

Comparative Evaluation of Fascia Iliaca Compartment Block and Intravenous Fentanyl for Positioning of the Patients with Hip Fractures for Central Neuraxial Blockade

Pooja Yadav¹, A R Gogia², Mona Swain³

¹Senior Resident, Department of Anesthesia and Intensive care, VMMC and Safdarjung Hospital, New Delhi, India.

²Consultant, Department of Anesthesia and Intensive care, VMMC and Safdarjung Hospital, New Delhi, India.

³Senior Resident, Department of Anesthesia and Intensive care, VMMC and Safdarjung Hospital, New Delhi, India.

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ABSTRACT

Background: Perioperative pain management is a major challenge in patients with hip fractures. Satisfactory analgesia may positively affect outcome following hip fractures. Positioning patients for central neuraxial blockade (CNB) can be extremely painful. Pain management was traditionally based on systemic opioids but now peripheral nerve blocks are gaining popularity in this setting. This prospective randomised study compares the analgesic efficacy of ultrasound guided fascia iliaca compartment block to intravenous fentanyl for positioning hip fracture patients for central neuraxial blockade. **Methods:** 60 patients of ASA grade I & II scheduled for hip fracture surgery were randomised to 2 groups of 30 each. FICB group receive fascia iliaca compartment block with 40 ml 0.25% bupivacaine and IVFE group receive a bolus dose of intravenous fentanyl 2mcg/kg 20 minutes and 5 minutes before positioning for central neuraxial blockade respectively. VRS score before and following the analgesic intervention, time needed for CNB, number of attempts and quality of patient positioning and patient satisfaction were documented. **Results:** FICB group patients showed significantly lower VRS scores in all instances following analgesic intervention (p value<0.0001), better quality of positioning with shorter CNB performance time (p value< 0.0001) and less number of attempts (p value=0.039) and better patient satisfaction rate (p value= 0.042) as compared to IVFE group. **Conclusion:** Fascia iliaca compartment block provides superior analgesia compared with intravenous fentanyl, central neuraxial blockade performance and yields wide patient acceptance, hence improving overall quality and efficacy of patient care.

Keywords: Analgesia, Fascia iliaca compartment block, Hip fractures, Regional Anesthesia.

INTRODUCTION

Hip fracture is a common orthopedic problem following trauma in the patients of all age groups most commonly elderly patients.^[1] These cause substantial short and long term morbidity and mortality in these patients.^[2,3] Most of these fractures are treated surgically either by internal fixation of the fracture or by replacement of femoral head with arthroplasty.

Central neuraxial blockade (CNB) is accepted anesthetic technique for these cases as this technique is associated with continued postoperative pain relief, lower odds of mortality and pulmonary complications compared with general anesthesia.^[4,5]

However, positioning of these patients for central neuraxial blockade can be extremely troublesome because of severe pain associated with movement of the fractured limb causing sympathetic stimulation and increased cardiac work. This may compromise high risk cardiac patients and elderly patients.

So, effective pain management is very important for the patient comfort and easier performance of CNB. Pain management is traditionally based on systemic opioids which have a large potential for side effects in elderly patients.^[6,7]

Many studies have evaluated role of nerve blocks for pain control for hip fractures but only few studies have compared the role of fascia iliaca compartment block (FICB) in providing satisfactory analgesia and ease of positioning of the patients prior to CNB with traditional opioid based pain management.

Therefore, this prospective randomized study is designed in order to compare analgesic efficacy of FICB with intravenous fentanyl prior to positioning of hip fracture patients for CNB.

MATERIALS AND METHODS

After obtaining approval from the institution ethical committee and patient's informed consent, 60 patients with ASA grade I & II aged 18 to 65 years and planned for hip fracture surgical repair were enrolled in the study.^[8]

Exclusion criteria included any contraindication for CNB, impaired cognition or dementia, multiple fractures. Patients were randomly assigned using

Name & Address of Corresponding Author

Dr. Mona Swain
Senior Resident,
Department of Anesthesia and Intensive care
VMMC and Safdarjung Hospital,
New Delhi, India.

computer generated random table system into one of the two groups namely group IVFE (n=30) and group FICB (n=30).

The purpose and protocol of study was explained to the patients and informed written consent was obtained. Patients were given a full explanation of verbal rating scale (0= no pain, 10= worst imaginable pain).

Upon arrival in premedication room, monitoring including Heart rate, NIBP, ECG and pulse oximetry applied. Intravenous line secured with 18-gauge cannula. No sedative or analgesic medication were administered other than study group medication.

Group IVFE patients received injection fentanyl 2 mcg/kg IV and 5 min later they were placed in sitting position for the performance of CNB. Group FICB received fascia iliaca compartment block with 20 ml of 0.25% bupivacaine and then placed in same position for CNB. We performed ultrasound guided FICB in supine position in the FICB group patients.

With the patient positioned supine, USG probe was placed in transverse orientation on thigh just inferior to inguinal ligament at one third distance from anterior superior iliac spine to pubic tubercle. Two fascial planes, the fascia lata and the fascia iliaca were visualized as two hyperechoic lines [Figure 1]. The compartment between fascia lata and fascia iliaca is fascia iliaca compartment.

Under USG guidance, a 23-gauge needle was inserted through skin penetrating two fascia and reaching fascia iliaca compartment. 40 ml of 0.25% bupivacaine was injected in the compartment over 2-3 min period with intermittent aspiration. An expanding anechoic collection just below fascia iliaca was the visual confirmation of correct placement of local anesthetic.

The primary outcome studied was pain during positioning for CNB. VRS score were recorded before any analgesic intervention, before positioning and immediately after positioning. If patient reported a VRS score >4 during positioning, further procedure was stopped and 100 mcg of IV fentanyl was given and these patients were excluded from the study.

The secondary outcome measures included quality of patient positioning which was evaluated in terms of CNB performance time (measured from the start of

positioning maneuvers to spinal needle removal) and number of attempts taken for CNB. Patient acceptance for intervention was evaluated after 24 hrs of the surgery using two point score (1= good, 2=bad). Intraoperative monitoring of all the relevant parameters (HR, NIBP, SPO2) was done.

Complications such as hypotension, bradycardia (a decrease of 20% from the baseline value of heart rate), hypoventilation and signs of local anesthetic toxicity were recorded as well.

Statistical Analysis

Data was analyzed using SPSS latest version. The mean and standard deviation were calculated for all continuous variables. Qualitative variables were compared using unpaired test/ Mann Whitney test when data set were not normally distributed and paired test was used for normally distributed data. Quantitative variables were compared using chi square test.

P value of <0.05 was considered statistically significant.

RESULTS

60 patients in the age group of 18-65 years belonging to ASA I & II undergoing hip fracture surgery were included in the study. Both the groups were comparable regarding demographic data and preoperative parameters [Table 1].

VRS scores before analgesic intervention did not differ significantly in both the groups. Pain scores decreased significantly in both the groups following intervention. The intergroup difference in VRS score was statistically significant at all times following analgesic intervention with FICB group showing lower pain score in all instances.

Time to perform CNB was significantly shorter in patient receiving FICB compared to IVFE group (p<0.0001). Number of attempts were less in the patients receiving FICB as compared to IVFE group (p=0.039) indicating that quality of position for CNB was significantly better in FICB group [Table 2].

93.3% of the patients in FICB group were satisfied with the technique of analgesia as compared to 70% in IVFE group.

Table 1: Demographic data of patients.

		FICB Group n = 30	IVFE Group n = 30	p-value
Age		46 ± 11.63	49.43 ± 8.88	0.204
Sex	Male	22 (73.33%)	24 (80.00%)	0.542
	Female	8 (26.67%)	6 (20.00%)	
ASA Grade	I	23 (76.67%)	25 (83.33%)	0.519
	II	7 (23.33%)	5 (16.67%)	

Table 2: VRS score before and after intervention

	FICB n = 30	IVFE n = 30	p-Value
Before Intervention	7±0.48	6.47±0.85	0.969
After Intervention (During Positioning)	1.77±0.68	2.77±0.94	20.0001

Table 3: Performance time, number of attempts and patient acceptance.

	FICB Group n = 30	IVFE Group n = 30	p-value
Number of attempts	1.07±0.25	1.27±0.45	0.039
Performance time (in minutes)	10.03±0.89	13.13±1.76	0.0001
Patient acceptance	93.33%	70.00%	0.042



Figure 1: Ultrasound Guided Fascia Iliaca Block

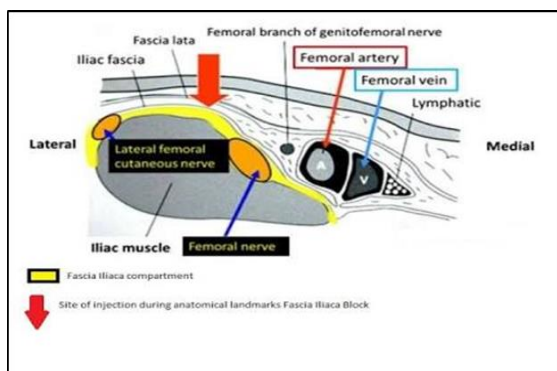


Figure 2: Anatomy of Fascia Iliaca Compartment

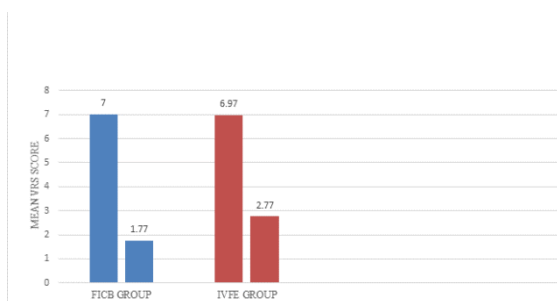


Figure 3: VRS scores observed before and after intervention in both groups

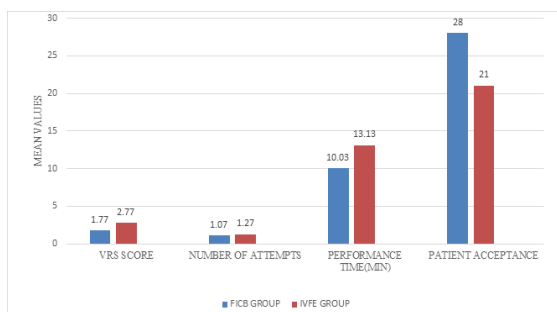


Figure 4: Study parameters in both groups

DISCUSSION

Effective pain management is primary goal in patients of hip fractures as it may positively affect outcome following hip fracture. The use of nerve blocks to

provide analgesia offers several advantages compared with traditional systemic medication including longer duration of pain relief and avoiding systemic side effects.

The fascia iliaca compartment block is easy to perform, require no expensive equipment and is accessed via a minimal risk approach. It provides a faster and more consistent simultaneous blockage of lateral cutaneous and femoral nerve.

This prospective randomized study is the first one comparing USG guided FICB with intravenous fentanyl and showed that FICB provides more effective analgesia for positioning during CNB and IV fentanyl. Moreover, patients in the FICB group were more satisfied with the technique of analgesia as compared with IVFE group.

Few studies have investigated FICB in terms of satisfactory analgesia and ease of positioning prior to spinal anesthesia for hip fracture surgery. They also compared FICB and traditional opioid based management.

A study by Maria Diakomi et al (2014),^[9] compared the FICB using 40 ml of 0.5% bupivacaine with fentanyl (1.5 mcg/kg). They demonstrated similar results in terms of lower NRS, shorter spinal performance time, better quality of positioning and higher patient satisfaction rate in FICB group.

Studies by Yun et al (2009),^[10] and Mosaffa et al (2005),^[11] also compared FICB with IV opioids for positioning of patients with hip fracture for CNB. They also concluded the superior efficacy of FICB as compared to intravenous opioids.

All of these studies assessed analgesic efficacy in lateral position. However, in our study we assess analgesic efficacy in sitting position using VRS score. In our study we used USG guidance for placement of FICB in contradistinction to landmark based technique used by other similar studies. USG guided FICB provides safe, fast and effective analgesia and rule out any accidental intravascular or intraneural injection of local anesthetic.^[12]

Sonographic guidance might be the reason for lesser number of partial blocks as compared to other studies. FICB constitute a feasible choice for perioperative pain control and also for acute pain control in emergency department with high success and low complication rates, being considered a safe technique to be implemented in these cases.

Many studies like by Nicolai et al (2007),^[13] Wathen et al (2007),^[14] and Lopez (2003),^[15] studied analgesic efficacy of FICB in patients with hip fractures in emergency department. Results from all these studies showed that FICB is simple, inexpensive, safe and effective method of prehospital analgesia for hip fractures.

The short term advantage of FICB may be extended over a longer period by placement of a catheter in the compartment for additional bolus dose administration or continuous infusion of local anesthetic.

CONCLUSION

In conclusion, our study suggests that FICB results in superior pain management than IVFE for positioning hip fractures patients for CNB, better quality of positioning, reduced CNB performance time and wide patient acceptance, hence improving overall quality efficacy of care.

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