Research Article

DOI: http://dx.doi.org/10.18203/2349-2902.isj20160252

Comparative study of efficacy of femoral nerve block and IV fentanyl for positioning during femur fracture surgery

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Received: 04 January 2016 Accepted: 18 January 2016

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ABSTRACT

Background: Spinal anesthesia is the preferred technique for femoral fracture surgeries. Since there is a very low threshold of pain in this area, intravenous fentanyl and femoral nerve blockers are generally administered to relieve the pain during the positioning of the hip before surgery. This study was performed to compare the efficacy of femoral nerve block over fentanyl.

Methods: 72 patients between the ages of 18-70, who had femur fracture and unable to sit due to extreme pain were included into the study. The patients were divided into 2 groups based on the random number table, to receive Femoral Nerve Block (FNB group) and intravenous fentanyl (IVF group). Vital statistics, visual analog scale for pain measurement and patient satisfaction was noted.

Results: The VAS scores 15 mins after analgesic in FNB group were 3.1 ± 2.1 compared to 3.9 ± 1.9 in IVF group and during the positioning, 6.2 ± 2.1 and 7.2 ± 2.7 respectively. Time to perform surgery was 2.0 mins ± 1.9 in FNB group and 3.6 ± 1.4 in IVF group while patient satisfaction was 32 and 26 respectively in the FNB and UVF groups.

Conclusions: Our study revealed that femoral nerve block was a better analgesic drug compared to intravenous fentanyl for positioning of the hip during spinal anesthesia in femoral fracture surgeries.

Keywords: Femur fracture, Femoral nerve block, Fentanyl, Analgesics

INTRODUCTION

Femoral fractures are one of the most common types of fractures especially in the elderly. Therefore the fracture of the hip and femur is a global problem and not just concentrated in one country. The incidence of hip fractures world wide have been estimated to be 1.26 million in the 1990s and are predicted to increase to 2.6 million by 2025 and increase to 4.5 million by 2050. Some other estimates predict a rise to 21.3 million.

They consist of neck, inter-trochanteric, diaphyseal and distal fractures. While the neck and the intertrochanteric types occur mainly in the elderly people with minor

trauma, diaphyseal and distal fractures result because of high energy injuries. 1,2

Major muscles are involved which can deform the thigh and angulate the bone and its fragments, thereby complicating the operative procedures.⁴

Moreover, the periostem has the lowest pain threshold of the deep somatic structures.⁵ As a result, most of the patients with femoral fractures are in considerable pain, therefore, they should be given proper and adequate pain management before positioning, transforming and immobilization.³

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The surgery of femur normally involves internal fixation of the fracture or replacement of the femoral head. Spinal block is most commonly used for this femoral fracture surgery. However due to the pain, analgesics or femoral nerve blockers are given to the patients, before positioning. 8,9

Femoral nerve blockers produce intense anaesthesia with very few side effects compared the opiods and NSAIDS. ¹⁰ In addition; the complications with the FNB are rare. ¹²

This study was performed with the intention to compare the femoral nerve blocker to the fentanyl given intravenously for positioning during the spinal anathesia.

METHODS

This study was conducted by the department of Anesthesia at Mallareddy Medical College for Women during the period of two years. 72 patients between the ages of 18-70, who had femur fracture and unable to sit due to extreme pain were included into the study.

All the patients who were in the American Society of Anesthesiologists status I to III and scheduled for fracture of the femur operation were included in the study. Patients who were able to sit comfortably, who had other contraindications for the surgery and anesthesia, multiple fractures, bleeding disorders were excluded from the study.

The complete procedure was thoroughly explained to the patients and informed consent was taken from all of them. The patients were divided into 2 groups based on the random number table, one group received Femoral Nerve Block (FNB group) and other group received intravenous fentanyl (IVF group).

Detailed histories, both physical and clinical were collected from all the patients. Preoperative examinations like urine analysis, blood urea, blood sugar, and bleeding time, clotting time, ECG and X ray chest were performed on all the patients.

Prior to the surgery, the patients were fasted for a minimum of 6 hours before the surgery and were not premedicated with analgesics and sedatives. Blood pressure, pulse rate and respiratory rate were recorded.

All patients were preloaded with 500 ml of Ringer's Lactate. In the FNB group, the femoral nerve blocker was guided by a peripheral nerve stimulator few minutes before positioning. At the site of entry, 1ml of 1% lignocaine was injected and a 22 gauge needle was introduced are 1cm lateral to the femoral artery and 1.5cm below the inguinal ligament. 20ml 1.5% lignocaine with adrenalin (1:20,000) is injected when the stimulator at 0.3-0.5 mA current can bring about a contraction of the quadriceps after a negative aspiration test.

For pain management during the procedure, IV fentanyl 0.5 µg/kg was given every 5 min until the pain decreased. 15 minutes before the spinal block was achieved, pain scores were taken and again after the spinal block. This was done using the visual scale analog (VAS - 0=no pain, 10 = maximum pain). Additional analgesic requirement, time taken to attain the position and anesthesiologist satisfaction (0= not satisfactory, 1= satisfactory, 2= good, 3 optimal) was noted. Patient's satisfaction (like/dislike) was also taken into account.

Other vital parameters, such as heart rate, mean arterial pressure and oxygen saturation were as continuously monitored.

RESULTS

Although femoral fractures are seen quite often among the children, most of the patients in our study were above 60 years of age in our study, of whom around 40 percent were females (Figure 1).

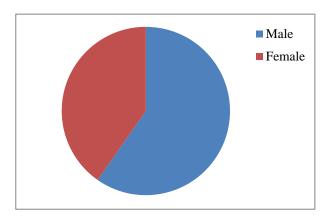


Figure 1: Gender wise distribution of the patients.

The main age group in our study was the elderly, above 60 years of age, belonging to the American society of anaesthesiologists category II. Most of the fractures were inter- trochanteric fractures, followed by neck fractures (Table 1).

Table 1: General demographic details of the patients.

Group FNB	Group IVF
(n= 36)	(n = 36)
62.4 ± 9.4	65.1 ± 6.8
67.1 ± 12.1	63.8 ± 8.3
3	5
29	24
4	7
15	17
9	11
5	3
7	5
	(n=36) 62.4 ± 9.4 67.1 ± 12.1 3 29 4

There was no significant difference in the heart rate of the patient before and during the analgesia while the mean arterial pressure and the oxygen saturation were comparatively higher after the analgesic (Table 2).

Table 2: Vital parameters before and during analgesia.

	Group FNB (n= 36)	Group IVF (n = 36)	
MAP mmHg at baseline	90.2 ± 9.3	87.34 ± 7.1	0.079
MAP mmHg during position	89.12 ± 4.9	84.36 ± 5.8	0.0023*
Heart rate / min at baseline	79.2 ± 9.6	79.5 ± 7.3	0.83
Heart rate / min during position	79.6 ± 6.9	78.8 ± 9.5	0.74
SpO2% at baseline	98.2	98.4	0.96
SpO2% during position	98.0	95.3	0.001*

^{*}p < 0.05, significant

The time for anesthesia was significantly lower in the FNB group as was the pain scores after 15 mins of analgesic. Even during the positioning of the hip, the pain scores were significantly lesser. More number of patients was satisfied after the FNB analgesic as compared to the satisfaction after IVF (Table 3).

Table 3: Pain scores and satisfaction.

	Group FNB (n= 36)	Group IVF (n = 36)	
Time to perform anesthesia	2.0 ± 1.9	3.6 ± 1.4	< 0.001*
Pain scores 15 mins after analgesia	3.1 ± 2.1	3.9 ± 1.9	< 0.001*
Pain scores during positioning	6.2 ± 2.1	7.2 ± 2.7	< 0.001*
Additional analgesic req	17.2 ± 11.3	21.4 ± 14.9	< 0.001*
Patient satisfaction (n)	32	26	

P value < 0.001 - significant

DISCUSSION

The peak incidence of the femur fractures occurs in the young, decreasing after 20 years and again increasing in the elderly, with the increase in age. ¹⁴ In this age group, majority of the fractures occur in the proximal third of the

femur. The neck is most of the time affected as it is the weakest part of the bone. 15

Patients for surgery during the fracture need to be given a sitting position so as to be given the nerve block. His involves flexion of the hip joint or traction on femur fracture, thereby increasing the pain in that area.¹⁶

Spinal anaesthesia is one of the main and universally accepted techniques for fracture of femur surgeries. ¹³ Less morbidity, less chances of vein thrombosis and less mortality are the main advantages of this technique over general anaesthesia. ^{6,7}

Most frequently, the frequent use of agents such as midazolam, ketamine, fentanyl, remifentanil and propofol have been reported.¹³ The use of femoral nerve block to relieve pain is now frequently being used during spinal anathesia.¹⁷⁻¹⁹

In our study, we found the femoral nerve blocker, lignocaine to be significantly better than fentanyl for the positioning of the hip for surgery with the VAS scores being significantly lower. This was found to be in accordance in other similar studies. Jadon et al, who used lignocaine as the nerve blocker also found similar results as Sia et al and Gosavi et al. 8,21,20 But Iamaroon et al did not find any significant difference in the two types of analgesia. It has been estimated that this could be due to the fact that he used bupivacaine instead of lignocaine as FNB. The analgesic effect of lignocaine comes within 5 mins while it takes 20-30 minutes for bupivacaine to come into effect. 8,22,23

The analgesic affect of FNB was better than that of IVF, with more number of patient's satisfaction as was seen with Jadon et al while Iamaroon et al found no difference in the two drugs. The time taken to perform the anesthesia was also significantly lower in the FNB group as compared to the IVF group, as with a study by Jadon et al.

CONCLUSION

Our study revealed that femoral nerve block was a better analgesic drug compared to intravenous fentanyl for positioning of the hip during spinal anesthesia in femoral fracture surgeries, in terms of analgesic affect, patient satisfaction, lower pain scores and lesser time taken.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

 $institutional\ ethics\ committee$

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Cite this article as: 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.