Parameter | Group E (n=45) | Group F (n=45) | P value |
|---|---|---|---|
| Age (Mean ± SD) | 39.47 ± 12.35 | 44.42 ± 11.57 | 0.053 |
| Age Distribution | | | |
| 20–30 yrs | 13 (28.9%) | 8 (17.8%) | |
| 31–40 yrs | 11 (24.4%) | 6 (13.3%) | |
| 41–50 yrs | 9 (20.0%) | 13 (28.9%) | |
| 51–60 yrs | 12 (26.7%) | 18 (40.0%) | |
| Gender | | | 0.21 |
| Male | 25 (55.6%) | 19 (42.2%) | |
| Female | 20 (44.4%) | 26 (57.8%) | |
| ASA Status | | | 0.14 |
| ASA I | 25 (55.6%) | 18 (40.0%) | |
| ASA II | 20 (44.4%) | 27 (60.0%) | |
| Type of Surgery | | | — |
| Total Hip Replacement | 16 (35.6%) | 19 (42.2%) | |
| Hemiarthroplasty | 19 (42.2%) | 14 (31.1%) | |
| ORIF Hip | 10 (22.2%) | 12 (26.7%) | |

**Table 2: Baseline Hemodynamic Parameters**

| Parameter | Group E (Mean ± SD) | Group F (Mean ± SD) | P value |
|---|---|---|---|
| Heart Rate (bpm) | 79.8 ± 4.6 | 80.9 ± 4.9 | 0.29 |
| MAP (mmHg) | 94.6 ± 3.7 | 96.1 ± 3.4 | 0.07 |
| $SpO_2$ (%) | 98.8 ± 0.9 | 99.0 ± 0.8 | 0.33 |
| Respiratory Rate (/min) | 16.9 ± 2.0 | 17.2 ± 2.1 | 0.48 |

**Table 3: Hemodynamic Changes Over Time**

| Time | HR (E vs F) | P value | MAP (E vs F) | P value | $SpO_2$ (E vs F) | P value | RR (E vs F) | P value |
|---|---|---|---|---|---|---|---|---|
| Baseline | 79.8 vs 80.9 | 0.29 | 94.6 vs 96.1 | 0.07 | 98.8 vs 99.0 | 0.33 | 16.9 vs 17.2 | 0.48 |
| 30 min | 78.4 vs 79.6 | 0.31 | 84.1 vs 92.6 | <0.001 | 98.7 vs 98.9 | 0.41 | 16.7 vs 17.0 | 0.45 |
| 2 hr | 77.9 vs 79.1 | 0.28 | 83.7 vs 92.1 | <0.001 | 98.6 vs 98.8 | 0.38 | 16.6 vs 16.9 | 0.44 |
| 4 hr | 77.6 vs 78.8 | 0.27 | 84.0 vs 91.8 | <0.001 | 98.6 vs 98.9 | 0.35 | 16.5 vs 16.8 | 0.42 |
| 6 hr | 77.3 vs 78.5 | 0.26 | 84.8 vs 91.9 | <0.001 | 98.7 vs 98.9 | 0.36 | 16.4 vs 16.7 | 0.41 |
| 8 hr | 77.1 vs 78.3 | 0.25 | 86.3 vs 92.7 | <0.001 | 98.8 vs 99.0 | 0.34 | 16.5 vs 16.8 | 0.43 |
| 12 hr | 76.9 vs 78.1 | 0.24 | 87.9 vs 93.3 | <0.001 | 98.9 vs 99.1 | 0.32 | 16.6 vs 16.9 | 0.44 |
| 24 hr | 77.5 vs 78.7 | 0.26 | 90.1 vs 94.2 | <0.001 | 99.0 vs 99.2 | 0.30 | 16.8 vs 17.0 | 0.46 |

**Table 4: Postoperative Pain Scores (VAS)**

| Time | Group E (Mean ± SD) | Group F (Mean ± SD) | P value |
|---|---|---|---|
| 0 hr | 1.04 ± 0.80 | 0.91 ± 0.76 | 0.42 |
| 1 hr | 1.09 ± 0.85 | 2.20 ± 0.84 | <0.001 |
| 6 hr | 1.93 ± 0.81 | 2.93 ± 0.81 | <0.001 |
| 12 hr | 2.04 ± 0.80 | 3.44 ± 1.18 | <0.001 |
| 24 hr | 2.64 ± 1.00 | 4.67 ± 1.13 | <0.001 |

**Table 5: Rescue Analgesia and Adverse Effects**

| Parameter | Group E | Group F | P value |
|---|---|---|---|
| Paracetamol consumption (mg) | 820 ± 215 | 1320 ± 260 | <0.001 |
| Hypotension | 9 (20.0%) | 2 (4.4%) | 0.03 |
| Nausea/Vomiting | 7 (15.6%) | 6 (13.3%) | 0.77 |
| Bradycardia | 4 (8.9%) | 1 (2.2%) | 0.17 |

## DISCUSSION

Postoperative pain following hip surgeries significantly affects early mobilisation and recovery, making effective analgesia essential. In this randomized controlled study, both groups were comparable in baseline characteristics, including age, gender, ASA status, and type of surgery, ensuring that outcomes were attributable to the analgesic techniques rather than confounding factors. Similar baseline comparability has been reported by Foss et al,[5] and Azizoglu et al,[6] who also demonstrated no significant influence of demographic variables on analgesic outcomes.

Haemodynamic parameters at baseline and heart rate trends over time were comparable between the groups, consistent with findings by Tetsunaga T et al,[7] and Azizoglu et al,[6] However, mean arterial pressure was significantly lower in the epidural group throughout the postoperative period, reflecting a higher incidence of hypotension, likely due to sympathetic blockade. This observation aligns with studies by Foss et al,[5] and Guay,[8] while Evangelista T et al,[9] reported better haemodynamic stability with fascia iliaca block due to its peripheral mechanism. Oxygen saturation and respiratory rate remained stable in both groups, corroborating reports by Li XD et al,[10] and Tetsunaga T et al,[7] confirming the respiratory safety of both techniques.

Pain scores assessed using VAS demonstrated significantly superior analgesia in the epidural group from 1 hour onwards, which is in agreement with studies by Tetsunaga T et al,[7] and Azizoglu et al.6, who reported more consistent and prolonged analgesia with epidural techniques. Although fascia iliaca block provided effective analgesia, its effect was comparatively less sustained, as also noted by Li XD et al,[10] Reduced rescue analgesic requirement in the epidural group further supports its superior efficacy, consistent with findings by Foss et al,[5] and Azizoglu et al.[6]

With regard to safety, hypotension was significantly more common in the epidural group, whereas the incidence of nausea, vomiting, and bradycardia was comparable, similar to observations by Tetsunaga T et al,[7] and Azizoglu et al,[6] No episodes of respiratory depression were noted, reinforcing the safety profile of regional analgesic techniques. Overall, while continuous epidural analgesia provided superior pain control, continuous fascia iliaca block offered better haemodynamic stability, making it a valuable alternative in selected patients.

**Limitations**

This study was conducted at a single centre with a relatively small sample size, which may limit generalizability. Only ASA I and II patients were included, restricting applicability to higher-risk populations. Pain assessment was limited to VAS at rest, without evaluation during movement or physiotherapy. Long-term outcomes such as ambulation, hospital stay, and functional recovery were not assessed. Additionally, catheter-related complications and technical factors were not separately analyzed, and the use of opioid adjuvant in the epidural group may have influenced analgesic outcomes.

## CONCLUSION

Both continuous epidural analgesia and continuous fascia iliaca compartment block are effective and safe modalities for postoperative pain management in hip surgeries. Epidural analgesia provides superior and sustained pain relief with reduced rescue analgesic requirement, but is associated with a higher incidence of hypotension. In contrast, fascia iliaca block offers better haemodynamic stability with adequate analgesia. Thus, while epidural analgesia remains more effective for pain control, fascia iliaca block serves as a reliable alternative, especially in patients where haemodynamic stability is a concern.

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