Open Access Journal

Indian Journal of Medical Research and Pharmaceutical Sciences

November 2020;7(11) ISSN: ISSN: 2349-5340

DOI: https://doi.org/10.29121/ijmrps.v7.i11.2020.3 Impact Factor: 4.054

TO COMPARE THE EFFICACY OF FEMORAL NERVE BLOCK vs IV FENTANYL FOR POSITIONING OF SUBARACHNOID BLOCK DURING FEMUR FRACTURE SURGERY

Dr. Tejinder Pal Kaur, Dr. Balwinder Kaur*, Dr. Manvir Singh, Dr. Mandeep Kaur

Keywords: *Analgesia, Efficacy, Femoral nerve block, Fentanyl.*

Abstract

Introduction: Most dreaded fear associated with any fracture is pain which has got wide psychological, behavioral, and clinical ramifications.

Aims and Objectives: To compare the efficacy of femoral nerve block with iv fentanyl for positioning of patient during subarachnoid block in femur fracture surgery in terms of time of onset of analgesia (VAS score upto 4), pain score during positioning and quality of patient's position.

Material and Methods: The patients in FNB GROUP (n=35) were given femoral nerve block with nerve stimulator by injecting 30 ml of levobupivacaine (a mixture of 20 ml of 0.5% levobupivacaine and 10 ml of normal saline).In FENT GROUP (n=35),IV fentanyl 1 ug/kg five-minute prior to positioning was given,escalating the dose to 3 µg/kg maximum until pain score decreased to ≤4.

Results: The results showed that the heart rate, SpO2, blood pressure and respiratory rate were maintained and comparable in both the groups. Time of onset of analgesia and pain scores during positioning were less in FNB group. Time of onset of analgesia VAS 4 was achieved at 15 min in group FNB(4.29±0.57) and at 20 min in group FENT(4.69±0.58).The pain scores achieved during positioning was 1.54±0.50 in group FNB and in group FENT it was 3.77±0.59. Quality of patient's position was better in FNB group.

Conclusion: We found that both femoral nerve block and IV fentanyl provide good analgesia during positioning in patients with fracture femur. But femoral nerve block provides better analgesia, early onset of analgesia, more optimal positioning and providing more comfort to patients post-operatively as less analgesics required than IV fentanyl group.

Introduction

The most dreaded fear associated with any fracture is pain which has got wide psychological, behavioral and clinical ramifications. Numerous researches and innovations have been carried out to give relief from this most unpleasant experience during preoperative, intraoperative and postoperative period[1].

The incidence of femur fractures increases in elderly patients with 41.6% belonging to age group 60-75 years[2].Most of these fractures occur about femoral shaft due to high energy injuries.While the neck and the intertrochanteric types occur with minor trauma[3,4]. Major muscles are involved in femur fracture thereby complicating the operative procedures[5] and also for anaesthestist where ideal position for subarachnoid block is challenged. The muscle forces act on shaft of femur angulate the bone fragments of hip or thigh[6].

So these fractures should be given proper and adequate pain management before positioning, transforming and immobilization. Systemic analgesia such as NSAIDS and opioids have been used.Newer modalities like femoral nerve block (FNB) or IV fentanyl (FENT) have been advocated to reduce femoral fracture pain and improve positioning of patient.[6]

Indian Journal of Medical Research and Pharmaceutical Sciences
November 2020;7(11) ISSN: ISSN: 2349-5340
DOI: https://doi.org/10.29121/ijmrps.v7.i11.2020.3 Impact Factor: 4.054

Fentanyl is a synthetic opioid,highly lipid-soluble with onset of action of 2 min and duration of action of 30-60 mins. Its adverse effects are respiratory depression, pruritus, skeletal and thoracic muscles rigidity and in elderly patients these complications are even more serious[7,8].Femoral nerve block results in anaesthesia of the muscles and skin of the anterior thigh, most of the femur and knee joint. The block also confers anaesthesia of the skin below the knee joint on the medial aspect of the leg. So the femoral nerve block is well-suited for preoperative pain management after femur fracture for positioning of subarachnoid block.Results are conflicting regarding superiority of FNB as compared to the IV FENT. Previous studies have shown the superiority of the FNB on IV FENT[9].

The objective of our study was to compare the efficacy of femoral nerve block vs IV fentanyl for positioning of patient during subarachnoid block in femur fracture surgery to determine the primary outcome in terms of pain scores during positioning.Time of onset of analgesia (VAS score upto 4) and quality of patient's position were considered as secondary outcomes.

Material and Methods

After the approval from hospital ethical committee patients were explained about the total procedure and only those who gave written consent were included in this study.This was a prospective, randomized, comparative study conducted in 70 patients of either sex of ASA Grade I-III age group 18-70 years at Government Medical College and Rajindra hospital,Patiala. After taking a written informed consent, these patients were divided into two groups by randomization which was performed using computer generated random number table with 35 patients in each group as follows:

Group FNB: Received Femoral nerve block[17]by injecting 30 ml of levobupivacaine (a mixture of 20 ml of 0.5% levobupivacaine and 10 ml of normal saline).

Group FENT: Received IV fentanyl 1 ug/kg five-minute prior to positioning, escalating the dose to 3 µg/kg maximum until pain score decreased to ≤4.

All the patients were familiarized with VAS for the assessment of pain. Patients who could sit comfortably, had multiple fracture, with peripheral neuropathy,bleeding disorders,psychiatric disorders,allergy to local anaesthetics ,neurological deficits which might hinder proper assessment during block,patients with skin lesion at block site,spinal deformities such as kyphosis and scoliosis were excluded.

The procedure[17] was carried out by placing the patient supine. After identifying the anterior superior iliac spine and the pubic symphysis, a line was drawn between these two landmarks. This line represents the inguinal ligament.Then,femoral pulse palpated and marked at the inguinal crease.The nerve stimulator was set to 2Hz frquency and 1 or 2mA current.1 to 2ml of 2% lignocaine infilterated in skin.The needle entry point was 1-1.5cm lateral to the femoral artery at the midpoint of the inguinal ligament.The needle was directed cephalad toward the centre of the inguinal ligament line at an angle of approximately 30 º to 45º continue to slowly advance the needle until a motor response was obtained. The classical end point is the 'patella snap' or 'dancing patella' i.e. quadriceps contraction.At this point,prepared drug was administered with intermittent aspiration.Patients in the fentanyl group received dose of IV fentanyl 1 µg/kg five-minute prior to positioning. Onset of analgesia was taken when the patient achieved VAS score 4. Pain scores were assessed at 15 minutes after intervention with FNB or IV fentanyl. IV fentanyl 0.5 µg/kg was given every five minutes until the pain score decreased to ≤4 or maximum dose of 3µg/kg was given. Thereafter a spinal block was performed in either the midline or paramedian approach. To record the pain score during positioning Visual analogue score (0 = no pain, 10 = maximal pain) was used.

Visual analog Scale[16] :

0	-	No pain
2	-	Mild pain
4	-	Moderate pain
6	-	Severe pain
8	-	Very severe pain
10	-	Worst possible pain.

Open Access Journal
Indian Journal of Medical Research and Pharmaceutical Sciences
November 2020;7(11) ISSN: ISSN: 2349-5340
DOI: https://doi.org/10.29121/ijmrps.v7.i11.2020.3 Impact Factor: 4.054

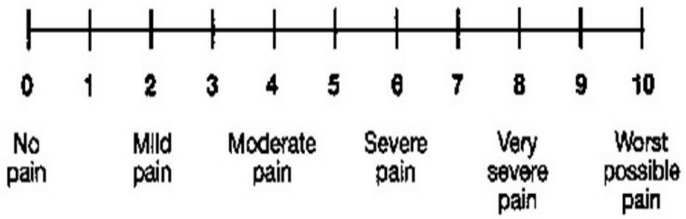


Figure 1. Visual Analogue Scale (VAS)

Also,we observed the quality of patient's position during spinal anaesthesia. We scored it on quality of patient's position scale.
Patient's positioning score[9]:
Not satisfactory=0
Satisfactory=1
Good=2
Optimal=3

Statistical Analysis
Analysis was conducted using IBMM SPSS statistics (version22.0). Numerical data was expressed as mean and standard deviation and statistically analysis was done using the independent t test to compare the two groups. For skewed data/scores Mann -Whitney U test was used. Gender was compared using Chi square test. The p value of <0.05 was considered as statistically significant and p value of <0.001 was considered as statistically highly significant.

Sample size calculation
Sample size was estimated based on pilot study; we see that mean difference in VAS score in two groups was 0.32 with SD of 0.46. With this our sample size n=33 per group at a power of 80% and confidence interval of 95% with z value of 1.96. For possible dropouts, it was decided to include 35 patients per group.

Results
Demographic data were comparable in both the groups as shown in table 1.During positioning VAS score was better in group FNB (1.54±0.50)than in group FENT(3.77±0.59) as shown in table 2.The difference was statistically significant as the p value was <0.001.So there was better quality of position in FNB group for neuraxial block and also greater anaesthesiologist's satisfaction. Consequently according to table 3 the time taken for spinal anaesthesia was less and there was less time of onset of analgesia in FNB group as compare to FENT group as depicted in graph 1.Also the quality of patient's position during spinal anesthesia was recorded according to patient's positioning score as in graph 2

Table-1 Demographic data

	GROUP FNB (n=35)	GROUP FENT (n=35)

Indian Journal of Medical Research and Pharmaceutical Sciences
November 2020;7(11) ISSN: ISSN: 2349-5340
DOI: https://doi.org/10.29121/ijmrps.v7.i11.2020.3 Impact Factor: 4.054

Age (years)	41.03±15.53	44.71 ± 16.53
Sex (male/female)	31/4	26/9
ASA (I/II/III)	20/14/1	19/15/1
Weight (kg)	73.5143	70.5429
Site of fracture		
Neck of femur Shaft of femur Distal femur	17 13 5	15 14 6

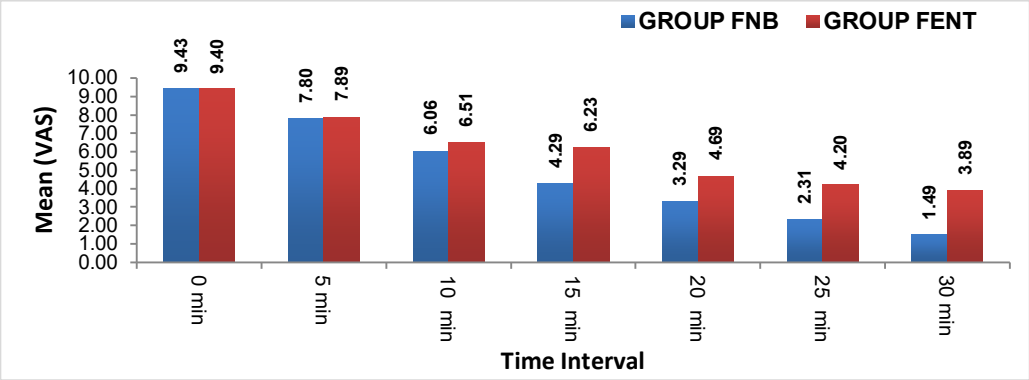
Table-2 pain scores during positioning

Pain scores (VAS)	Baseline	During positioning	p-value	Significance
Group FNB	8.1 ± 1.12	1.54± 0.51	<0.001	HS
Group FENT	7.8 ± 1.23	3.77± 0.60	<0.001	HS

Table-3 time taken for spinal anesthesia

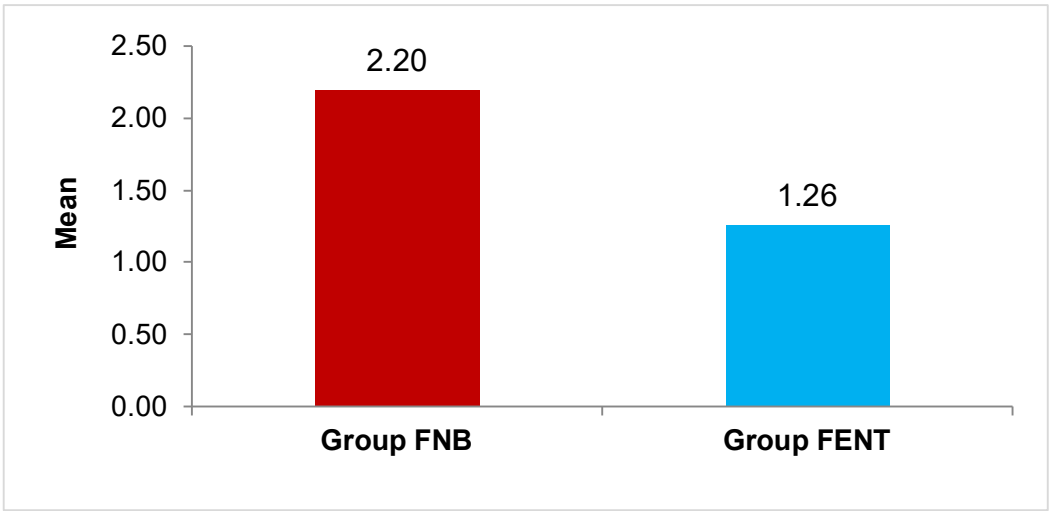
TIME FOR ANESTHESIA	MINUTES	p-value	Significance
Group FNB	15.33±1.64	<0.001	HS
Group FENT	19.56±3.09	<0.001	HS

Open Access Journal
Indian Journal of Medical Research and Pharmaceutical Sciences
November 2020;7(11) ISSN: ISSN: 2349-5340
DOI: https://doi.org/10.29121/ijmrps.v7.i11.2020.3 Impact Factor: 4.054



Graph -1 time of onset of analgesia (vas ≤4).

Graph 1 shows time of onset of analgesia VAS 4 was achieved at 15 min in group FNB and at 20 min in group FENT.which was statistically significant($p<0.05$).



Graph-2 quality of patient's positioning (0=not satisfactory, 1=satisfactory, 2=good, 3=optimal)

Graph 2 shows the quality of patient's position in group FNB was 2.20±0.41 and in group FENT was 1.2571±0.44. It was statistically highly significant ($p <0.001$).

Discussion

Most of the patients with fracture of femur are in considerable pain, any movement of affected limb in these patients results in aggravation of pain. Before surgery the failure to effectively control the pain in femur fracture patients may increase potential risks of cardiovascular events.To prevent this pain during positioning for spinal anesthesia we compared the femoral nerve block with IV fentanyl and found superiority of Femoral nerve block in providing better analgesia, early onset of analgesia, more optimal positioning and more comfort to patients post-operatively over IV fentanyl.

In our study onset of analgesia (VAS 4) was achieved at 15 min in group FNB and at 20 min in group FENT . This is in concordance with study conducted by Buddhi et al[11] in which onset of analgesia was early in femoral nerve group as compared to IV fentanyl as VAS 4 achieved at 10 minutes in femoral nerve block and similarly Pakhare et

Indian Journal of Medical Research and Pharmaceutical Sciences
November 2020;7(11) ISSN: ISSN: 2349-5340
DOI: https://doi.org/10.29121/ijmrps.v7.i11.2020.3 Impact Factor: 4.054

al[10] concluded that onset of analgesia was better in femoral nerve block as VAS<4 achieved at 20 minutes and difference was statistically significant with p value<0.05

During positioning VAS score was better in group FNB (1.54±0.50) than in group FENT (3.77±0.59).The difference was statistically significant as the p value was <0.001. Similar to our study, Ranjit et al[13] in 2016 compared the ultrasound guided femoral nerve block with lignocaine and iv fentanyl in providing effective analgesia before positioning patient with femur fracture for subarachnoid block concluded that VAS during positioning was significantly less in FNB group (2.35±0.81) than FENT group (2.95±0.82) with p value <0.05. Kumar et al[12] reported that FNB provides better analgesia, patient satisfaction, less time for anaesthesia and satisfactory positioning than iv fentanyl for central neuraxial block in patients undergoing for femur fracture. VAS during positioning was significantly less in FNB group (1.57±0.67) than FENT group (2.93±0.64) with p value <0.001 . Quality of patient's position score in this study was better in Group FNB (2.7) in comparison to Group FENT (1.4) This is in concordance with our study (graph 2).

Although our study had greater anaesthesiologist satisfaction for positioning during spinal anaesthesia, there were certain limitations. Anaesthetic technique using FNB plus spinal anesthesia were time-consuming. The real issue here was perhaps some pressure from surgeons concerning delays to surgery[14] .Secondly ,the quality of the analgesia depends on the fracture site; excellent relief can be obtained for midshaft fractures, good relief for lower third fractures, and partial relief for upper third fractures[15].In FENT group ,titration of the dose of fentanyl was required to reduce any serious side-effects, such as hypoventilation or apnea.

Conclusion

In this study "To compare the efficacy of femoral nerve block vs IV fentanyl for positioning during femur fracture surgery" we found that both femoral nerve block and IV fentanyl provide good analgesia during positioning in patients with fracture femur. But femoral nerve block provides better analgesia, early onset of analgesia, more optimal positioning and providing more comfort to patients post-operatively as less analgesics required than IV fentanyl group.

References

1. Bajwa SJ, Takrouri MS. Innovations, improvisations, challenges and constraints: The untold story of Anaesthesia in developing nations. Anaesth Essays Res. 2014;8:1–2.
2. Bishnoi M et al. Int J Res Orthop. 2018 Jul;4(4):568-571
3. Gullberg B, Johnell O, Kanis JA. Worldwide projections for hip fracture. Osteoporosis International. 1997;7:407-13.
4. Johnson B, Herring AS, Shah M, Krosin D. Mantuani, Nagdev A. Door-to-block time: Prioritizing acute pain management for femoral fractures in the ED. Am. J. Emergency Med. 2014;32:801-3.
5. Starr AJ, Bucholz RW. Fractures of the shaft of the femur. In: Rockwood and Green's fractures in adults. Lippincott Williams & Wilkins. 2001;1683-1730.
6. Purohit S, Ejjapuredi S, Badami RN. Positioning for regional Anaesthesia in femur fracture surgeries: how effective is femoral nerve block? a randomised control study. Int J Res Med Sci 2017;5:3590-5.
7. Bajwa SS, Kulshrestha A. Craniofacial and maxillary anomalies: Anaesthetic implications and management. J Sci Soc. 2014;41:73-8.
8. Chau DL, Walker V, Pai L, Cho LM. Opiates and elderly: Use and side effects. Clin Interv Aging. 2008;3:273-8.
9. Jadon A, Kedia SK, Dixit S, Chakraborty S. Comparative evaluation of femoral nerve block and intravenous fentanyl for positioning during spinal anaesthesia in surgery of femur fracture. Indian J Anaesth 2014;58:705-8
10. Pakhare PV, Pendyala P. A randomized prospective study of comparison of IV Fentanyl vs. femoral nerve block to facilitate administration of subarachnoid block in sitting position for femur fracture surgeries. Indian Journal of Clinical Anaesthesia, 2016;3(4):507-11.
11. Buddhi M, Gupta P. Ultrasound Guided Femoral Nerve Block versus Intravenous Fontanel - To Provide Analgesia for Positioning For Neuraxial Block in Patients with Fracture Shaft Femur. Journal of Dental and Medical Sciences 2018;17(3):39-55.

November 2020;7(11) ISSN: ISSN: 2349-5340
DOI: https://doi.org/10.29121/ijmrps.v7.i11.2020.3 Impact Factor: 4.054

12. Kumar A, Sinha C, Kumar A, Kumari P, Bhar D, Bhadani UK. Positioning of fracture femur patients for spinal anesthesia: femoral nerve block or intravenous fentanyl? Bali Journal of Anesthesiology 2018;2(3):61-4.
13. Ranjit S, Pradhan BB. Ultrasound Guided Femoral Nerve Block to Provide Analgesia for Positioning Patients with Femur Fracture Before Subarachnoid Block: Comparison with Intravenous Fentanyl. Kathmandu Univ Med J (KUMJ). 2016;14(54):125-9.
14. Haddad FS, Williams RL. Femoral nerve block in extracapsular femoral neck fractures. J Bone Joint Surg Br. 1995;77:922–923.
15. Hartrick CT. Trauma. In: Raj PP, editor. Textbook of Regional Anesthesia. New York, NY: Churchill livingstone;2002.p897
16. Reddy ED, Rao BD. Comparative study of efficacy of femoral nerve block and IV fentanyl for positioning during femur fracture surgery. Int Surg J 2016;3:321-4.
17. https://www.nysora.com/techniques/lower-extremity/femoral/femoral-nerve-block/