

USEFULNESS OF FASCIA ILIACA COMPARTMENT BLOCK WITH INJECTION BUPIVACAINE AND DEXAMETHASONE AS ADJUVANT IN PATIENTS UNDERGOING HIP FRACTURE SURGERIES UNDER SPINAL ANESTHESIA

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ABSTRACT

Objectives: The objectives of our study are to study the effectiveness of fascia iliaca block for positioning during spinal anesthesia and to compare the duration of post-operative analgesia using bupivacaine alone and bupivacaine with dexamethasone as an adjuvant.

Methods: This was a prospective randomized study done at a general hospital. Fifty patients aged 18 years and above of ASA Grades II and III undergoing hip fracture surgeries (proximal femur nailing, DHS, and hemiarthroplasty) were included in the study to receive the fascia iliaca compartment block (FICB). Group A (25 patients) received 38 mL of 0.25% bupivacaine with 2 mL normal saline and Group B (25 patients) received 38 mL of 0.25% bupivacaine with 2ml dexamethasone (8 mg). Relief of pain for positioning during spinal anesthesia was assessed by recording the visual analog score, 30 min after the FICB. In both groups, the post-operative analgesia was recorded from the time of giving spinal anesthesia to the time for first rescue analgesia which was given when VAS was 4 or more.

Results: There was a significant prolongation in the post-operative analgesia in Group B patients who received FICB with bupivacaine and dexamethasone in comparison to Group A in which bupivacaine alone was used. However, the VAS score after 30 min of FICB, for positioning for spinal anesthesia and the patient satisfaction score was similar in both groups.

Conclusion: FICB is effective for providing adequate positioning for spinal anesthesia and the addition of dexamethasone (8 mg) to bupivacaine for FICB significantly prolonged the duration of the block and increased the time to first rescue analgesia as compared to using bupivacaine alone.

Keywords: Bupivacaine, Dexamethasone, Hip fracture, Spinal anesthesia.

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INTRODUCTION

Fractures may involve the femoral neck, shaft, or distal femur. These operations are more often managed with regional anesthesia techniques. Positioning for neuraxial blocks is always challenging because, even slight overriding of the fracture ends, is intensely painful [1,2]. To alleviate the pain of femoral fracture, fascia iliaca compartment nerve block (FICB) is commonly used. The goal is to place the needle tip under the fascia iliaca approximately at a lateral third of the line connecting the anterior superior iliac spine to the pubic tubercle [3,4].

Spinal anesthesia is a useful technique of anesthesia, especially for lower-limb and lower-abdominal surgeries. It offers various advantages such as excellent muscle relaxation for the surgeon and total obtundation of the surgical stress response. It is a safe, reliable, and an inexpensive technique for providing surgical anesthesia and post-operative pain relief in lower-limb and lower-abdominal surgeries. The disadvantage of this technique is its limited duration of action [5-7]. Various adjuvant drugs such as opioids, non-opioids, and α_2 -agonists such as clonidine and dexmedetomidine have been added with bupivacaine to improve the quality of perioperative analgesia and also to minimize the local anesthetic dosage requirement, particularly in high-risk patients and in ambulatory procedures [8,9].

However, in patients suffering from hip fracture, the excruciating pain from the fracture site disables them from providing an adequate sitting position for spinal anesthesia. To overcome this painful experience and make the procedure technically less challenging, intravenous drugs such as opioids and non-steroidal

anti-inflammatory drugs have been used [10]. However, past studies have proved that, as sole agents, they do not do complete justice in obtunding the pain occurring due to overriding of fracture ends in a sitting position. Adverse effects of opioids include nausea, vomiting, giddiness, drowsiness, and urinary retention, whereas NSAIDs cause gastritis and renal dysfunction [11-13].

Other means of providing analgesia for hip fracture patients are femoral nerve block and FICB. The FICB block was introduced by Dalen's *et al.* in 1989 using the landmark-guided technique. The fascia iliaca compartment is a potential space between the fascia iliaca layers anteriorly and the iliacus and psoas muscle posteriorly [14].

It may be thought of as an anterior approach to lumbar plexus block where local anesthetic is injected proximally beneath the fascia iliaca, with the aim of blocking the femoral nerve, lateral cutaneous nerve of the thigh, and the obturator nerve simultaneously. Thereby, the pain sensations carried by the nerves supplying the anterior compartment of the thigh and articular branches of the hip joint will be obtunded [15,16].

Addition of a steroid such as a dexamethasone, perineural, produces vasoconstriction and potentiates the activity of inhibitory potassium channels on nociceptive c-fibers which reduce the systemic absorption of the local anesthetic drug and, thereby, prolongs its duration of action. Hence, the objective of the present study was to study the fascia iliaca compartment block with injection bupivacaine 0.25% given before spinal anesthesia in patients undergoing hip fracture surgeries.

Table 1 : Distribution of patients based on ASA grading

ASA Grade	Group A	Group B	p-value
II	15	13	0.29
III	10	12	

Table 2: VAS score (30 min after FICB)

Visual analog score	Group A	Group B	p-value
0	4	3	0.4
1	12	15	
2	7	6	
3	2	1	
Total	25	25	

Table 3: The patient satisfaction score in both the groups

Satisfaction score	Group A	Group B	p-value
1-poor	0	0	0.54
2-fair	8	1	
3-good	12	15	
4-very good	5	9	
Total	25	25	

METHODS

The present study is the prospective observational study done in the department of the anesthesia, medical college and hospital. A total of 50 patients who underwent the surgeries of the hip fracture were included in the study. All the patients were administered with spinal anesthesia and were given FICB block. The study period was 4 months. The ethical committees of the institute were informed about the study and the ethical clearance certificate was obtained before the start of the study and written informed consent was taken from all the participants.

The inclusion and exclusion criteria included in the study were as follows:

Inclusion criteria

The following criteria were included in the study:

- Patient above the age of 18 years
- Patients following under the category of ASA Grades I, II, and III
- Patients posted for elective surgeries of hip fractures such as proximal femur nailing dynamic hip screw and hemiarthroplasty under spinal anesthesia.

Exclusion criteria

The following criteria were excluded from the study:

- Patients who give negative consent
- Infection at the local site
- History of allergy to local anesthetic
- Very obese patients
- Patients with a previous history of femoral bypass surgery
- Patients having coagulopathy, peripheral neuropathy, and neurological conditions.

The patients included in the study were divided into two groups:

- Group A-patients were administered with injection bupivacaine 0.25% 38 mL + 2 mL saline
- Group B-patients were administered with injection bupivacaine 0.25% 38 mL +Inj. dexamethasone

The detailed history of all the included patients was recorded. The examination of the airway with the general and systemic examination of all the patients was done. All patients were explained about the visual analog score. All patients were monitored with ECG, pulse oximetry, and non-invasive blood pressure monitoring throughout the procedure and surgery.

The patients were given the fascia iliaca block 30 min before giving spinal anesthesia using the landmark guided technique as described by Dalens *et al.* A line is drawn from the anterior superior iliac spine to the pubic tubercle. The junction of lateral and medial third of the line is marked as the point of entry, for the block. Under aseptic precautions and after local infiltration of the skin, a blunted hypodermic needle is advanced perpendicular to the line. The first give-in sensation is that of fascia lata after which the needle is advanced further and the second give-in sensation is that of fascia iliaca. The drug is administered in aliquots of 5 ml, after negative aspiration. No resistance should be felt on injection. If the needle tip is likely to be in the iliacus muscle, then withdraw it until no resistance is felt.

Assessment of pain was done using the visual analog score immediately before the block, every 5 min after giving the block, and simultaneously, vital signs were monitored. The patient was observed for any adverse effects such as pain at the site of injection, hypotension, and arrhythmias. Thirty minutes after the block, the patient's comfort in a sitting position during spinal anesthesia was noted using the visual analog score. At the same time, the angle made by the patient's spine with the table during positioning for spinal anesthesia was noted.

The duration of post-operative pain relief was done by a study team member using a VAS score. Those patients having a VAS score of 4 or more were given Inj. tramadol as rescue analgesia.

Statistical analysis

For a normally distributed data, the student "t" test was used to compare the mean difference of variables between the two groups. Significant differences for categorical data such as gender distribution and ASA grading were done by Chi-square method. $p < 0.05$ was accepted as the level of significance and $p < 0.001$ was taken as highly significant.

RESULTS

A total of 50 patients were included in the study. There was no statistically significant difference in the distribution of demographic characteristics such as age, gender distribution, and ASA grading in both the groups ($p > 0.05$) (Table 1).

The visual analog score for analysis of pain done 30 minutes after FICB was comparable between the two groups and did not show any statistically significant difference. It was observed to be at the same time the angle made by the patient's spine with the table that was observed to be 90° in all patients (Table 2).

The duration of post-operative analgesia, as inferred by the time to first rescue analgesia in Group A was 6.6+1.25 h and in Group B was 12.4+3.13 h. As the value of p is 0.001, the duration of post-operative analgesia is significantly greater in Group B than in Group A. The patient satisfaction score in both the groups was comparable and did not show any significant statistical difference between the two groups (Table 3).

DISCUSSION

The fascia iliaca compartment block provides safe and effective analgesia that mitigates the pain in sitting position in patients with hip fractures. The block is easy to perform using the landmark-guided technique. As the drug is administered in a compartment, the site of needle entry is at a safe distance from the femoral artery and femoral nerve which reduces the chances of hematoma formation, systemic adverse events such as hypotension, arrhythmias, and local adverse effects such as neuropraxia associated with peripheral blocks [17,18].

The aim of our study was to test the efficacy of the block in providing a comfortable sitting position for spinal anesthesia and compare the visual analog score 30 minutes after the block in both groups. It was observed that the mean VAS score was reduced from 7.27 to 1.28+0.82, 30 min after the block was given in Group A and from 7.35 to 1.20+0.69 in Group B. In 2009, Garlich *et al.* found that FICB decreased mean VAS

score from 7.4 to 2 [19]. Similarly, a study by Kumar *et al.*, in 2019, showed a decrease in mean VAS from 7.16 to 1.67 after FICB. Both of the studies are comparable to our results which show a statistically significant reduction in VAS ($p < 0.001$) in both groups. However, the VAS scores done 30 min after FICB were comparable in both groups and did not show any statistically significant difference [5].

We also compared the FICB using Inj. bupivacaine alone and injection bupivacaine with injection dexamethasone 8 mg as adjuvant and observed that there was prolongation of post-operative analgesia in the latter group. In 2016, Rosenfeld *et al.* [20] studied perineural versus intravenous dexamethasone as an adjuvant to local anesthetic in brachial plexus block for shoulder surgery. In 2014, Kawanishi *et al.* observed that perineural, not intravenous dexamethasone prolongs the duration of interscalene block with ropivacaine [21].

In our study, the mean time to first rescue analgesia in Group A was 6.6+1.35 h and Group B was 12.4+3.13 h. The difference in the duration of post-operative analgesia is statistically significant ($p < 0.001$). The result is comparable to the study done by Weinstein *et al.*, in 2014, [6] which demonstrated that adding dexamethasone to bupivacaine plain would significantly prolong post-operative analgesia in FICB done before spinal anesthesia.

Finally, no adverse effects such as local hematoma, neurotoxicity, and arrhythmias were observed in either group.

CONCLUSION

The observation from our study is that the fascia iliaca block given before spinal anesthesia allows for comfortable positioning during the subarachnoid block. Addition of dexamethasone to plain bupivacaine significantly prolongs the duration of post-operative analgesia.

AUTHORS' CONTRIBUTIONS

Design of research work, data collection, and drafting of manuscript were done by Dr. Chaitalee. N. Lil and Dr. Hina.R.Gajjar. Review and final editing of the manuscript was done by Dr. Ayush Shah, Dr. Akash Shah, Dr. Ishani Patel, and Dr. Yagnik Ramani

CONFLICTS OF INTEREST

The authors, hereby, declare that there are no conflicts of interest.

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