



EFFICACY OF USG GUIDED FASCIA ILIACA COMPARTMENT BLOCK AS POSTOPERATIVE ANALGESIA IN PROXIMAL FRACTURE FEMUR

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ABSTRACT

Background Fascia iliaca compartment nerve block (FICNB) has been reported to provide effective postoperative analgesia in patients with femur fracture. This study aimed to evaluate the effectiveness of FICNB with Bupivacaine and Dexamethasone for postoperative analgesia in proximal fracture femur.

Methods Sixty-four patients of ASA grade 1 to 3, aged 50-80 years scheduled for proximal femur fracture femur were included and randomly assigned to two groups of 32 patients each Group F received ultrasound guided(FICNB) with 0.25% 40ml of Bupivacaine & Dexamethasone 4 mg & Group T received Tramadol 50mg at the end of surgery. Postoperative pain was assessed at 30 minutes, 2 hours, 4 hours, 6 hours, 8 hours, 12 hours and 24 hours using visual analogue scale (VAS). Injection Paracetamol 1gm was given intravenously as rescue analgesia in both the groups when VAS was more than four.

Results Both the groups were comparable for demographic parameters. The mean duration of analgesia was 460.31 ± 10.50 minutes in the FICNB group while it was only 263.72 ± 12.85 minutes in the tramadol group, the difference being statistically significant (with a 'p value' of 0.001). The total consumption of paracetamol did not show a significant difference in either of the groups in the first 24 hours, the 'p value' being 0.406.

Conclusion Ultrasound guided FICNB given postoperatively in patients undergoing proximal fracture femur can provide postoperative pain relief for longer duration than Inj. Tramadol.

KEYWORDS : Bupivacaine, Dexamethasone, Fascia iliaca compartment nerve block, postoperative analgesia.

INTRODUCTION

Proximal fracture femur is the commonest fracture in the geriatric age group.¹ Pain associated with these fractures can exaggerate the effects of postoperative delirium and dementia increasing morbidity and mortality.^{2,3}

Regional nerve blocks given to alleviate pain after proximal fracture femur include fascia iliaca compartment nerve block (FICNB), an anterior approach to the lumbar plexus. In most of the studies FICNB was given in the preoperative period⁴ Very few studies have been conducted on FICNB given postoperatively in fracture femur^{10,11}. Therefore we evaluated the effect of FICNB given after completion of surgery for proximal fracture femur and compared with Injection (Inj.) Tramadol which is routinely given for post operative analgesia in our institute.

MATERIALS AND METHODS

It was a prospective randomized controlled, double blind study, over a period of 2 years. This study is registered under clinical trial registry of India (CTRI/2018/12/016679). A total 64 patients of ages from 50 to 80 years and American Society of Anesthesiologists (ASA) physical status I to III, scheduled to undergo surgery for proximal fracture femur were included in the study.

Sample Size Estimation

The sample size of 28 patients in each group was determined with previous study⁶, using VAS score. (α = 0.9 & β = 0.9)

Considering dropouts we had included 32 patients in each group

$$n = 2 \frac{S^2 (Z1 + Z2)^2}{(M1 - M2)^2}$$

M1 Mean test intervention: 3.00, M2 Mean control intervention: 2.60

S1 Standard deviation of M1: 0.4, S2 Standard deviation of M2: 0.6

S pooled S.D.: 0.5099, α = 0.9, β = 0.9

Minimum sample size n=28

CONSORT Flow Diagram

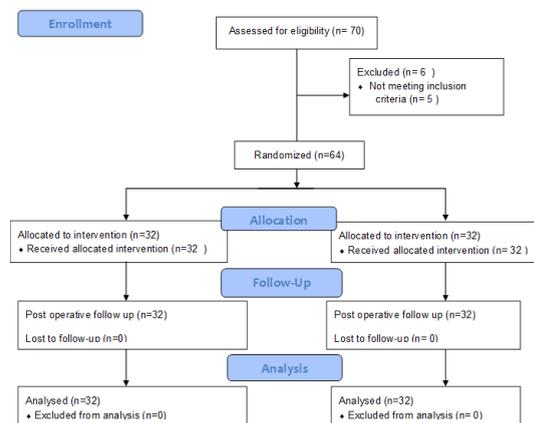


Figure 1

Patients were divided into two groups using sealed envelope method as Group T & Group F. Under all aseptic precautions, spinal anaesthesia was given in sitting position with Inj. Bupivacaine (0.5%) heavy 2.5 ml mixed with Inj. Fentanyl 25 µgm

After the completion of surgery Group T received Inj. Tramadol 50mg intravenously diluted in 100 ml of saline & Group F received USG guided FICNB with 40ml of 0.25% Inj. Bupivacaine along with Inj. Dexamethasone 4mg as an adjuvant. Assessment of postoperative pain in both the groups was made by using the visual analogue scale (VAS). Pain was assessed at 30 minutes, 2 hours, 4 hours, 6 hours, 8 hours, 12 hours and 24 hours postoperatively. If VAS was more than 4, rescue analgesia in the form of Inj. Paracetamol 1gm, given intravenously in both the groups. Inj. Tramadol 50mg diluted in 100 ml normal saline was given 12 hourly in both the groups as per Institutional protocol. Duration of analgesia was considered from injection of giving FICNB or Tramadol to demand of analgesic by the patient.

Block Technique (Figure 2, 3, 4)

In the supine position, inguinal crease was sterilized using Betadine. The linear probe is positioned in the iliac crease to locate the femoral artery and traced laterally to visualize iliopsoas muscle and fascia iliaca. The stimplex needle of 100 mm was inserted and an indentation was seen in the fascia as the needle passes through the fascia iliaca. A 'pop' was felt when the needle pierces the fascia iliaca. 1-2ml of local anaesthetic is injected in this plane after confirmation of negative aspiration of blood. Separation of the fascia iliaca and the iliopsoas muscle confirms injection of the drug in the proper plane. A total volume of 40ml, 0.25 % Bupivacaine along with Dexamethasone 4mg was administered in this plane.



Figure 2 Position Of Probe



Figure 3 Sonoanatomy Of FICNB



Figure 4 Needle Placements For FICNB

Statistical Analysis

For normally distributed data, the student t test was used to compare the mean differences of variables between the two groups. Tests for significant differences between the two groups were done with χ^2 the categorical data (ASA, sex). A p value of less than 0.05 was accepted as the level of significance & p value of less than 0.001 was taken as highly significant.

RESULTS

Sixty four pts were included in this study. There were no statistically significant differences in distribution of all demographic characteristics in both the groups. (Table 1)

Table 1: Distribution Of Patients According To Age

Parameters (mean)	Group T n= 32	Group F n=32	P value
Age (in years)	68.91+/- 8.31	65.66+/-5.73	0.073 NS*
Gender (male)	56.25%	37.50%	
(female)	43.75%	62.5%	0.133 NS*
ASA Grade 2	52.13%	65.62%	
3	46.87%	34.38%	0.308 NS*

*NS- Not Significant

The 24 hour VAS score analysis showed a highly significant difference in the pain score up to 4 hours with less score in FICNB group (p value 0.000 to 0.0006). After this hour the, the difference was not statistically significant. (Figure 5)

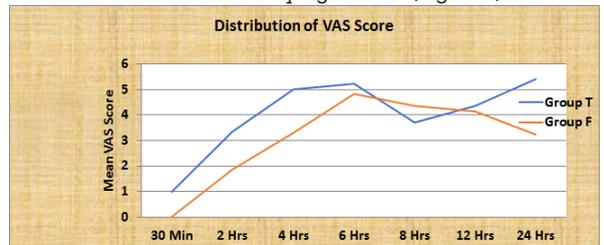


Figure 5

The duration of analgesia in FICNB group was 460.31 ± 10.50 minutes and 263.72 ± 12.85 minutes in Tramadol group. The time for first rescue analgesic requirement was delayed in FICNB group than the controlled group which was statistically highly significant with a 'p' value of 0.001. (Figure 6)

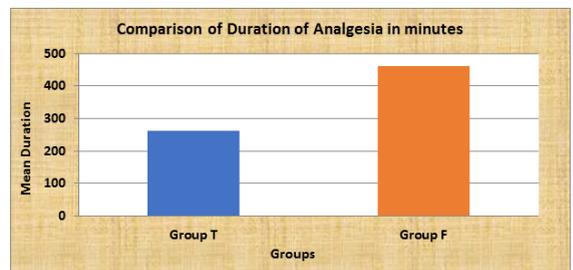


Figure 6

The total consumption of Paracetamol did not show a significant difference in either of the groups in the first 24 hours, the 'p' value being 0.406. No complications were observed during the study. (Figure 7)

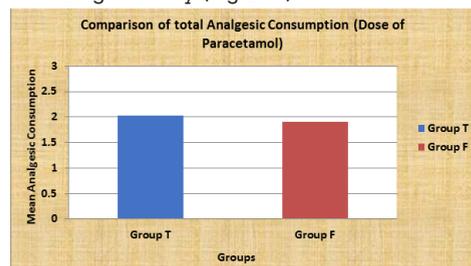


Figure 7

DISCUSSION

We in our study administered FICNB with Bupivacaine and Dexamethasone as an adjuvant and compared its effectiveness with Inj. Tramadol which is routinely given 12 hourly for postoperative analgesia in our institute for proximal femur fractures. Systemic analgesics, patient controlled analgesia, and nerve blocks are various methods used to relieve post operative pain.² Systemic analgesics like opioids and NSAID can have significant adverse effects in elderly population¹². Patient controlled analgesia (PCA) is an impractical method for elderly patients as they may not be able to follow proper directions for PCA due to postoperative cognitive dysfunction¹². Peripheral nerve blocks are superior particularly in elderly patients as they avoid polypharmacy and allow early rehabilitation decreasing the postoperative morbidity². Various regional nerve blocks like, FICNB, femoral nerve block, three in one nerve block are used for postoperative analgesia in proximal fracture femur. FICNB was first described by Dalen's et al in 1989, with the original understanding that it was used in paediatric patients. FICNB includes blockade of the femoral nerve and lateral cutaneous nerve of thigh.¹⁰ The FICNB has proved to be an easy and safe technique. It is free from complications, as major vascular structures are away from needle insertion.¹¹ Femoral nerve block is in close proximity with the blood vessels, if breached, it can lead to side effect like local anaesthetic toxicity¹³ Providing three in one block to the patients can be difficult and it often requires assistance of peripheral nerve stimulation, necessitating the development of special skill. It can also result in anaesthesia sparing to the obturator nerve and lateral femoral cutaneous nerve, thereby leading to increased dissatisfaction among patients¹⁴

The fascia iliaca compartment technique provides faster and more consistent simultaneous blockade of the lateral femoral cutaneous and femoral nerves than three in one block.¹³ FICNB is placed more laterally as compared to three in one block thereby decreasing potential for an intravascular or intraneural injection. If adequate volume of local anaesthetic is given, the drug spreads adequately to reach these nerves which lie beneath the fascia¹⁵. Fascia iliaca block helps in reducing the postoperative cognitive dysfunction in elderly patients and helps in early rehabilitation². The peripheral nerve stimulator or blind technique is based on the 'double pop' feel when the needle is pierced through the fascia lata and fascia iliaca¹³. False pops may decrease the success rate of these techniques. The landmark technique using fascial click had a low success rate of 35% to 47%. However, FICNB performed under real time ultrasound guidance, had success rate increase up to 82% to 87%.¹⁶

Bupivacaine is a commonly used local anaesthetic agent for fascia iliaca block. The effect of Bupivacaine alone lasts only for few hours¹⁷. Therefore, additives such as Dexamethasone, opioids, alpha-2 agonists like Dexmedetomidine are added which help in prolonging the duration of analgesia². Dexamethasone, a long acting steroid is being used in regional anaesthesia as an additive, which is devoid of major side effects¹⁸ Very few studies have been conducted using Dexamethasone as an adjuvant in fascia iliaca block.

The results of our study showed that the mean duration of analgesia in FICNB group was more than the control group. (460.31 minutes Vs 263.72 minutes) The difference being statistically significant. (p value = 0.001). However, the total analgesic consumption of Inj. Paracetamol in 24 hours did not show a significant difference in both the groups. In our study we have given Inj. Tramadol 12 hours after surgery in postoperative period irrespective of VAS which may be the cause of this nonsignificant difference. In VAS analysis we had statistically highly significant difference up to 4 hrs & there was no statistically significant difference at 6th & 8 th hour.

Hanna et al⁷ did a prospective case control study of the role of FICNB in hip fractures for pain management and compared it with systemic analgesics. Pain scores were assessed through a visual analogue scale of 0–10 at 15 minutes, 2, 8, 16 and 24 hours after giving analgesia or block preoperatively using 30ml of 0.25% inj Levobupivacaine. The study showed a significant decrease in the pain scores at 2 hours following fascia iliaca blockade which continued for upto 8 hours. The time for initial analgesia was reduced in the fascia iliaca block group than in the control group which is similar to our group. The systemic analgesic need was significantly decreased for first 24 hours after giving the block. They concluded that giving fascia iliaca block is better than giving systemic analgesics for pain management in patients having hip fractures.

Fentahun Tarekegn Kumie et al¹⁰ study is similar to our study where they studied the efficacy of 0.25%, 30ml of Bupivacaine in FICNB as a part of multimodal analgesia after surgery in patients having femoral bone fracture and compared it to systemic analgesics. They observed that time for first analgesic request was longer in the FICNB group which was 417 minutes as compared to the control group where no block was administered was 139 minutes. The total analgesic consumption of Diclofenac was also reduced at 12 and 24 hours. They concluded that fascia iliaca compartment block decreases the need for systemic analgesics. This numerical difference in duration of analgesia in our study might be because of Dexamethasone added as an adjuvant.

Elizabeth Dulaney-Cripe et al⁵ in their study compared a continuous infusion of fascia iliaca compartment block in hip fracture with their usual protocol of pain management with opioids, non-opioids and ice therapy. The total analgesic consumption of morphine equivalent medications was found much more when they followed their routine protocol than in fascia iliaca group. They concluded that giving a continuous fascia iliaca compartment block is a better analgesic technique than using opioids.

Nicolai Foss et al⁴ compared efficacy of FICNB with systemic morphine in hip fractures. Morphine consumption was less in fascia iliaca group compared to the controlled group where the block was given preoperatively with 40ml (1%) inj mepivacaine with 1:2,00,000 inj Adrenaline. They concluded by supporting the use of Fascia iliaca compartment nerve block for acute pain control in hip fracture patients. Round the clock administration of Inj. Tramadol in both the groups did not show any statistically significant difference in analgesic consumption in our study.

Deniz S et al⁶ observed a decrease in VAS score and opioid consumption in ultrasound guided FICNB group compared to 3 in 1 block & no block group in hip prosthesis surgery given preoperatively. However, the difference in VAS score was statistically significant only upto 2 hours and there was no statistical significant difference in the 4th, 6th and 24th hour in both the groups. However, they concluded that ultrasound guided FICNB is a safe and efficient multimodal analgesic treatment in order to enable postoperative analgesia in hip prosthesis surgery.

Seunguk Bang et al¹⁶ in 2015 did a randomized control trial on patients undergoing bipolar hemiarthroplasty to check the efficacy of postoperative ultrasound (USG) guided FICNB given with 0.2% of 40ml ropivacaine versus no block in patients receiving intravenous patient-controlled analgesia (PCA). They observed that the VAS was similar in both the groups but fentanyl requirement at 4, 8 and 12 hours was lower in FICNB group. They concluded that ultrasound guided FICNB had a significant opioid sparing effect in the patients operated for bipolar hemiarthroplasty.

We observed in our study that there was highly statistically significant difference in VAS score upto 4 hours after the surgery, suggesting that the efficacy of fascia iliaca block is superior than the control group.

Study conducted by Nikila Gopal et al⁸ showed that VAS score was significantly lower in Bupivacaine and Dexmedetomidine (0.5 µg/kg) group than Bupivacaine alone when used in FICNB for patients with fracture femur. However, complications like hypotension and nausea were found to be more in Dexmedetomidine group.

Temelkovska-Stevanovska et al¹⁹ did a randomized control trial on sixty patients with hip fracture to compare the efficacy and duration of continuous femoral nerve block (FNB) versus Fascia iliaca compartment block (FICNB) as postoperative analgesia. FICNB group patients received a fascia iliaca nerve block after the surgery with 40ml of 0.25% Bupivacaine. They noticed side effects like nausea, sedation and dizziness was more in the FICNB group. We did not come across such complications in our study might be due to addition of Dexamethasone

Limitations Of The Study-

A larger sample size may be required to compare VAS distribution. We administered injection Tramadol 12 hourly irrespective of VAS considering that patient may not convey regarding pain properly. This intervention resulted in nonsignificant difference in paracetamol consumption in both the groups.

CONCLUSION

Ultrasound guided FICNB (Inj. Bupivacaine 40ml of 0.25% with Inj. Dexamethasone 4mg) can be safely administered to patients undergoing proximal fracture femur surgery as it significantly prolongs the duration of analgesia compared to Inj. Tramadol without any adverse effects.

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