



Anaesthesiology

COMPARATIVE STUDY OF FEMORAL NERVE BLOCK AND INTRAVENOUS PARACETAMOL FOR POSITIONING DURING SPINAL ANAESTHESIA IN SURGERY OF FEMUR FRACTURE- A CROSS SECTIONAL STUDY.

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ABSTRACT **Background:** Femoral fracture is the most painful bone injury and performing spinal anaesthesia is extremely challenging due to very poor positioning unless we have a very good mode of analgesia. **Objectives:** To compare the analgesic effect provided by FNB and IV paracetamol prior to positioning for central neuraxial block in patients undergoing surgery for femur fracture. **Material & Methods:** This cross sectional study was conducted in tertiary health care centre on 100 study subjects divided in two groups' i.e. femoral nerve block group & I.V. paracetamol group. Pain scores before and during positioning were recorded & ease for positioning for spinal anaesthesia along with satisfaction among patients & quality of positioning were compared among these two groups. **Results:** The group in which femoral nerve block was given; the position to give spinal anaesthesia was less painful as compared to group in which IV paracetamol was given. Mean pain score at 2 minutes, 5 minutes, and 10 minutes was less in femoral nerve block group and the difference was statistically significant. Similarly pain score at positioning, time for anaesthesia was at lower side in FNB group with statistically significant difference. Also Quality of patient positioning & Mean satisfaction scores was more in FNB group with statistically significant difference. **Conclusion:** Femoral nerve block provides better analgesia, patient satisfaction, less time for anaesthesia and satisfactory positioning than IV Paracetamol.

KEYWORDS : Femur Fracture, Intravenous Paracetamol, Femoral Nerve Block.

INTRODUCTION:

Fracture of the femur is a common orthopaedic problem following trauma in patients of all ages and central neuraxial block such as spinal anaesthesia is the preferred technique for providing anaesthesia.^[1] Correct positioning during central neuraxial block is the prerequisite for a successful procedure. However, limb immobility and extreme pain are the deterrents for an ideal positioning for this procedure. Various modalities like intravenous (IV) fentanyl (FENT), I.V Paracetamol or other NSAID, femoral nerve block (FNB) or fascia iliaca block with local anaesthetic have been advocated to reduce the pain pre-operatively and improve the positioning of these patients.^[2,3]

Despite the aforementioned advantages, the technique of performing spinal anaesthesia in patients with a femoral fracture is difficult due to poor positioning secondary to pain. Correct positioning during spinal anaesthesia is the prerequisite in order to perform spinal anaesthesia successfully.^[4] However, it is extremely painful, causing major patient distress, accompanied by well-known physiological sequelae such as sympathetic activation causing tachycardia, hypertension, and increased cardiac work that may compromise high-risk cardiac patients. Limb immobility and extreme pain are the deterrents for ideal positioning for this procedure.^[5]

Most of the time anaesthetists administer opioid or non-steroidal anti-inflammatory drugs (NSAID) for better tolerance of pain during positioning for spinal anaesthesia.^[6] However, they have relatively high complications and clinicians are searching for other ways of minimizing pain. Nowadays studies propose that nerve blocks mainly femoral nerve block (FNB) minimize this devastating pain and increase patient safety, shorten time to perform spinal anaesthesia, and provide postoperative analgesia without significant side effects.^[7]

Considering above facts, we conducted this study with the aim to compare the analgesic effect provided by FNB and IV paracetamol prior to positioning for central neuraxial block in patients undergoing surgery for femur fracture.

MATERIALS & METHODS

This cross sectional observational study was conducted during the period from January 2022 – April 2022 in the department of Anaesthesia in Data Meghe Medical College & Hospital Wanadongari, Nagpur a tertiary care centre in Maharashtra state.

This study was done on patients admitted under orthopaedic department, in the tertiary care centre and fulfilling the inclusion and exclusion criteria. American Society of Anesthesiologists physical status I to III, scheduled for fracture femur operation under central neuraxial block, but unable to sit due to pain were included in the study. Patients who could sit comfortably refused for participation in the study or having any contraindication to spinal anaesthesia, FNB or use of local anaesthetic were excluded. Patients with multiple fractures, polytrauma, peripheral neuropathy, bleeding disorders, mental disorders, neurological deficits which might hinder proper assessment during block, any allergy to study drugs were excluded from study.

Patients were distributed in two groups through computer generated random numbers table; FNB group and IV Analgesic (Paracetamol) group. Sample size was calculated based on an earlier study,^[8] which showed in their study that FNB was more effective to reduce pain, and Quality of position in FNB group was 2.667 ± 0.606 & in IV analgesic group was 1.967 ± 0.85 . Based on $\alpha = 0.05$, $\beta = 0.20$, minimum sample to achieve the desired objectives was 18 per group for one-tailed testing. Taking attrition at 10% due to conversion of technique (general anaesthesia), refusal on table, technical difficulties, total 100 patients were included (50 patients in each group).

The night before surgery, patients were evaluated for eligibility and informed consent was taken after proper explanation about the study, interventions, and measurements. As the patient arrives at the operation room, standard monitoring such as electrocardiography, pulse-oximeter and Non-invasive blood pressure measurement were attached and recorded every five minutes. An infusion of lactated Ringer's solution 20mL/kg was given and all patients were supplied with oxygen (2L/ min) via a nasal cannula. Pain score before the intervention was recorded when the patient lied on the operation table. In the first group patients were given FNB before positioning for combined spinal epidural block, while in the second group patients were given combined spinal epidural block without any prior FNB.

IV analgesic group received Paracetamol 10 mg/kg IV, and 5 minutes later, they were placed in the sitting position to perform spinal anaesthesia. 0.2% ropivacaine was used for FNB. FNB was performed by nerve stimulator technique on supine position.

Femoral nerve blocks were administered in the anaesthesia induction room, which was adequately equipped with resuscitation equipment.

All the patients were explained about the procedure of block as well as explained the scoring of VAS (visual analogue score).

In patients, wherein no prior FNB was given were directly shifted to the operation room for the central neuraxial block in sitting position. VAS score was noted during poisoning for the central neuraxial block. Time to perform combined spinal epidural block was noted in both groups, starting from poisoning for the spinal block till the patient is made supine after the combined block. Patient's acceptance and satisfaction scores were noted.

Pain scores before and during positioning were recorded. Pain assessment was done using visual analog scale (0 = no pain, 10 = maximal pain). Vital parameters; heart rate (HR), mean arterial pressure (MAP) by non-invasive blood pressure and oxygen saturation (SpO2) were monitored.

Data was entered on Microsoft excel sheet on regular basis and results were obtained. Analysis of data was done using SPSS trial version 20. Qualitative variables were expressed as mean, standard deviation (SD), range, frequencies (number of cases) and percentages. t test was used to compare qualitative variables and to test the significance. Quantitative variables were presented in terms of mean ± standard deviation. Level of significance "p" value was evaluated, where p value < 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic Profile Of Study Subjects

PARAMETER	FNB GROUP (n=50)	IV ANALGESIC GROUP (n=50)
AGE	64.8±13.2	65.5±15.7
GENDER (M/F)	21/29	20/30
WEIGHT	62.8±13.7	64.6±9.7
ASA (I/II/III)	14/20/16	13/22/15
FRACTURE SITE		
Neck of femur	15	14
Inter-trochanteric	20	22
Sub-trochanteric	8	6
Shaft of femur	7	8

Mean age of study subjects was 64.8±13.2 years in FNB group & 65.5±15.7 years in IV analgesic groups. Majority of study subjects were female with ASA II. Most common site for fracture femur was inter-trochanteric in both groups.

Table 2: Vital Clinical Parameter Before Analgesia And During Position

PARAMETER	FNB GROUP (n=50)	IV ANALGESIC GROUP (PCM)(n=50)	P value (t Test)
MAP mm Hg at T0	88.35±5.64	86.8±7.74	0.2552
MAP mm Hg during position	89.24±6.92	83.3±7.01	0.00004626
HR per minute at T0	78.81± 9.15	79.1±10.11	0.8808
HR per minute during position	76.35±8.84	80.66±10.21	0.03386
SpO2% at T0	98.01±8.81	98.2±0.01	0.8791
SpO2% during position	98.0±0.12	95.04±0.41	<0.0000001

(T0 – Baseline value; MAP – Mean arterial pressure; HR – Heart rate; FNB – Femoral nerve block; SpO2 – Oxygen saturation; PCM- Paracetamol)

Mean arterial pressure, heart rate & oxygen saturation at baseline was not statistically significant, but MAP, Heart rate & oxygen saturation in femoral nerve block group was more during positioning after the intervention as compared to IV paracetamol group & the difference was also statistically significant. Thus concluding for maintaining vital parameters at good position FNB was good as compared to IV paracetamol.

Table 3: Performance Time And Patient Acceptance

PARAMETER	FNB GROUP (n=50)	IV ANALGESIC GROUP (PCM)(n=50)	P value (t Test)
Time from trauma to OT (in hours)	69.5±41.2	68.7±31.7	0.9136

Patient's acceptance (yes/no)	48/2	41/9	<0.05
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Time from trauma to Operation theatre in both groups was approximately same. Patient's acceptance was more in FNB group & the difference was statistically significant.

Table 4: Summary of results of the procedure.

PARAMETER	FNB GROUP (n=50)	IV ANALGESIC GROUP (PCM)(n=50)	P value (t Test)
VAS at T0	7.21±0.36	7.29±0.378	0.2812
VAS at T2	5.5±0.24	7.3±0.36	<0.000001
VAS at T5	3.5±0.18	6.8 ±0.39	<0.000001
VAS at T10	1.70±0.16	6.2 ±0.45	<0.000001
VAS during positioning	1.5±0.17	5.3 ±0.37	<0.0000001
Quality of patient positioning (0-3)	2.8 ±0.13	1.4±0.25	<0.000001
Mean satisfaction scores (0-1.8)	1.5±0.04	0.38±0.18	<0.000001
Time for anesthesia (minute)	13.03±0.47	19.67±0.38	<0.0000001

(T0- Baseline, T2-2 minutes, T5-5 minutes, T-10-10 minutes, T15-15 minutes)

Visual analogue scale shows that, the mean pain score in both groups at base line was not statistically significant. But after intervention it was found that the group in which femoral nerve block was given, the position to give spinal anaesthesia was less painful as compared to group in which IV paracetamol was given.

Mean pain score at 2 minutes, 5 minutes, 10 minutes was less in Femoral nerve block group and the difference was statistically significant. Similarly pain score at positioning, time for anaesthesia was at lower side in FNB group with statistically significant difference. Also Quality of patient positioning & Mean satisfaction scores was more in FNB group with statistically significant difference. (Table No.4)

Table 5: Comparison of effective positioning for SAB

PARAMETER	FNB Group (n=50)	IV Analgesic Group (PCM) (n=50)	P value (t Test)
Time Taken To Achieve *SAB (sec)	177.34±33.12	211.11±14.01	<0.0000001
Quality Of Positioning			0.02622 (X2 test)
Excellent	49	41	
Good	1	6	
satisfactorily	0	3	

Time taken to achieve subarachnoid block was less in FNB group and the difference was statistically significant. Also, the quality of positioning for spinal anaesthesia after doing FNB was good as compared to intravenous paracetamol group and after applying chi square test the difference was found to be statistically significant.

DISCUSSION:

Spinal anaesthesia is universally accepted and preferred technique of anaesthesia for surgery of fracture femur. This technique has many advantages over general anaesthesia like early mobility, less chances of deep vein thrombosis and mortality.^[9]

When considering the technique used to aid positioning patients for the spinal block, Sandby-Thomas et al.^[10] reported that the most frequently used agents were midazolam, ketamine, and propofol. Alternative agents were fentanyl, remifentanyl, morphine, nitrous oxide, and sevoflurane, whereas nerve blocks were infrequently used. Use of FNB to relieve pain from a fracture of the femur at various other situations is well known and now, is being used for positioning during spinal anaesthesia.^[11,12] In the present study visual analog scale values in FNB were significantly lower than Paracetamol. Many other studies also reported significantly low pain scores with FNB compare to IV Paracetamol.^[13]

The most important finding of our study was that femoral nerve blockade offered superior analgesia compared to IV paracetamol

during position for spinal anaesthesia in cases of fracture femur. In addition, FNB was associated with greater patient satisfaction. Sia et al^[14] were the pioneers who conducted a study for the very first time to compare the analgesic effects and feasibility of femoral nerve block.

Bhosle, Durranni et^[15,16] al also found similar results in their studies. Also, many authors while comparing FNB with other modalities for positioning for central neuraxial block found FNB to be superior to all other modalities.^[17,18]

Various authors reported significantly low pain scores with FNB compare to IV analgesic.^[16,17] But, Iamaroon et al.^[19] did not find any significant difference between FNB and intravenous analgesic. The probable reason for decreased efficacy of FNB in their study was use of 0.3% bupivacaine and waiting period of only 15 min to position the patient. Time taken to achieve SAB was also found to be high in patients who had taken intravenous fentanyl compared to patients who were given FNB which was statistically very highly significant.

CONCLUSION

Femoral nerve block provides better analgesia, patient satisfaction, less time for anaesthesia and satisfactory positioning than IV Paracetamol for central neuraxial block in patients undergoing surgery for femur fractures.

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