



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

**Dr. Kulkarni  
Sanhita J.\***

M. D. Professor. and H.O.D.. \*Corresponding Author

**Dr. Sahasrabudhe  
Saumil S**

M.D. Junior Resident.

**Dr. Joshi Pradnya S**

M. D. Associate Professor.

**Dr. Bhale Pramod V**

M.D. Professor.

**Dr. Sasturkar  
Vasanti M**

M.D. Professor.

**Dr. Loya Shilpa J**

D. A. Senior Resident.

### 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  $460.31 \pm 10.50$  minutes in the FICNB group while it was only  $263.72 \pm 12.85$  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.<sup>1</sup> Pain associated with these fractures can exaggerate the effects of postoperative delirium and dementia increasing morbidity and mortality.<sup>2,3</sup>

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 period.<sup>4-9</sup> Very few studies have been conducted on FICNB given postoperatively in fracture femur<sup>10,11</sup>. 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 study<sup>16</sup>, using VAS score. ( $\alpha = 0.9$  &  $\beta = 0.9$ )

Considering dropouts we had included 32 patients in each group

$$n = 2 \frac{S^2 (Z_1 + Z_2)^2}{(M_1 - M_2)^2}$$

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,  $\alpha = 0.9$ ,  $\beta = 0.9$

Minimum sample size  $n = 28$

CONSORT Flow Diagram

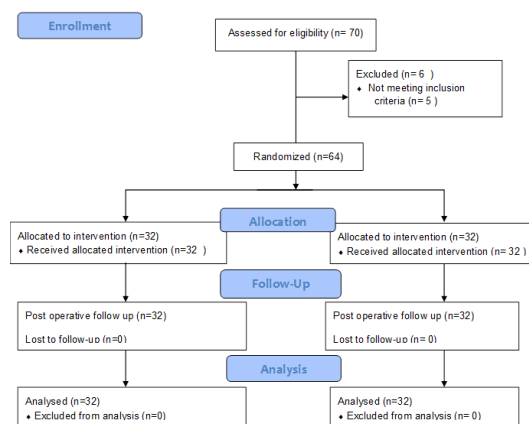


Figure 1

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

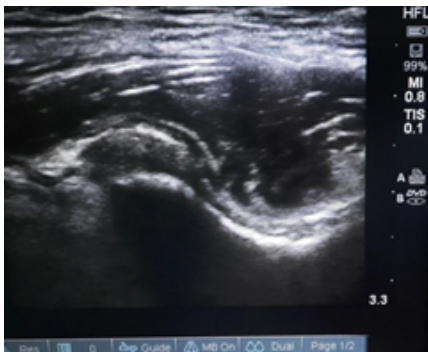


Figure 4 Needle Placements For FICNB

### 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  $\chi^2$  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)

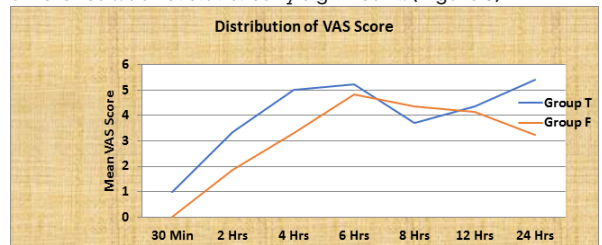


Figure 5

The duration of analgesia in FICNB group was  $460.31 \pm 10.50$  minutes and  $263.72 \pm 12.85$  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)

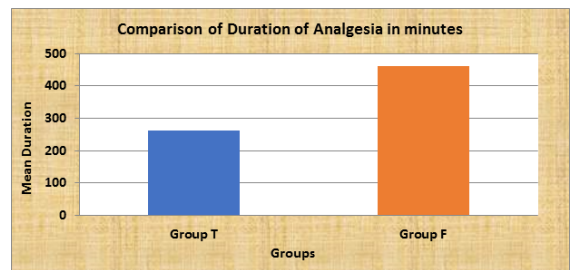


Figure 6

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)

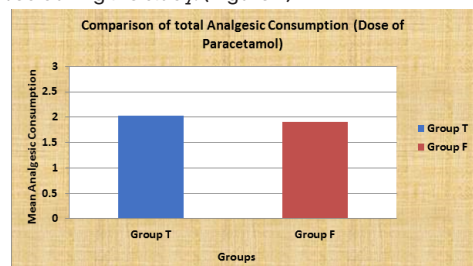


Figure 7

## 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.<sup>2</sup> Systemic analgesics like opioids and NSAID can have significant adverse effects in elderly population<sup>12</sup>. 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 dysfunction<sup>12</sup>. Peripheral nerve blocks are superior particularly in elderly patients as they avoid polypharmacy and allow early rehabilitation decreasing the postoperative morbidity<sup>2</sup>. 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.<sup>10</sup> 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.<sup>11</sup> Femoral nerve block is in close proximity with the blood vessels, if breached, it can lead to side effect like local anaesthetic toxicity<sup>13</sup> 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 patients<sup>14</sup>

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.<sup>13</sup> 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 fascia<sup>15</sup>. Fascia iliaca block helps in reducing the postoperative cognitive dysfunction in elderly patients and helps in early rehabilitation<sup>7</sup>. 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 iliaca<sup>13</sup>. 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%.<sup>16</sup>

Bupivacaine is a commonly used local anaesthetic agent for fascia iliaca block. The effect of Bupivacaine alone lasts only for few hours<sup>17</sup>. Therefore, additives such as Dexamethasone, opioids, alpha-2 agonists like Dexmedetomidine are added which help in prolonging the duration of analgesia<sup>8</sup>. Dexamethasone, a long acting steroid is being used in regional anaesthesia as an additive, which is devoid of major side effects<sup>18</sup> 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 6<sup>th</sup> & 8 th hour.

Hanna et al<sup>7</sup> 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 al<sup>10</sup> 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 al<sup>5</sup> 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 al<sup>4</sup> 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 al<sup>6</sup> 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 4<sup>th</sup>, 6<sup>th</sup> and 24<sup>th</sup> 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 al<sup>16</sup> 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 al<sup>8</sup> 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 al<sup>19</sup> 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.

### REFERENCES

1. Zoltan G, Laura L. 'Geriatric disorders'. In: Roberta L.Hines, editor. Stoelting's Anaesthesia and co-existing disease, 2<sup>nd</sup> South Asia edition: Elsevier Publishers; 2014. p. 651-52.
2. Frederick Sieber, Ronald Pauldine. 'Geriatric anaesthesia'. In: Ronald D.Miller, editor. Miller's Anaesthesia, 8<sup>th</sup> International edition, volume 2: Elsevier Publishers; 2015. p. 2407-20.
3. Gurdev S. Rai. 'Geriatric anaesthesia'. In: James C.Duke, editor. Duke's Anaesthesia secrets, 5<sup>th</sup> Southeast Asia edition: Elsevier Publishers; 2015. p. 387-88.
4. Nicolai B.Foss, Billy B.Kristensen, Morton Bundgaard, Mikkel Bak, Christian Heiring, Henrik Kehlet et al. 'Fascia iliaca Compartment Blockade for acute pain control in Hip Fracture Patients: A Randomized, placebo-controlled trial. Anaesthesiology 2007;106: 773-8.
5. Elizabeth Dulaney-Cripe, Scott Hadaway, Ryan Bauman, Cathy Trame, Carole Smith, Becky Sillaman et al. 'A Continuous infusion Fascia Iliaca Compartment Block in Hip Fracture Patients: A pilot study. Journal of Clinical Medicine Research. 2012 Feb; 4(1): 45-48.
6. Deniz S, Atim A, Kurklu M, Cayci T, Kurt E et al. 'Comparison of the Postoperative analgesic efficacy of an Ultrasound-guided fascia iliaca compartment block versus 3 in 1 block in hip prosthesis surgery: A Randomized prospective controlled study. Agri. 2014; 26(4): 151-7.
7. Hanna, A.Gulati, A.Graham. 'The Role of Fascia Iliaca Block in Hip Fractures: A Prospective Case-controlled study and Feasibility Assessment of a junior doctor-delivered service. ISRN Orthopedics, volume 2014, article ID 191306, 5 pages.
8. Nikila Devarayasamudram Gopal, Dinesh Krishnamurthy. 'A Clinical comparative study of fascia iliaca compartment block with Bupivacaine and Bupivacaine with Dexmedetomidine for positioning and duration of postoperative analgesia in fracture femur under spinal anaesthesia.' A Randomized double blind prospective study. Anesthesia Essays and Researches, volume 12, issue 2. 2018. p. 528-34.
9. J Yang et al. 'Ultrasound guided continuous Fascia iliaca Block for pain management in elder patients with hip fractures.' A Randomized-controlled study. Anesthesia and Analgesia: September 2016, volume 123, issue 3S. p. 440-41.
10. Fentahun Tarekegn Kumie, Endale Gebreegziabher, Hailu Yimer Tawuye et al. 'Efficacy of Fascia iliaca Compartment Nerve Block as part of multimodal analgesia after surgery for femoral bone fracture.' A Case controlled study. World Journal of Emergency Medicine. 2015; 6(2): 142-46.
11. Kaldırım U., Yolcu U. Fascia iliaca compartment block for hip dislocation. Eur J Emerg Med 2015; 22: 145-146
12. Donna M.Lisi. 'Patient-controlled analgesia and older patient'. US Pharm. 2013;38(3): HS2-HS6.
13. Terese T. Horlocker, Sandra L.Kopp, Denise J. Wedel Ronald. 'Peripheral Nerve Blocks'. In: Ronald D.Miller, editor. Miller's Anaesthesia, 8<sup>th</sup> International edition, volume 1: Elsevier Publishers; 2015. p. 1739-41

14. Wallace JB, Andrade JA, Christensen JP, Osborne LA, Pellegrini JE. Comparison of fascia iliaca compartment block and 3-in-1 block in adults undergoing knee arthroscopy and meniscal repair. AANA J. 2012;80:37-44.
15. NYSORA; 'Ultrasound Guided Fascia Iliaca Block'
16. Seunguk Bang, Jihyun Chung, Jaejung Jeong, Hahyeon Bak and Dongju Kim et al. 'Efficacy of Ultrasound-guided Fascia Iliaca compartment block after Hip Hemiarthroplasty.' A prospective randomized trial. Medicine (Baltimore). 2016 Sep; 95(39): e5018.
17. Stoelting RK, Hillier SC. Local Anaesthetics In: 'Pharmacology and Physiology in Anaesthesia Practice'. 4th ed. Philadelphia: Lippincott Williams and Wilkins; 2006. p.180-200.
18. Bernard P Schimmer, John W.Funder. 'ACTH, Adrenal steroids and Pharmacology of Adrenal Cortex'. In: Laurence Brunton, editor. Goodman and Gillman's The Pharmacological Basis of Therapeutics, 12th edition e-book. 2011. p. 1215-33.
19. Temelkovska-Stevanovska M, Durnev V, Jovanovski-Srceva M, Mojsova-Mijovska M, Trepeski S et al. 'Continuous Femoral Nerve Block versus Fascia iliaca Compartment block as postoperative analgesia in patients with hip fracture.' A Randomized control study. Pril. 2014; 35(2): 85-93.