

“COMPARISON OF ANALGESIC EFFECT OF INTRAVENOUS FENTANYL VS FEMORAL NERVE BLOCK DURING SPINAL ANESTHESIA POSITIONING IN PATIENTS UNDERGOING FEMUR FRACTURE SURGERY.”

Anaesthesiology

Dr Dinesh Babariya

Assistant Professor, Anaesthesiology Department, GMERS Medical College, Junagadh

Dr Hetal Kanabar

Assistant Professor, Anaesthesiology Department, GMERS Medical College, Junagadh

Dr Dipti Desai

Assistant Professor, Anaesthesiology Department, GMERS Medical College, Junagadh

Dr Kanvee Vania

Professor, Anaesthesiology Department, GMERS Medical College, Junagadh

ABSTRACT

Introduction: For operative procedures of femur fracture, spinal anaesthesia is widely used over general anaesthesia with advantages of better post-operative pain relief, early mobilization, less respiratory complications and avoiding multiple drugs usage. For effectively giving spinal anaesthesia, pain free positioning is must. While giving spinal anaesthesia in femur fracture procedures, proper positioning of patient is very difficult because of pain, more so when fracture is displaced. Thus pre operatively intravenous fentanyl, femoral nerve block or fascia iliaca block are some of the procedures which can be used to decrease pain and to provide correct positioning during spinal anaesthesia. **Objectives:** To compare the analgesic effect and hemodynamic stability of femoral nerve block and intravenous fentanyl. **Methods:** Study was carry out on 70 patients divided randomly into two groups of 35 patients each. Group A patients received Femoral nerve block and Group B patients received intravenous fentanyl. **Result:** VAS score at rest and at movement at 15 minutes in femoral nerve block group was 2.37 +/- 1.45 and 3.37 +/- 1.55 in intravenous fentanyl group was 4.94 +/- 0.98 and 5.55 +/- 0.88. Patient satisfaction score was higher in femoral nerve block group. **Conclusion:** Analgesic effect of femoral nerve block was better compare to intravenous fentanyl.

KEYWORDS

INTRODUCTION

Femur fracture is one of most common bony fracture with peak incidence between 15 and 44 years of age^[1]. Pain is the most common concern related with any fracture which causes physiological, clinical and behavioral consequences. To help alleviate this dreaded pain, many researches and studies has been done.^[2]

Fracture of femur is extremely painful because among all deep somatic structures, periosteum has lowest pain threshold.^[3,4] For operative procedures of femur fracture, spinal anaesthesia is widely used over general anaesthesia with advantages of better post-operative pain relief, early mobilization, less respiratory complications and avoiding multiple drugs usage^[4]. For effectively giving spinal anaesthesia, pain free positioning is must. While giving spinal anaesthesia in femur fracture procedures, proper positioning of patient is very difficult because of pain, more so when fracture is displaced.^[4] Thus pre operatively intravenous fentanyl, femoral nerve block or fascia iliaca block are some of the procedures which can be used to decrease pain and to provide correct positioning during spinal anaesthesia^[5].

We perform this study to compare efficacy, safety and haemodynamic stability of intravenous fentanyl and femoral nerve block during positioning patients for spinal anaesthesia in femoral fractures.

A. Methodology

After obtaining a due permission from the institutional ethical committee and after registering the study in Clinical Trial Registry Of India, Study will be conducted on 70 (35 patients in each group) patients of ASA I, II and III between age 18-60 yrs undergoing elective and emergency femur fracture surgery under spinal anesthesia.

We have used data from a previous study to calculate the sample size.^[4] Using MedCalc software, taking in consideration time to perform spinal anaesthesia in group FNB 1.8 ± 0.7 (mean $\pm$ SD) mins and in IV fentanyl group 3.0 ± 1.1 (mean $\pm$ SD) mins, sample size comes to 29 in each group at alpha error 0.01 & beta error 0.01. So after addition of 20% non response rate, sample size comes to $29 + 6 = 35$ in each group. So required final sample size will be $35 + 35 = 70$.

After obtaining pre- anesthetic evaluation and obtaining all routine investigations like complete blood count, renal and liver function test, random blood sugar, chest x-ray and electrocardiography, patients posted for femur fracture surgeries under spinal anaesthesia only, age between 18-60 years, giving written valid consent, ASA physical status I, II and III were included in the study. Patients with poor GCS, with renal and liver diseases, with bleeding tendencies and

coagulopathy, with known neuropathy, with skin lesions at local site, with local anesthetic allergy, and patients requiring general anaesthesia were excluded from study.

Patients were randomly allocated using sealed envelope into two groups. In Group A patients, Peripheral Nerve Stimulator (PNS) guided femoral nerve block was given using 1.5 % lignocaine (15 ml of 2% lignocaine + 5 ml of Normal Saline) 15 minutes before giving spinal anaesthesia and in Group B patients, Intravenous fentanyl 1 microgram/kg was administered 15 minutes before giving spinal anaesthesia.

Inside the operation theatre, patient was adequately explained about visual analogue scale (0- no pain to 10- maximal pain). Patient was monitored with electrocardiography, non invasive blood pressure and pulse oximetry measurement.

Intravenous access was secured and IV fluids was started. Patients received inj. glycopyrolate 4 microgram/kg and inj. ondansetron 0.15mg/kg as a premedication. Patient was given oxygen via face mask (4L/ min)

Patient in Group A was received femoral nerve block with lignocaine 1.5% 20ml with 22G hypodermic needle guided by peripheral nerve stimulator introduced 1cm lateral to femoral artery and Patients in Group B was received intravenous fentanyl 1 microgram/kg. In Group A, when current 0.2-0.4 mA elicited a quadriceps contraction, lignocaine was given after negative aspiration. Time of giving femoral nerve block or iv fentanyl was considered as starting time and patient was given position after 15 mins of starting time and VAS score was recorded during this time. If patient's pain is greater than 4 according to VAS score after 15 minutes, rescue analgesic in form of IV paracetamol 15mg/kg was used.

Parameters observed in study will be heart rate, mean arterial pressure, VAS score at rest, VAS score at movement of fracture limb, quality of patient positioning for administering spinal anaesthesia (0- not satisfactory, 1- satisfactory, 2- good, 3- optimal), time to perform spinal anaesthesia and rescue analgesic requirement. Parameters observed in study was noted at pre-intervention time, after giving fentanyl or FNB at every 5mins till performing spinal anaesthesia.

Patients was observed for any complications for 2hr from starting time. Complications that can be possible in intravenous fentanyl group are nausea, vomiting and respiratory depression and in femoral nerve block group are arrhythmia, convulsion, haematoma, local anesthetic

systemic toxicity. All resuscitation equipments and drugs will be kept ready inside the operation theatre.

Demographic profile will be compared using mean and standard deviation. The discrete data will be assessed by numbers and percentage. Difference in observations between two groups will be determined by chi square test, t-test, and Mann-Whitney U test whenever it will be applicable.

After data tabulation in Microsoft Excel descriptive and analytic statistics will be performed for the two study groups using Epi info software. P value of less than 0.05 will be considered significant. Independent Students' t-test will be carried out to compare VAS score.

RESULTS

In present study, 70 patients who fulfilled inclusion criteria for study were taken for analysis of results. They were randomly divided into two groups, Group A and Group B, to receive femoral nerve block and intravenous fentanyl respectively.

Table-1 Age distribution of patients

Age (years)	Group A	Percentage	Group B	Percentage	P value
18-30	5	14.2%	3	8.6%	0.7181
31-40	8	22.9%	9	25.7%	0.9956
41-50	10	28.6%	11	31.4%	0.9958
51-60	12	34.3%	12	34.3%	0.8012

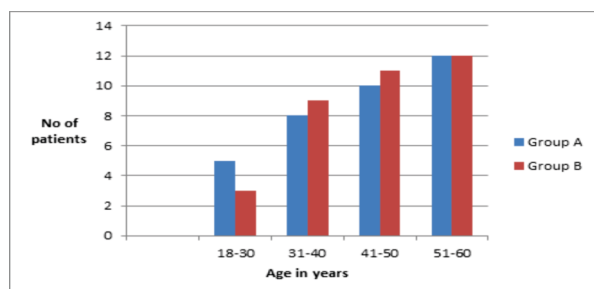


Table-2 Gender distribution of patients

Gender	Group A	Percentage	Group B	Percentage	P value
Male	20	57.1%	22	62.9%	0.8016
Female	15	42.9%	13	37.1%	0.8016

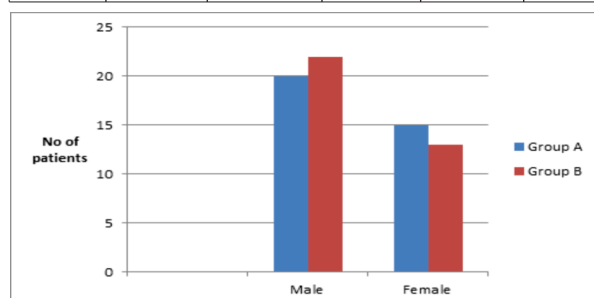


Table-3 Physical status of patients

Physical status	Group A	Percentage	Group B	Percentage	P value
I	4	11.5%	6	17.1%	0.7431
II	25	71.4%	26	74.3%	0.9968
III	6	17.1%	3	8.6%	0.4806

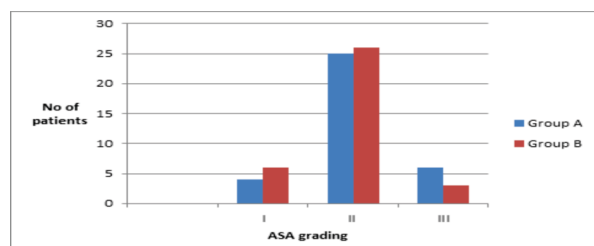
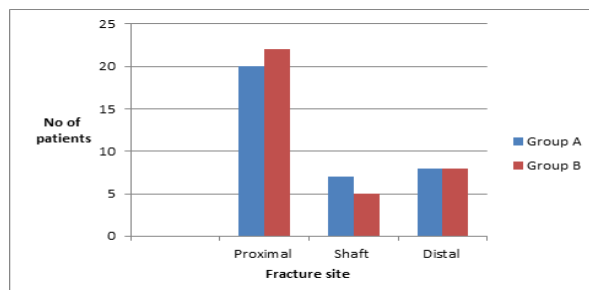


Table-4 fracture site of patients

Fracture site	Group A	Percentage	Group B	Percentage	Pvalue
Proximal	20	57.1%	22	62.8%	0.8082

Shaft	7	20%	5	14.3%	0.7524
Distal	8	22.9%	8	22.9%	0.7761



From above tables, Age distribution, Gender distribution, ASA grading and fracture site in both FNB and intravenous fentanyl group are statistically non significant.

Table-5 VAS score at rest

VAS score at rest	Group A		Group B		P value
	Mean	SD	Mean	SD	
Pre intervention	8.78	0.22	8.68	0.32	0.0329
2 minutes	8.22	0.82	7.86	0.62	0.0040
5 minutes	7.83	1.12	6.68	0.84	<0.0001
10 minutes	4.35	1.06	6.50	0.91	<0.0001
15 minutes	2.37	1.45	4.94	0.98	<0.0001

Table-6 VAS score at movement

VAS score at movement	Group A		Group B		P Value
	Mean	SD	Mean	SD	
Pre intervention	9.55	0.45	9.6	0.40	0.4883
2 minutes	9.23	0.86	8.86	0.78	0.0086
5 minutes	8.12	1.08	6.68	0.84	<0.0001
10 minutes	4.78	1.16	6.58	0.98	<0.0001
15 minutes	3.37	1.55	5.55	0.88	<0.0001

From above tables, VAS score at rest and VAS score at movement in both groups are statistically significant at 2, 5, 10, 15 minutes. VAS score at rest and movement is decreased significantly after 5 minute in femoral nerve block group. VAS score at rest and movement is decreased in intravenous fentanyl group till 5 minutes.

Table-7 Heart rate per minute

Heart rate per minute	Group A		Group B		P Value
	Mean	SD	Mean	SD	
Pre intervention	88.1	7.27	89.4	8.26	0.3247
2 minutes	87.8	6.52	86.1	6.78	0.1328
5 minutes	85.3	6.44	87.5	5.27	0.0286
10 minutes	78.9	5.44	79.5	5.25	0.5074
15 minutes	79.6	4.55	81.6	6.25	0.0321

Table-8 Mean arterial pressure in mmhg

Mean arterial pressure	Group A		Group B		P value
	Mean	SD	Mean	SD	
Pre intervention	96.4	4.53	94.4	6.10	0.0293
2 minutes	97.2	4.10	97.1	4.88	0.8958
5 minutes	94.5	5.20	95.4	5.37	0.3155
10 minutes	94.3	4.76	92.5	4.27	0.0199
15 minutes	93.8	4.78	91.6	5.45	0.0122s

From above results, heart rate and mean arterial blood pressure changes in both groups are statistically non significant.

Table-9 Quality of patients positioning

Quality of patients positioning	Group A	Percentage	Group B	Percentage	P value
0	0	0%	3	8.6%	0.2363
1	4	11.4%	6	17.1%	0.7337
2	10	28.6%	22	62.9%	0.0083
3	21	60%	4	11.4%	0.0001

Quality of patients positioning is significantly better in femoral nerve block group than intravenous fentanyl. So femoral nerve block has higher analgesic efficacy compared to intravenous fentanyl.

DISCUSSION:

Femur bone fracture surgeries are mostly operated under spinal

anaesthesia. Positioning for spinal anaesthesia is challenging due to severe pain during sitting positioning due to overriding of bone fragmentation. So analgesic procedure before giving spinal anaesthesia is useful to avoid pain during sitting positioning and to perform spinal anaesthesia procedure smoothly. In our study, femoral nerve block provides superior analgesia compare to intravenous fentanyl. This is supported by VAS score at rest and at movement in this group at 15 minutes is 2.37 ± 1.45 and 3.37 ± 1.55 (mean $\pm$ SD), higher patient satisfaction score and decrease time to perform spinal anaesthesia.

Melaku Bantie et al.^[1], comparing analgesic effect of intravenous fentanyl, femoral nerve block and fascia iliaca block during spinal anaesthesia, quality of patient positioning is higher in femoral nerve block group than intravenous fentanyl group which is similar to result in our study.

P Vandana Pakhare et al.^[4], comparison of IV fentanyl vs femoral nerve block to facilitate administration of subarachnoid block in sitting position for femur fracture surgery, VAS score at rest at 30 mins is 2.4 ± 1.65 and in our study vas score at 15 mins is 2.37 ± 1.45 . In our study vas score 2.4 achieved at 15 mins which may be due to higher concentration of lignocaine 1.5% used compared to 1% in comparative study.

Arissara Iamaroon et al.^[7] in this study, no significant difference in analgesic effect of intravenous fentanyl and femoral nerve block for positioning during spinal anaesthesia which is opposite to our study.

Haemodynamic parameters in our study are statistically non significant. Haemodynamic parameters remains stable during observation before giving spinal anaesthesia in both groups.

No adverse systemic toxicity of lignocaine such as seizure, arrhythmia or cardiovascular collapse seen in femoral nerve block group. No nausea, vomiting, respiratory depression seen in fentanyl group.

CONCLUSION

Both Femoral nerve block and intravenous fentanyl can be used for analgesia before giving sitting position for spinal anaesthesia. Femoral nerve block provides higher analgesic effect compare to intravenous fentanyl for giving sitting position for spinal anaesthesia in femur bone fracture surgeries.

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