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Original Research Article

Positioning for regional anesthesia in femur fracture surgeries: how effective is femoral nerve block? a randomised control study

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ABSTRACT

Background: Fracture of the femur is a common orthopaedic problem following trauma in patients of all ages. This study was undertaken to evaluate the effectiveness of femoral nerve block (FNB) in positioning the patients for regional anesthesia.
Methods: 100 patients between the ages 18 to 80 years, of ASA grade I, II and III, scheduled for elective surgeries of femur fracture were evaluated in 2 groups. Group FNB (n=50) received femoral nerve block with 15ml of 1.5% lignocaine and Group. Non FNB (n=50) was not given any block. Assessment of pain was carried out using visual analog scale (VAS). This was rated before, during and after the procedure of positioning for spinal/combined spinal epidural anesthesia (CSE). Vital parameters were tabulated.
Results: VAS scores were noted at 0, 2, 5,10,15 minutes and at the time of positioning. VAS scores at 15 minutes after FNB was 1.473 ±0.1639 and 8.250±0.3615 in patients without FNB. Time taken for CSE was significantly less in FNB group (13.026±0.4628) minutes as compared to non FNB group (19.660 ±0.3742) minutes. Patient satisfaction scores were significantly higher in FNB group (45/50) 1.4952±0.033 as compared to non FNB group (10/50) 0.3460±0.1786. Quality of patient positioning was better in FNB group (2.782 ±0.1273) as compared to non FNB (1.382±0.2473).
Conclusions: This study concludes that FNB is highly effective in giving good pain relief for positioning for regional anaesthetic procedures improving performance time and offers higher acceptance among patients with femoral fractures.

Keywords: Combined spinal epidural, Femoral nerve block, Fracture femur, Positioning

INTRODUCTION

Fracture of the femur is a common orthopedic problem following trauma in patients of all ages. It is a painful bone injury more common in elderly patients leading to considerable morbidity.[1]

Patients with fracture of the femur present special problems to the anesthesiologist. The femoral shaft is subjected to major muscle forces that, especially in young patients, can deform the hip and/or thigh and angulate the bone fragments, thus complicating the intraoperative reduction of the fracture.[2] Therefore, complete paralysis of all the muscles acting on the femur is mandatory. For this purpose, spinal or epidural anesthesia is routinely used in these patients. Correct positioning during central neuraxial block is the prerequisite for a successful procedure.

Limb immobility and extreme pain are the deterrents for an ideal positioning for this procedure.[3] Also, any overriding of the fracture ends causes deformity and is extremely painful. Delay in positioning further aggravates pain. Administration of epidural requires relatively longer time hence positioning for patients becomes more problematic. Hence the procedure of patient positioning to perform a spinal block, in most cases, requires the administration of IV analgesics.[4]

Various modalities like intravenous (IV) fentanyl (FENT), femoral nerve block (FNB) or fascia iliac block with local anaesthetic have been advocated to reduce the pain pre-operatively and improve the positioning of these patients.[4,5] Few studies have demonstrated that a fascia iliac compartment (FIC) block provides effective analgesia for a fractured femur in terms of facilitating an adequate position for spinal anaesthesia or when administered either during pre-hospital management or in emergency departments.[6-8]

Systemic analgesics, such as narcotics, are commonly used, but their side effects profile including respiratory depression, cognitive impairment, vomiting, urinary retention, and others limits their clinical utility during injuries of the head, chest, or abdomen.[9-11] Previous studies suggest that the use of local anesthesia using femoral nerve block (FNB) is a safe and effective method. These methods can be carried out during prehospital care, emergency department (ED) and in the preoperative setting.[12,13]

Although femoral nerve block is one of the easiest peripheral nerve blocks to perform because the landmarks are easy to identify and the nerve is usually superficial yet person administering must be aware of possible complication and ready to manage them. Possible complications specific to femoral nerve block include vascular puncture, hematoma, difficulty weight bearing/ mobilizing leading to falls and injuries.[14,15]We conducted this study to evaluate the analgesic effect provided by FNB prior to positioning for combined spinal epidural block in patients undergoing surgery for femur fracture.

METHODS

After the approval of institutional ethics committee and with the informed consent, a prospective randomized double blinded study was conducted from August 2016 to January 2017. 100 patients of both sexes with age group between 18 to 80 years of ASA I, II and III scheduled for elective surgeries of fracture femur were included. Fracture types were graded by one senior orthopedic surgeon.

Type of fractures were as shown in Figure 1. Randomization was performed using computer generated random number table. The patients were randomly allocated in two groups of 50 each. 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. 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.

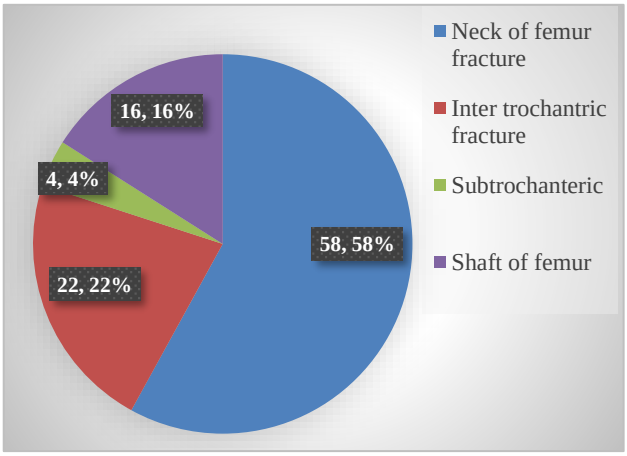

Figure 1: Type of fractures in study groups.

Patients were asked to stay nil orally for six hours. They received a premedication with tablet Ranitidine 150 mg and tablet Alprazolam 0.5 mg at bed time. On the morning of surgery all patients had peripheral IV access with 18-gauge cannula and received an infusion with ringer lactate at a rate of 15ml/kg. Standard multipara monitor connected and electrocardiography, pulse rate, SPO_2, respiratory rate and non-invasive blood pressure measurement recorded. All patients were supplied with oxygen (5L/min) via a face mask.

No premedication or sedation was given. 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).

The blocks were given by the blind technique by loss of resistance after confirming paranesthesia. The patient was positioned supine, the anterior superior iliac spine and the pubic symphysis were marked, and a line was drawn between these two landmarks. This line represents the inguinal ligament. The femoral nerve passes through the center of the line, which makes this landmark useful for positioning the needle in the inguinal crease, particularly in an obese patient. Then the femoral pulse was palpated and marked at the inguinal crease.

A 23-gauge needle was used in this study and was inserted directly lateral (1-1.5 cm) to the artery in the inguinal crease. At this location, the femoral nerve is wide and superficial, and the needle does not pass through significant muscle mass. The needle is directed

cephalad toward the center of the inguinal ligament line, paresthesia's elicited and the drug was injected. 15 ml of lignocaine 1.5% was injected slowly after a negative aspiration keeping the needle steady at the point of eliciting paranesthesia in the thigh. In this study 2% lignocaine was used for FNB, which was diluted to make the drug concentration 1.5% of lignocaine.

The relief of pain following FNB was assessed quantitatively using visual analog scale (VAS) (0-no pain to 10-worst pain) and satisfaction score (Table 1) at interval of 2 minutes, 5 minutes, 10 minutes, and 15 minutes.

Table 1: Satisfaction scores.

Visual Analog scale (VAS)	Satisfaction score
0	Not Satisfactory
1	Satisfactory
2	Good
3	Optimal

Then, patients were shifted to the operating room and combined spinal epidural performed in sitting position after 15 minutes of giving FNB while checking VAS during positioning. After confirming the appropriate interspace, 2% lignocaine (3 ml) was injected. This was followed by insertion of 18-gauge Tuohy's needle in the epidural space after confirmation by using the loss of resistance to air technique.

By keeping a close vigil monitoring of heart rate, a test dose of 3 ml lignocaine with adrenaline was given through the epidural catheter. One level below the insertion of the epidural catheter, the subarachnoid block was performed using 25-gauge Quincke's needle and 3 ml of 0.5% bupivacaine was injected after obtaining a clear flow of cerebrospinal fluid. Time to perform spinal anesthesia was recorded. Intra-operatively the time of onset, maximum level and duration of sensory block were recorded.

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. Patients acceptance and satisfaction scores were noted.

Statistical analysis

Student's t-test, Chi-square test or Fisher exact test were used as appropriate to compare the two groups. Results were expressed as mean and standard deviation and analyzed using SPSS Software. $P < 0.05$ was considered as statistically significant.

RESULTS

Demographic data were comparable in both the groups (Table 2).

Table 2: Demographic data of the patients in FNB and non FNB groups.

	FNB group	Non FNB group
No. of patients	50	50
Mean age (years)	58	57
Sex (M/F)	28/22	27/23
ASA (1/2/3)	9/22/19	10/28/12
Site of fracture		
Neck of femur	28	30
Inter-trochanteric	10	12
Sub-trochanteric	3	1
Shaft of femur	9	7

Table 3: Summary of results of the procedure.

	FNB group (n=50)	Non FNB group (n=50)	P-value
VAS at T0	7.202±0.3560	7.294±0.3793	0.214(NS)
VAS at T2	5.554±0.2358	7.280±0.3511	<0.001*(HS)
VAS at T5	3.384±0.1920	6.766±0.3837	<0.001*(HS)
VAS at T10	1.736±0.1535	6.382±0.4154	<0.001*(HS)
VAS at T15	0.768±0.1491	5.964±0.4552	<0.001*(HS)
VAS during positioning	1.474±0.1639	5.250±0.3615	<0.001*(HS)
Quality of patient positioning (0-3)	2.782±0.1273	1.382±0.2413	<0.001*(HS)
Mean satisfaction scores (0-1.8)	1.4952±0.0333	0.3760+0.17867	<0.001*(HS)
Time for anesthesia (minute)	13.026±0.4628	19.660±0.3742	<0.001*(HS)

*Significance value is 0.000; HS=highly significant; NS=not significant.

VAS values were checked regularly just before FNB (T0), then 2 minutes, 5 minutes, 10 minutes, 15 minutes after FNB (T2, T5, T10, T15) and during positioning of the patient. Group I (FNB group) 1.473 ±0.1639 had

lower VAS scores compared to Group II (non FNB) 8.250±0.3615 and the difference was statistically significant (P < 0.001) as shown in Table 3. Satisfaction score was better in Group I when compared with Group II always (1.4952±0.033 versus 0.3460±0.1786). Time to perform spinal-epidural anesthesia was shorter in Group I versus Group II (P < 0.001) (13.026±0.4628 minutes versus 19.660±0.3742 minutes). Quality of patient positioning for spinal anesthesia was higher in group FNB (2.782±0.1273 as compared to non FNB (1.382±0.2473) (Figure 2).

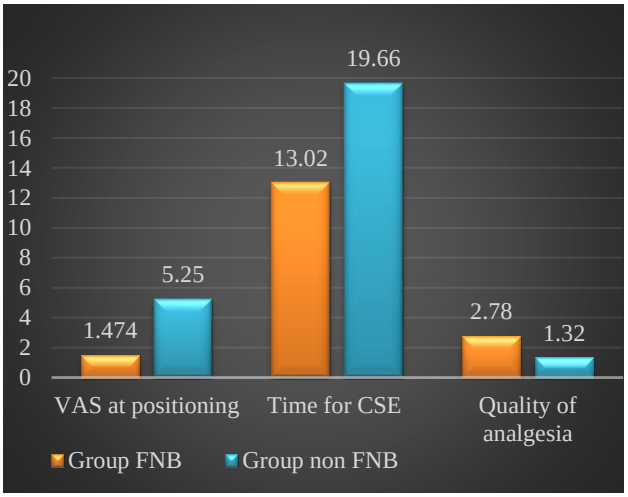

Figure 2: Comparison of VAS at positioning (0-10), time for CSE (minute), quality of analgesia (0-3).

There was no significant difference in intra-operative hemodynamic parameters as well as postoperative complications such as hypotension, bradycardia, nausea and vomiting, respiratory depression, convulsions, and anaphylaxis. No major complications were recorded with the administration of 1.5% Lignocaine, i.e. no signs of toxicity, convulsions, or cardiovascular collapse. None of the patients in both the groups had SpO2 <90% during the procedure.

DISCUSSION

Spinal anaesthesia is universally accepted and preferred technique of anaesthesia for surgery of fracture femur.[16] Spinal/epidural technique has many advantages over general anaesthesia like early mobility, less chances of deep vein thrombosis and mortality.[17,18]

The major problem for spinal/epidural block is the pain during positioning for a block in these patients. These problems are further heightened if we encounter obese patients for such surgical procedures. Femoral nerve block has been successfully used in adults for femoral shaft fracture analgesia. We studied the analgesic effect of femoral nerve block to ensure proper positioning for regional techniques of CSE.

Sandby-Thomas et al reported that technique used to aid positioning for central neuraxial block, the most frequently used agents were midazolam, ketamine, and propofol, fentanyl, remifentanil, morphine, nitrous oxide, and sevoflurane[16]. Previously nerve blocks were infrequently used to aid positioning in spinal-epidural block. There is sufficient data to show the usefulness of FNB to relieve pain from fracture of the femur and now, is being used for positioning during central neuraxial blockade as well.[3,4,12,19-22]

Femoral nerve block can be performed using peripheral nerve stimulator, ultrasound guided technique or by loss of resistance technique. Geier KO concluded that there were no significant differences regarding efficiency between loss of resistance and peripheral nerve stimulator methods.[25] In present study we used blind technique that is loss of resistance and by eliciting paresthesia as shown by Khoo.[26]

The results of this prospective, randomized study demonstrate that FNB using 15 ml of 1.5% lignocaine provided better pain relief prior to positioning of patients with fractured femur for the combined spinal epidural block. The VAS score and patient satisfaction was better in patients with FNB Block than those without FNB block while positioning for combined spinal epidural block. We also found that the time required for the epidural block was less in FNB group patients than non FNB group patients.

Bhoslse, Durranni et al also found similar results in their studies.[1,14] Also, many authors while comparing FNB with other modalities for positioning for central neuraxial block found FNB to be superior to all other modalities.[3,4,6,12,14] The drug used for the block also has a significant difference on the duration and results as shown in study conducted by Iamaroon et al, did not find much advantage of FNB over other modalities as bupivacaine was used instead of lignocaine. The effect of lignocaine in FNB comes in 5 minutes.

However, onset of analgesic effect of bupivacaine is variable and may take 25-30 minutes for full effect.[5,23,24] In this study FNB was performed with 1.5% lignocaine and time to onset was 5 min with a peak at 12 minutes. It can be reasoned out by the fact that FNB produced relaxation of the quadriceps muscle and hence provided better analgesia for positioning and a shorter time to perform spinal anesthesia.[7] The main limitation of present study was that we did not compare FNB with any other modality (e.g.: IV fentanyl) for pain relief while positioning for epidural block. Also, we did not note the effect of FNB on the post-operative epidural top ups and analgesia required.

CONCLUSION

FNB before central neuraxial block reduces VAS score, improves satisfaction rates, lower duration for epidural

bock and improves quality of patient positioning as compared to those who were directly positioned for central neuraxial block.

FNB using 15 ml of 1.5% lignocaine is a safe and effective method to alleviate pain while poisoning for central neuraxial block and hence reduces the time to perform spinal anesthesia, provides better analgesia, patient satisfaction, less time for anaesthesia and satisfactory positioning for central neuraxial block in patients undergoing surgery for femur fractures.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Bhosle P, Prakash A, Aphale S. Femoral nerve block for positioning during regional anaesthesia in patients with fracture femur: a randomized controlled study. J Med Dental Sci Res. 2015;2(11):04-6.
2. Barriot P, Riou B, Ronchi L, Bellaiche S. Femoral nerve block in prehospital management of fractured shaft of femur. JEUR. 1988;1:21-4.
3. 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.
4. Sia S, Pelusio F, Barbagli R, Rivituso C. Analgesia before performing a spinal block in the sitting position in patients with femoral shaft fracture: a comparison between femoral nerve block and intravenous fentanyl. Anesth Analg. 2004;99:1221-4.
5. Mosaffa F, Esmaelijah A, Khoshnevis H. Analgesia before performing a spinal block in the lateral decubitus position in patients with femoral neck fracture: A comparison between fascia iliac block and IV fentanyl. Reg Anesth Pain Med. 2005;30(1):61.
6. Yun MJ, Kim YH, Han MK, Kim JH, Hwang JW, Do SH. Analgesia before a spinal block for femoral neck fracture: fascia iliac compartment block. Acta Anaesthesiol Scand. 2009;53:1282-7.
7. Lopez S, Gros T, Bernard N, Plasse C, Capdevila X. Fascia iliac compartment block for femoral bone fractures in prehospital care. Reg Anesth Pain Med. 2003;28:203-7.
8. Wathen JE, Gao D, Merritt G, Georgopoulos G, Battan FK. A randomized controlled trial comparing a fascia iliac compartment nerve block to a traditional systemic analgesic for femur fractures in a pediatric emergency department. Ann Emerg Med. 2007;50:162-71.
9. Bajwa SS, Kulshrestha A. Craniofacial and maxillary anomalies: Anesthetics implications and management. J Sci Soc. 2014;41:73-8.
10. Chau DL, Walker V, Pai L, Cho LM. Opiates and elderly: use and side effects. Clin Interv Aging. 2008;3:273-8.
11. Mutty CE, Jensen EJ, Manka MA, Anders MJ, Bone LB. Femoral nerve block for diaphyseal and distal femoral fractures in the emergency department. Surgical technique. J Bone Joint Surg Am. 2008;90:218-26.
12. Singh AP, Kohli V, Bajwa SJ. Intravenous analgesia with opioids versus femoral nerve block with 0.2% ropivacaine as pre-emptive analgesic for fracture femur: a randomized comparative study. Anesth Essays Res. 2016;10:338-42.
13. Pennington N, Gadd RJ, Green N, Loughenbury PR. A national survey of acute hospitals in England on their current practice in the use of femoral nerve blocks when splinting femoral fractures. Injury. 2012;43:843-5.
14. Durrani H, Butt KJ, Khosa AH. Pain Relief during positioning for spinal anesthesia in patients with femoral fracture: a comparison between femoral nerve block and intravenous nalbuphine. PJMHS. 2013;7(4).
15. McEwen A. Anaesthesia Tutorial of the week 249, 6th February 2012. Available at www.totw.anaesthesiologists.org www. davis drug .com
16. Sandby-Thomas M, Sullivan G, Hall JE. A national survey into the peri-operative anaesthetic management of patients presenting for surgical correction of a fractured neck of femur. Anaesthesia. 2008;63:250-8.
17. Parker MJ, Handoll HH, Griffiths R. Anaesthesia for hip fracture surgery in adults. Cochrane Database Syst Rev. 2004;4(4).
18. Urwin SC, Parker MJ, Griffiths R. General versus regional anaesthesia for hip fracture surgery: a meta-analysis of randomized trials. Br J Anaesth. 2000;84:450-5.
19. Stanley I. The anaesthetic management of upper femoral fracture. Curr Anaesth Crit Care. 2005;16:23-33.
20. Schiferer A, Gore C, Gorove L, Lang T, Steinlechner B, Zimpfer M, et al. A randomized controlled trial of femoral nerve blockade administered preclinically for pain relief in femoral trauma. Anesth Analg. 2007;105:1852-4.
21. Szucs S, Iohom G, O'Donnell B, Sajgalik P, Ahmad I, Salah N, et al. Analgesic efficacy of continuous femoral nerve block commenced prior to operative fixation of fractured neck of femur. Perioper Med. 2012;1:4.
22. Iamaroon A, Raksakietisak M, Halilamien P, Hongsawad J, Boonsararuxsapong K. Femoral nerve block versus fentanyl: Analgesia for positioning patients with fractured femur. Local Reg Anesth. 2010;3:21-6.

23. Urbanek B, Duma A, Kimberger O, Huber G, Marhofer P, Zimpfer M, et al. Onset, time, quality of blockade, and duration of three-in-one blocks with levobupivacaine and bupivacaine. Anesth Analg. 2003;97:888-92.
24. Marhofer P, Oismuller C, Faryniak B, Sitzwohl C, Mayer N, Kapral S. Three-in-one blocks with ropivacaine: Evaluation of sensory onset time and quality of sensory block. Anesth Analg. 2000;90:125-8.
25. Geier KO. Peripheral nerve stimulator for femoral nerve block. Is it really necessary? Rev Bras Anestesiol. 2003;53(3):338-45.
26. Khoo ST, Brown TC. Femoral nerve block-the anatomical basis for a single injection technique. Anaesthesia Intensive Care. 1983;11:40-2.

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