IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 3 Ver.14 March. (2018), PP 39-55
www.iosrjournals.org

Ultrasound Guided Femoral Nerve Block versus Intravenous Fontanel - To Provide Analgesia for Positioning For Neuraxial Block in Patients with Fracture Shaft Femur

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Abstract: *Fracture femur is a particularly painful bone injury and requires surgical repair by internal fixation. Mostly neuraxial blockade in the form of spinal and epidural are used for performing the surgery and they provide excellent analgesia and relaxation of the thigh muscles. However the patient has to endure a lot of pain in the sitting position for performance of central neuraxial anaesthesia.Few studies have addressed this problem and comparison of various intravenous analgesic agents especially opioids with regional blocks have been done with varying results.In this study,intravenous injection Fentanyl 2µg/kg was compared with ultrasound guided femoral nerve block of the fractured limb.The results show that statistically both methods are comparable and there was no haemodynamic instability. However femoral block provided faster and denser analgesia unlike injection fentanyl which needed rescue analgesics and had mild side effects like pruritus and sedation. Hence ultrasound guided femoral nerve block is as good as intravenous injection of Fentanyl to achieve pain relief and facilitate sitting positioning for neuraxial block, in addition it has fewer side effects and does not require rescue analgesics.*

Date of Submission: 12-03-2018 Date of acceptance: 28-03-2018

I. Introduction

Relieving pain is one of the fundamental responsibilities of medical practitioners and is usually a primary goal of patients seeking medical care. Many published reviews have outlined this problem, some of that showing that upto 70% of patients receive ineffective, inadequate, unsatisfying or delayed pain relief.[1,2]

The femur is the longest, strongest, and heaviest tubular bone in the human body and one of the principal load bearing bones in the lower extremity.[3-6] The annual incidence of mid-shaft femur fractures is approximately 10 per 100,000 persons per year.[7]The majority of femur fractures occur in the proximal third. The incidence of femoral, particularly diaphyseal, fractures due to severe trauma is greatest in young men. Patients younger than 40 are more likely to sustain high energy trauma (eg, motor vehicle crash) and fracture the midshaft of the femur, while those over 40 are more likely to sustain low energy trauma (eg, fall) and fracture the proximal third of the femur.[8]

Displaced fracture are very painful and don't allow the patient to move. Fracture of femur is a particularly painful bone injury because its periosteum has lowest pain threshold of the deep somatic structure. Surgical repair most commonly involves internal fixation of the fracture. Patients with these fracture present special problems to the anaesthesiologist. These are subjected to major muscle forces that can deform the thigh and angulate the bone fragments, thus complicating the intraoperative reduction of the fracture. Therefore, complete paralysis of all the muscles acting on femur is mandatory.Mostly neuraxial blockade is used more frequently than general anesthesia for femoral fracture surgery[9,10].

Providing adequate pain relief not only increases comfort in these patients, but has also been shown to improve positioning for neuroaxial block. Intravenous analgesia and femoral nerve block are often used to help the patient to tolerate position. Among analgesics, NSAIDs, opioids, paracetamol etc. are generally used [11,12]. The use of narcotics for pain control must be balanced with their potentially deleterious consequences: namely respiratory depression, hypotension, and mental confusion. Regional anesthesia can possibly provide adjunctive or even alternative pain control that is both safe and effective.Femoral nerve blocks, using local anesthetics, have been described as a method to reduce pain and the requirement for systemic analgesia, specifically opioids.Ultrasound (US) can be used to precisely visualize the femoral neurovascular anatomy when performing a femoral nerve block.[13]

In this prospective randomized study feasibility and analgesic effect of ultrasound guidedfemoral nerve block was compared with intravenous fentanyl to facilitate sitting position for administration of combined spinal and epidural anaesthesia in patients who would undergo surgery for fracture shaft femur.

II. Material and Methods

Study design: This prospective randomized controlled study was conducted in the department of Anaesthesiology, Seth GS Medical College and KEM Hospital after institutionalethics committee approval and written informed consent of the patients.It was conducted over a period of one year between December 2013 and December 2014.Considering an alpha error of 5% and beta error of 15% a sample size of 64 patients undergoing surgery for fracture of femur shaft were selected.They were randomly allotted to one of two groups

Group A: In this group (n=32) ofpatient intravenous fentanyl 2 micrograms/kg was administered slowly 15 minutes before planned neuraxial blockade.

Group B: In this group (n=32) ofpatient ultrasonography guided femoral nerve block was performed 15 minutes before planned neuraxial blockade.

Inclusion criteria:

1. All patients undergoing surgeries for shaft femur fractures.
2. Age >18 years and <65 years.

Exclusion criteria:

1. Patients with poor GCS
2. Age <18 years and >65 years
3. Patients with liver and renal diseases
4. Patients with known local anesthetic allergy
5. Patient with bleeding tendencies and coagulopathy.

Study procedure:A pre-anaesthetic evaluation comprising of history of previous medical and surgical illnesses, previous anesthesia exposures, drug allergies and upper respiratory tract infection, clinical examination and baseline investigation of blood for complete blood count, renal function, liver function and coagulation profile, radiograph of the chest and electrocardiogram was done. Informed written consent was taken from the patient who was kept nil by mouth for eight hours prior to surgery.Pre-operative vital parameters in the form of baseline pulse and blood pressure were recorded.

Measurement of patient's pain scores using Visual Analogue Scale(VAS score)[14] before intervention at rest as well as at movements were noted. An 18-gauge intravenous cannula was inserted into forearm after applying standard monitoring (cardioscope, pulse oxymetry, and non-invasive blood pressure).According to the randomization they were allotted to one of the two groups

Group A patients received 2 microgram/kg intravenous fentanyl 15 minutes prior to positioning for neuroaxial block.

Group B patients received ultrasonography guided femoral nerve block 15 minutes prior to positioning for neuroaxial block.In this group, with the patient in supine position, the groin area of the fracture side was cleaned and draped under all sterile aseptic precautions.The anterior superior iliac spine and inguinal crease were identified and local anesthetic 2% lignocaine was infiltrated subcutaneously at the estimated site of needle insertion. The injection for the skin anaesthesia was shallow and in a line extending laterally to allow for more lateral needle reinsertion when necessary.

Ultrasound screen was placed on the opposite side of the patient bed from the side to be blocked.The anterior superior iliac spine and inguinal crease are identified. The ultrasound probe was cleaned and prepared with a sterile adhesive dressing across the probe contact surface. Keeping the probe transversely across the femoral region of the upper thigh roughly parallel to the inguinal crease, the femoral vessels were then identified and centered on the screen. Gentle compression with the probe collapses the femoral vein (medial) more easily than the artery (lateral). When desired, identification of the femoral vessels was confirmed by using color Doppler imaging. First the femoral artery was identified and centered on the screen, then followed the artery proximal to the inguinal ligament and distal to the takeoff of the profunda femoris artery. Proximal to this bifurcation, the femoral nerve appeared as a triangular or oval honeycomb structure 3-10 mm in diameter covered anteriorly by the hyperechoic fascia iliaca. After the femoral nerve and overlying fascia iliaca are identified, skin was penetrated with the needle bevel up about 1 cm lateral to the probe. The angle of entry depended on the target depth of the fascia iliaca. More shallow angles of entry improved needle visibility. The needle was advanced slowly, maintaining the shaft and tip in view at all times, targeted the hyperechoic fascia iliaca overly the iliopsoas muscle 1-3 cm lateral to the femoral nerve. Once beneath the fascia iliaca, aspiration to confirm the needle tip had not entered a vessel.A slowinjection of 3-5 mL of prepared local anesthetic was given. With the needle tip in view, the spread of hypoechoic injection was visualized in real time with superficial movement of the fascia iliaca toward the skin surface. After confirming optimal needle tip location, 20 ml of drug mixture (contain 0.375%of bupivacaine and 0.5% lignocaine) was administered. If at any point

the spread of local anesthetic was not visualized, intravascular injection was suspected and the procedure halted. During and after injection,the patient was examined for any sign of anesthetic toxicity such as perioral numbness, dizziness, or convulsions.

Successful blocks were associated with direct visualization of hypoechoic local anesthetic displacing the femoral nerve anteriorly, and subsequent tracking of anesthetic distally resulting in a donut-like pattern circumferentially surrounding the nerve. VAS score was assessed at every 5 minute interval for 30 min. A femoral block resulted in anaesthesia of the entire anterior thigh and most of the femur and knee joint.

If complication occurred in the form puncture of femoral artery; needle was immediately withdrawn and redirected. Side effects including nausea, retching, vomiting, respiratory depression, allergic reaction, hepatotoxicity etc. would be recorded. If indicated, side effects would be treated as required.

Patients were given sitting position 15 minute after our intervention for administration of central neuroaxial blockade.

If the patient's pain was greater than 4 according to VAS; rescue analgesic in the form of intravenous tramadol 1 mg/kg was used. The time of rescue analgesia, if required during study duration was recorded.

III. Result and Analysis

This study consists of 64 patients who are randomly distributed in two groups of ultrasonography guided femoral nerve block and intravenous fentanyl and data collected. Data is analyzed using an SPSS 13.0 software package. Parametric variables are described as mean ± SD; qualitative variables are described as number (percentage) and as median. Fisher exact test and Mann-Whitney U tests are used as appropriate to compare the two groups.

The p value less than 0.05 is considered statistically significant.

Table 1:shows age distribution in GroupA(Fentanyl) and GroupB (Femoral Block)

Age distribution	GroupA Fentanyl	GroupB Femoral block
18-25 years	9	13
26-35 years	10	4
36-45 years	4	5
46-55 years	1	3
56-65 years	8	7

Table 2: Comparison of mean age in GroupA(Fentanyl) and GroupB (Femoral Block)

	GroupA Fentanyl	GroupB Femoral block	Test	P value, interpretation
Mean age (in years)	37.34+16.48	36.81±16.51	Mann Whitney test	0.99. The mean age between the two groups is comparable.

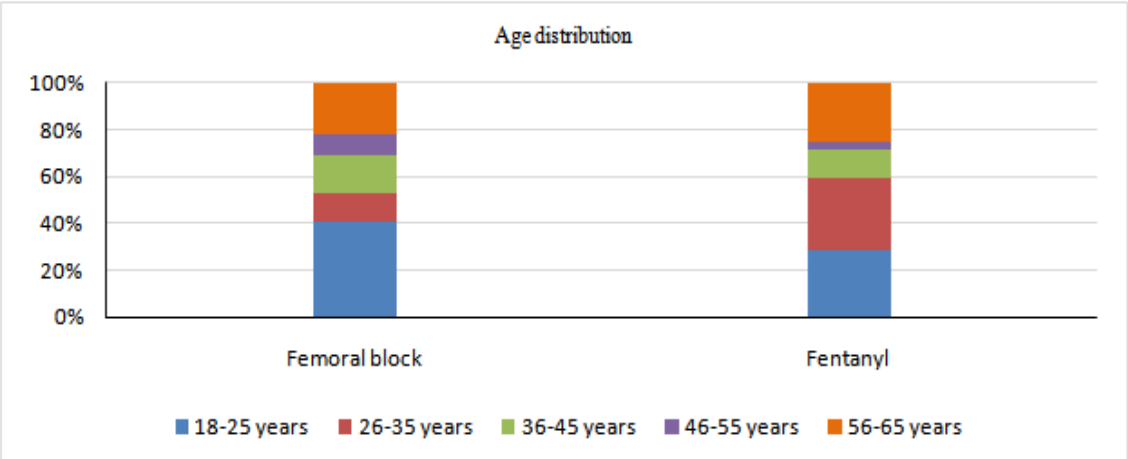


Figure 1: Age distribution in groupA(fentanyl) and groupB(emoral block)

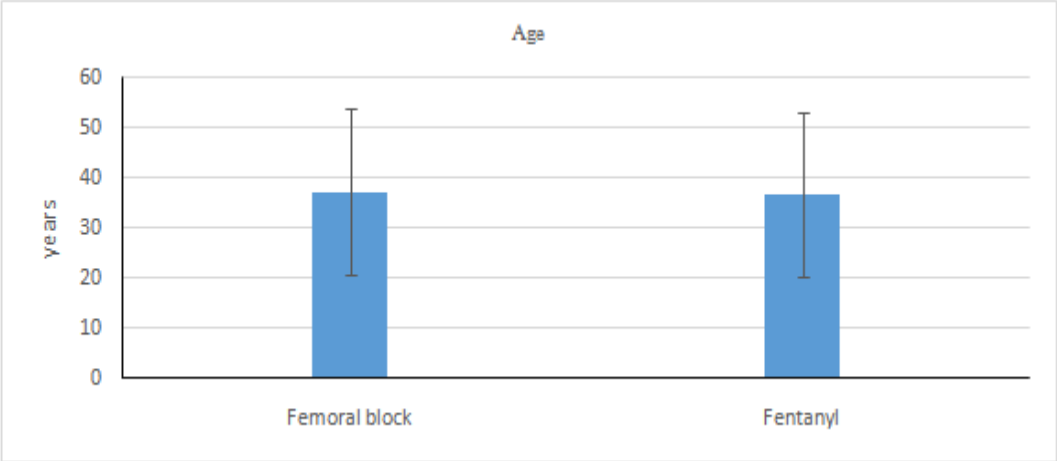


Figure 2: Comparing mean age ingroupA(fentanyl) and groupB(femoral block).
Mann Whitney test comparison shows p value >0.05 hence difference in the age distributionbetween the two groups is insignificant

Table 3: shows sex distribution in group A(fentanyl) and groupB(femoral block)

	GroupAFentanyl	GroupBFemoral Block	Test	P value interpretation
Sex distribution	M: 27 F: 5	M: 26 F: 6	**Fisher's exact test**	P>1.0. The sex distribution between the two groups is insignificantly different.

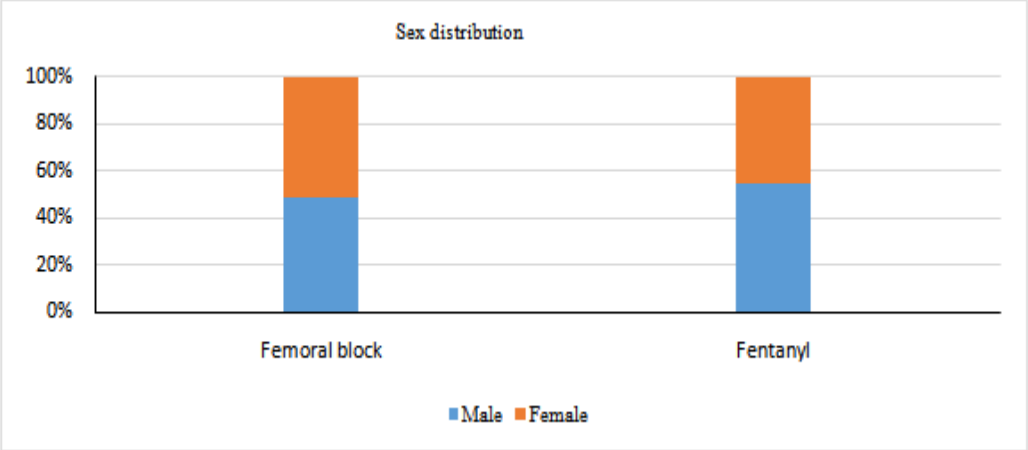


Figure3: sex distribution in group A(fentanyl) and groupB(femoral block)
Mann Whitney test comparison shows p value >0.05 hence difference in the sex distribution between the two groups is insignifi

Table 4:shows comparison of heart rate in groupA(fentanyl) and groupB(femoral block) pre and post intervention period.

Intervention(In)	GroupA(Fentanyl)	GroupB(Femoral block)	p value	Interpretation
Pre In HR	89.81 ± 8.38	85.81 ± 7.98	0.093	Comparable
PostIn HR 5min	89.12 ± 6.09	86.75 ± 7.53	0.161	Comparable.
PostIn HR 10min	86.34 ± 5.80	84.18 ± 5.88	0.231	Comparable.
PostIn HR 15min	83.25 ± 5.44	79.75 ± 5.62	0.014	Significantly higher

				in fentanyl group.
PostIn HR 20min	82.43 ± 5.14	76.84 ± 4.84	0.00	Significantly higher in fentanyl group.
PostIn HR 25min	81.65 ± 5.00	75 ± 4.47	0.00	Significantly higher in fentanyl group
PostIn HR 30min	82.06 ± 4.71	74.81 ± 5.29	0.00	Significantly higher in fentanyl group.

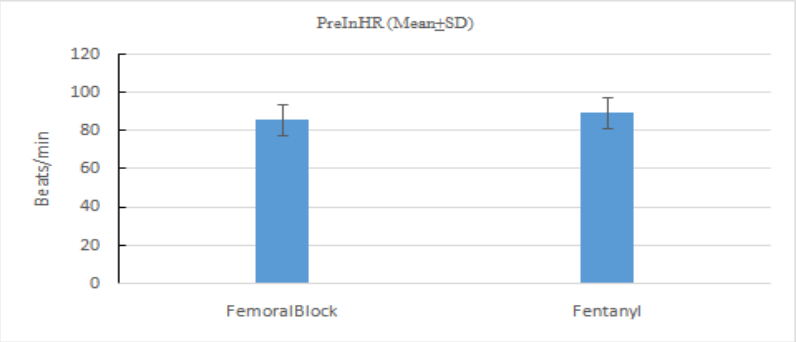


Figure4:Pre-intervention heart rates in groupA(fentanyl) and groupB(femoralblock) are expressed as bar diagrams for each group

Mann Whitney test comparison shows p value >0.05 hence difference in the pre-intervention heart rate between the two groups is insignificant

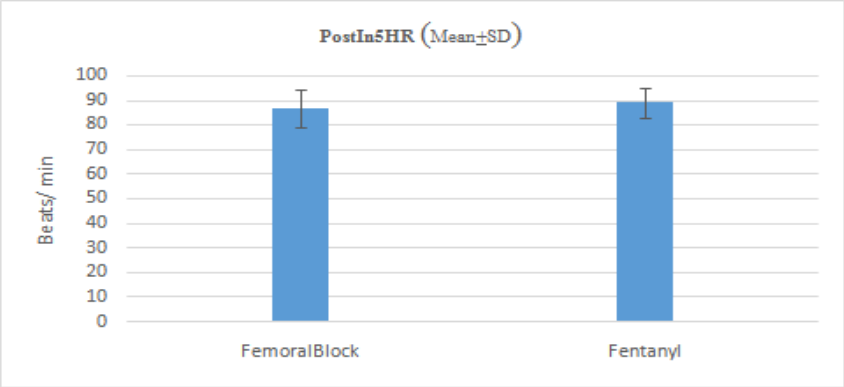


Figure5: Post-intervention heart rates at 5 min are expressed as bar diagrams for groupA(fentanyl) and groupB(femoralblock).

Mann Whitney test comparison shows p value >0.05 hence difference in the heart reate at 5 minutes post intervention is insignificant

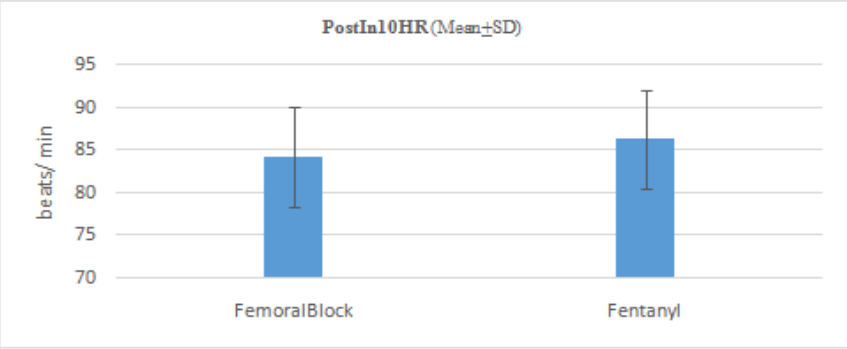


Figure6: Post-intervention heart rates at 10 min are expressed as bar diagrams for groupA(fentanyl) and groupB(femoralblock).Mann Whitney test comparison shows p value >0.05 hence difference in the heart reate at 10 minutes post intervention is insignificant

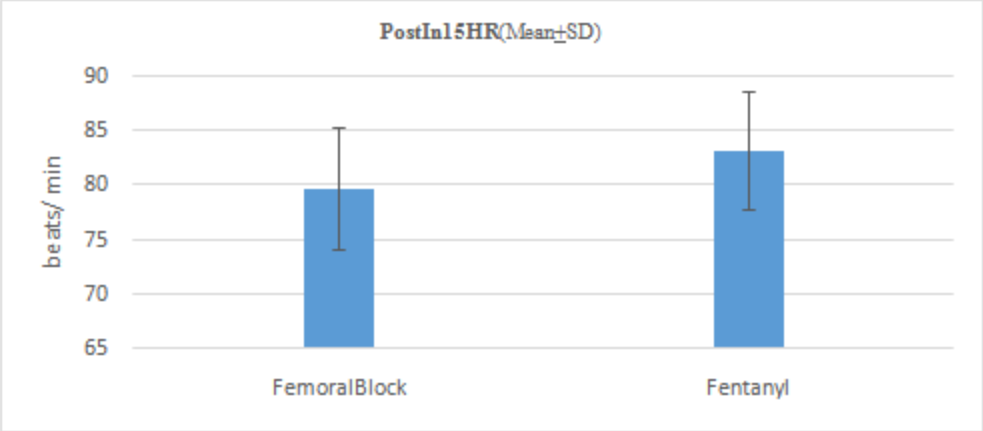


Figure7: Post-intervention heart rates at 15 min are expressed as bar diagrams for groupA(fentanyl) and groupB(femoralblock).
Mann Whitney test comparison shows p value <0.05 hence difference in the heart reate at 15 minutes post intervention is significant.

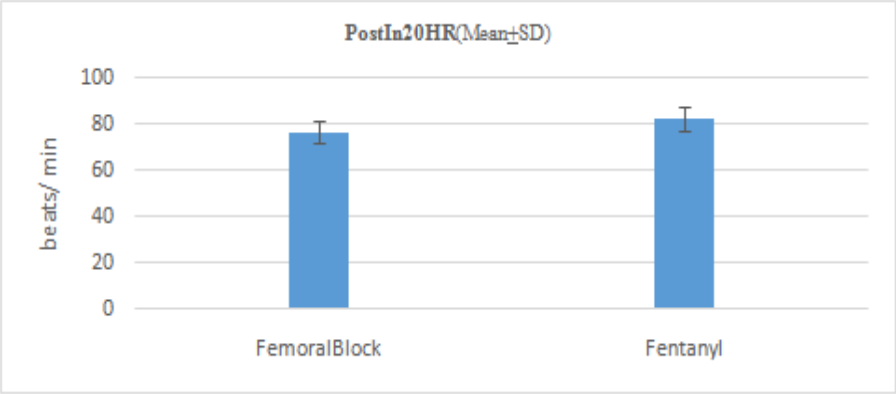


Figure8: Post-intervention heart rates at 20 min are expressed as bar diagrams for groupA(fentanyl) and groupB(femoralblock).
Mann Whitney test comparison shows p value <0.05 hence difference in the heart rate at 20 minutes post intervention is significant

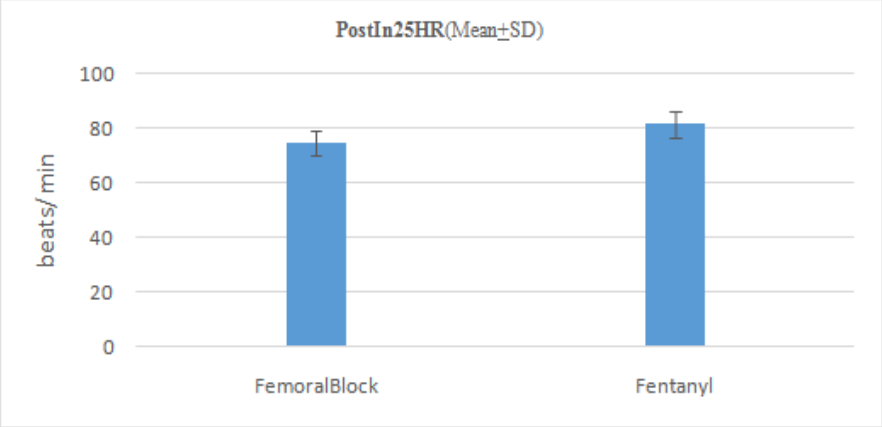


Figure 9: Post-intervention heart rates at 25 min are expressed as bar diagrams for groupA(fentanyl) and groupB(femoralblock).
Mann Whitney test comparison shows p value <0.05 hence difference in the heart rate at 25 minutes post intervention is significant.

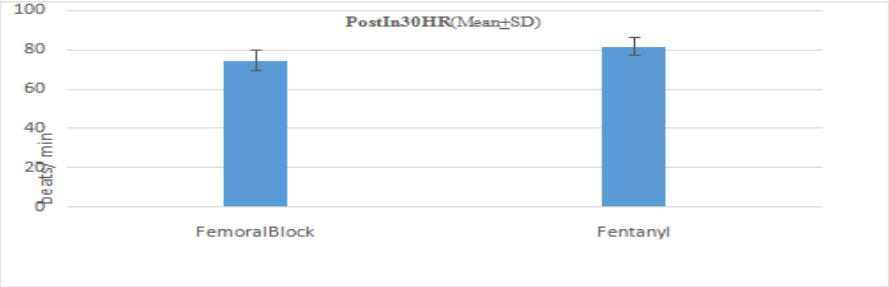


Figure10: Post-intervention heart rates at 30 min are expressed as bar diagrams for groupA(fentanyl) and groupB(femoralblock).
Mann Whitney test comparison shows p value <0.05 hence difference in the heart rate at 30 minutes post intervention is significant.

Table 5: shows comparison of systolic blood pressure(BPS) in groupA(fentanyl) and groupB(femoral block) pre and post intervention period

Intervention	GroupA(Fentanyl)	GroupB(Femoral block)	p value	Interpretation
PreIn BPS	133.31 ± 58.75	130.62 ± 7.44	0.277	Comparable.
PostIn 5min BPS	129.46 ± 8.09	129.903 ± 6.75	0.817	Comparable.
PostIn 10min BPS	127.5 ± 6.82	127.78 ± 7.49	0.565	Comparable.
PostIn 15min BPS	125.34 ± 6.18	124.93 ± 6.81	0.735	Comparable.
PostIn 20min BPS	123.68 ± 7.06	123.31 ± 8.15	0.824	Comparable
PostIn 25min BPS	123 ± 6.50	123 ± 7.31	0.935	Comparable
PostIn 30min BPS	123.90 ± 5.41	122.28 ± 7.73	0.361	Comparable

Mann whitney test comparison of systolic blood pressure in groupA(fentanyl) and groupB(femoralblock) in pre and post intervention period shows p>0.05and hence shows insignificant difference

Table 6: shows comparison of diastolic blood pressure(BPD) in groupA(fentanyl) and groupB(femoral block) pre and post intervention period

Intervention	Femoral block	Fentanyl	p value	Interpretation
PreIN BPD	78.62 ± 5.22	78.56 ± 5.22	0.895	Comparable.
PostIn 5min BPD	78.75 ± 4.37	78.87 ± 3.54	0.764	Comparable.
PostIn 10min BPD	77.12 ± 4.03	77.06 ± 3.68	0.753	Comparable.
PostIn 15min BPD	76.87 ± 4.21	76.34 ± 4.76	0.806	Comparable.
PostIn 20min BPD	76.56 ± 4.93	75.31 ± 5.02	0.156	Comparable
PostIn 25min BPD	76.59 ± 5.23	75.43 ± 3.81	0.065	Comparable
PostIn 30min BPD	76 ± 7.87	74.68 ± 3.84	0.15	Comparable

Mann whitney test comparison of diastolic blood pressure in groupA(fentanyl) and groupB(femoralblock) in pre and post intervention period shows p>0.05and hence shows insignificant difference

Table 7: shows comparison of SPO_2(pulse oximetry)between groupA(fentanyl) and groupB(femoralblock) in pre intervention and post intervention period

	Fentanyl	Femoral Block	p value	Interpretation
PreIn SPO2	100	100	1	Comparable.
PostIn 5min SPO2	100	100	1	Comparable.
PostIn 10min SPO2	100	100	1	Comparable.
PostIn 15min SPO2	100	100	1	Comparable.
PostIn 20min SPO2	100	100	1	Comparable
PostIn 25min SPO2	100	100	1	Comparable
PostIn 30min SPO2	100	100	1	Comparable

Mann whitney test compararison of SPO_2 in groupA(fentanyl) and groupB(femoralblock) in pre and post intervention shows p>0.05 and hence there is no difference between both the groups

Table 8:shows pre and post intervention VAS(visual analog score) score at rest(nomovement of fractured limb) in groupA(fentanyl) and groupB(femoralblock)

	groupA(Fentanyl)	groupB(Femoral block)	p value	Interpretation
PreIn VAS Rest	8.56 ± 1.21	8.90 ± 0.53	0.161	Comparable
PostIn 5min VASRest	7.03 ± 0.96	6.15 ± 1.32	0.002	Significantly higher in the fentanyl group
PostIn 10min VASRest	5.46 ± 0.98	4.18 ± 0.89	0.00	Significantly higher in the fentanyl group
PostIn 15min VASRest	4.34 ± 0.70	2.59 ± 0.79	0.00	Significantly higher in the fentanyl group
PostIn 20min VASRest	4.09 ± 0.68	1.84 ± 0.72	0.00	Significantly higher in the fentanyl group
PostIn 25min VASRest	4.06 ± 0.66	1.65 ± 0.70	0.00	Significantly higher in the fentanyl group
PostIn 30min VASRest	4.06 ± 0.66	1.59 ± 0.71	0.00	Significantly higher in the fentanyl group

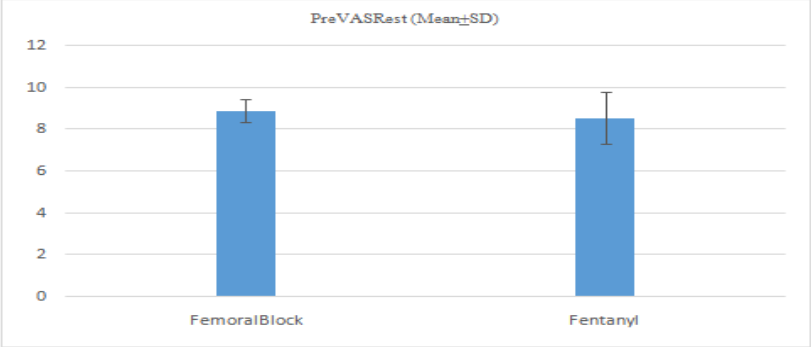


Figure11: pre-intervention VAS(visual analog score) score at rest(nomovement of fractured limb) in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score between groupA(fentanyl) and groupB(femoral block) in pre-intervention period shows p>0.05 and hence is comparable

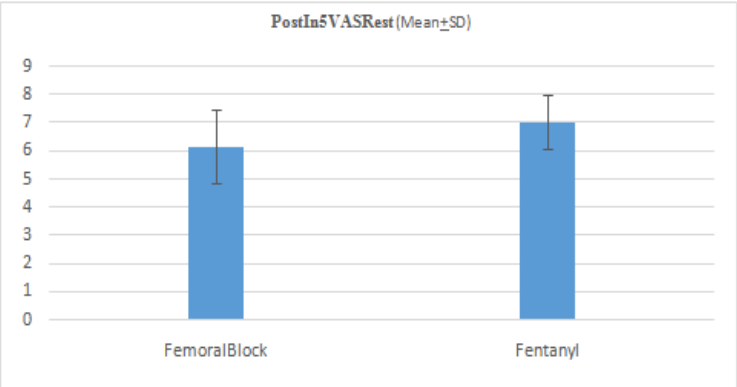


Figure12: post—intervention 5minute VAS(visual analog score) score at rest(nomovement of fractured limb) in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score between groupA(fentanyl) and groupB(femoral block) at 5 minutes post-intervention period shows p<0.05 and hence the difference is significant.

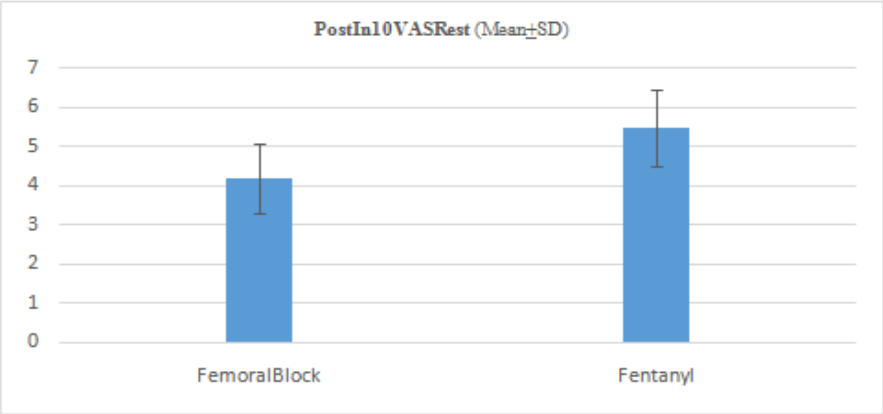


Figure13: post—intervention 10 minute VAS(visual analog score) score at rest(nomovement of fractured limb) in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score between groupA(fentanyl) and groupB(femoral block) at 10 minutes post-intervention period shows $p<0.05$ and hence the difference is significant.

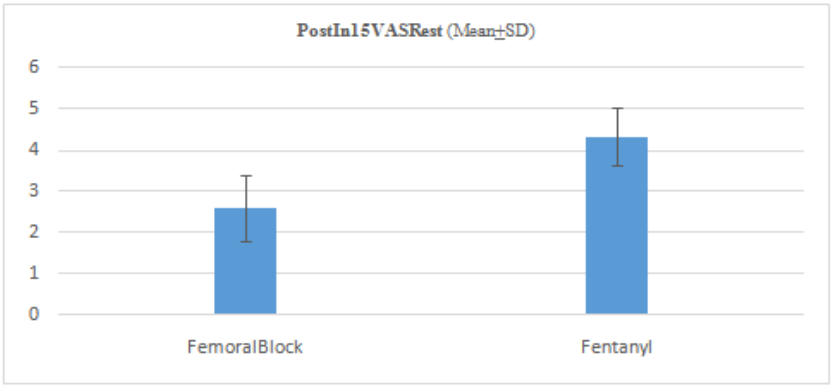


Figure14: post—intervention 15 minute VAS(visual analog score) score at rest(no movement of fractured limb) in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score between groupA(fentanyl) and groupB(femoral block) at 15 minutes post-intervention period shows $p<0.05$ and hence the difference is significant.

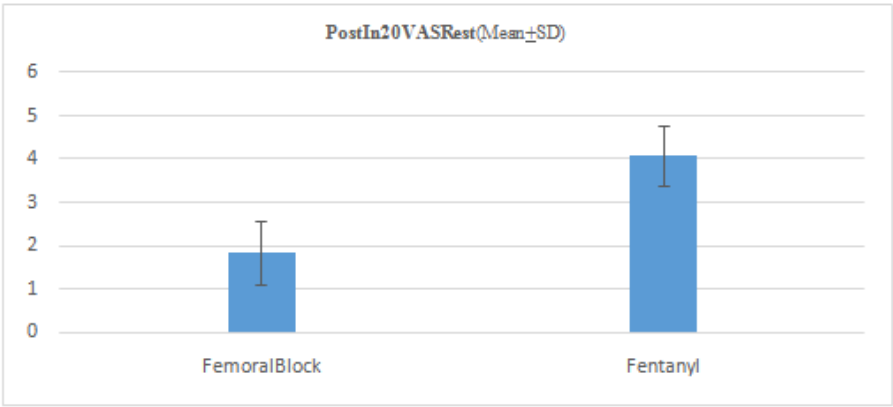


Figure15: post—intervention 20 minute VAS(visual analog score) score at rest(no movement of fractured limb) in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score between groupA(fentanyl) and groupB(femoral block) at 20 minutes post-intervention period shows $p<0.05$ and hence the difference is significant.

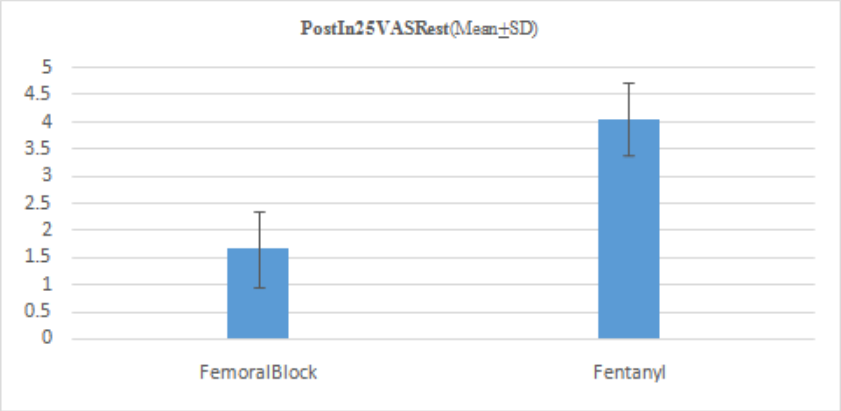


Figure16: post—intervention 25 minute VAS(visual analog score) score at rest(no movement of fractured limb) in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score between groupA(fentanyl) and groupB(femoral block) at 25 minutes post-intervention period shows $p<0.05$ and hence the difference is significant.

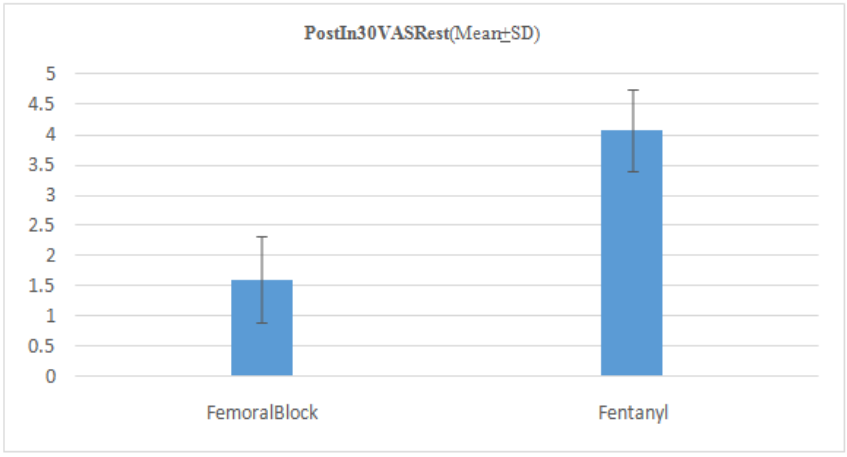


Figure17: post—intervention 30 minute VAS(visual analog score) score at rest(no movement of fractured limb) in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score between groupA(fentanyl) and groupB(femoral block) at 30 minutes post-intervention period shows $p<0.05$ and hence the difference is significant.

Table 9: shows pre and post intervention VASMov(visual analog score) score at movement of fractured limb in groupA(fentanyl) and groupB(femoralblock)

	GroupA(Fentany)l	GroupB(Femoral block)	p value	Interpretation
PreIn VASMov	9.6251.18	10	0.041	Comparable
PostIn 5min VASMov	8.03 ± 0.93	7.21 ± 1.38	0.002	Significantly higher in the fentanyl group
PostIn 10min VASMov	6.81 ± 0.93	5.43 ± 0.94	0.00	Significantly higher in the fentanyl group
PostIn 15min VASMov	5.59 ± 0.75	3.56 ± 0.94	0.00	Significantly higher in the fentanyl group
PostIn 20min VASMov	5.09 ± 0.73	2.59 ± 0.66	0.00	Significantly higher in the fentanyl group
PostIn 25min VASMov	4.96 ± 0.69	2.21 ± 0.49	0.00	Significantly higher in the fentanyl group
PostIn 30min VASMov	4.96 ± 0.69	2.15 ± 0.51	0.00	Significantly higher in the fentanyl group

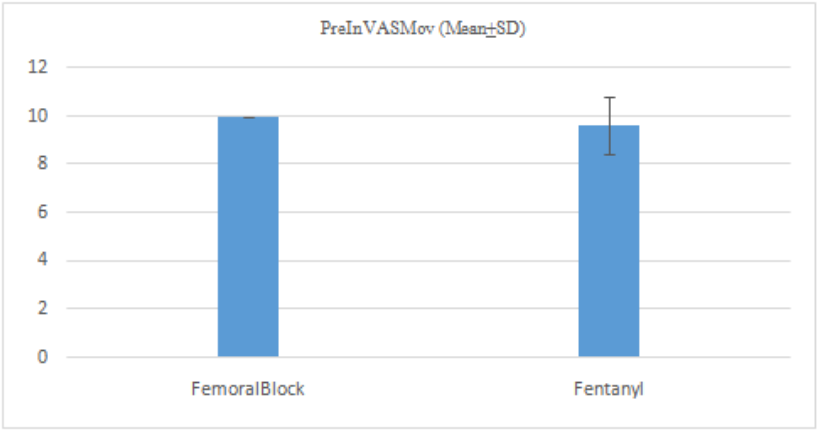
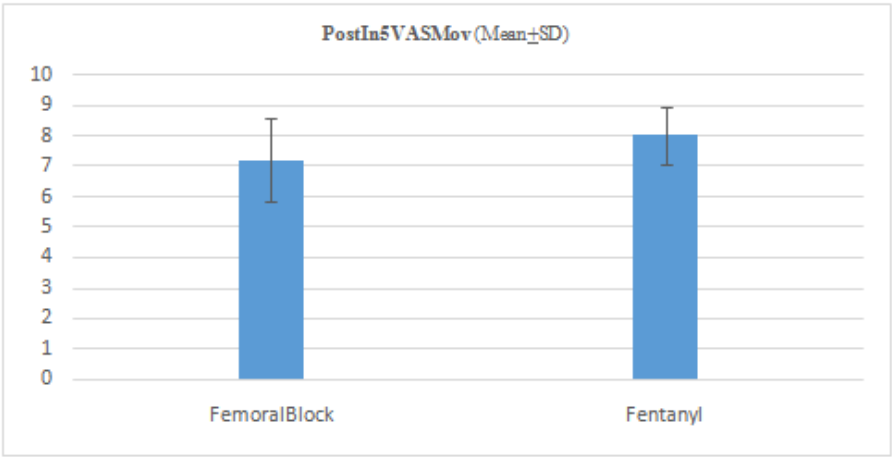


Figure18: pre-intervention VAS(visual analog score) score at movement of fractured limb in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing comparison of VAS score at movement of fractured limb between groupA(fentanyl) and groupB(femoral block) shows $p>0.05$ and hence the difference is insignificant.



.Figure19: post-intervention 5 minute VASmov(visual analog score) score at movement of fractured limb in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score on movement of fractured limb between groupA(fentanyl) and groupB(femoral block) at 5 minute post-intervention period shows $p<0.05$ and hence the difference is significant

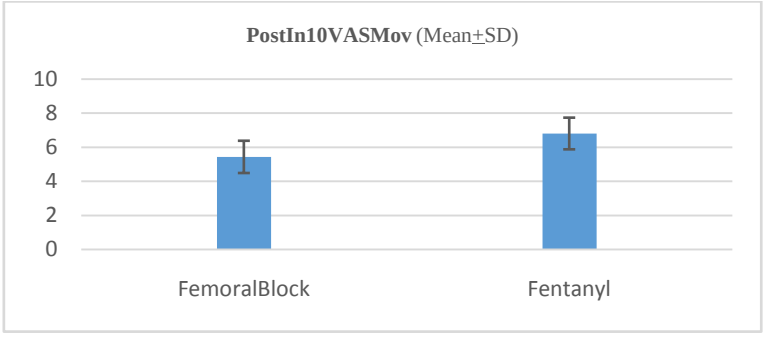


Figure20: post-intervention 10 minute VASmov(visual analog score) score at movement of fractured limb in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score on movement of fractured limb between groupA(fentanyl) and groupB(femoral block) at 10 minute post-intervention period shows $p<0.05$ and hence the difference is significant.

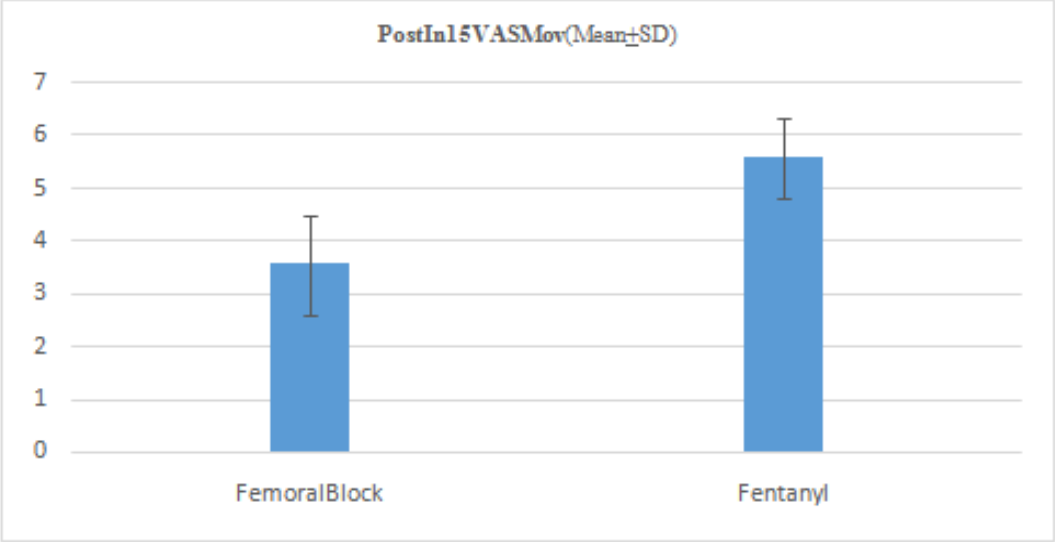


Figure21: post-intervention 15 minute VASmov(visual analog score) score at movement of fractured limb in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score on movement of fractured limb between groupA(fentanyl) and groupB(femoral block) at 15 minute post-intervention period shows $p<0.05$ and hence the difference is significant.

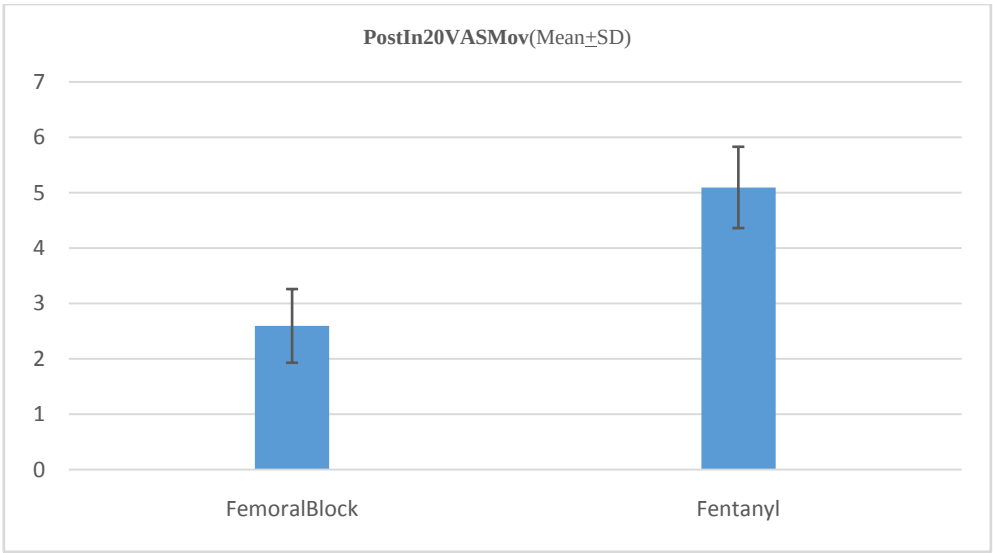


Figure22: post-intervention 20 minute VASmov(visual analog score) score at movement of fractured limb in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score on movement of fractured limb between groupA(fentanyl) and groupB(femoral block) at 20 minute post-intervention period shows $p<0.05$ and hence the difference is significant.

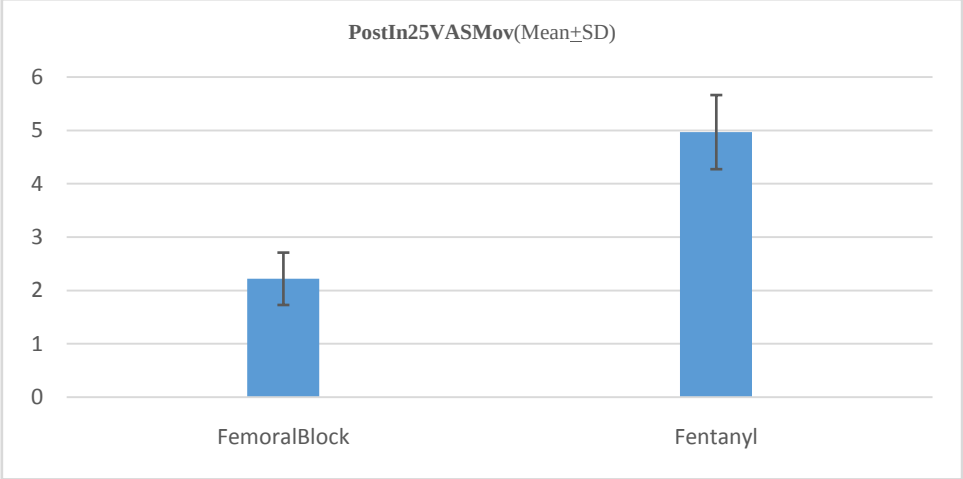


Figure23: post-intervention 25 minute VASmov(visual analog score) score at movement of fractured limb in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score on movement of fractured limb between groupA(fentanyl) and groupB(femoral block) at 25 minute post-intervention period shows $p<0.05$ and hence the difference is significan

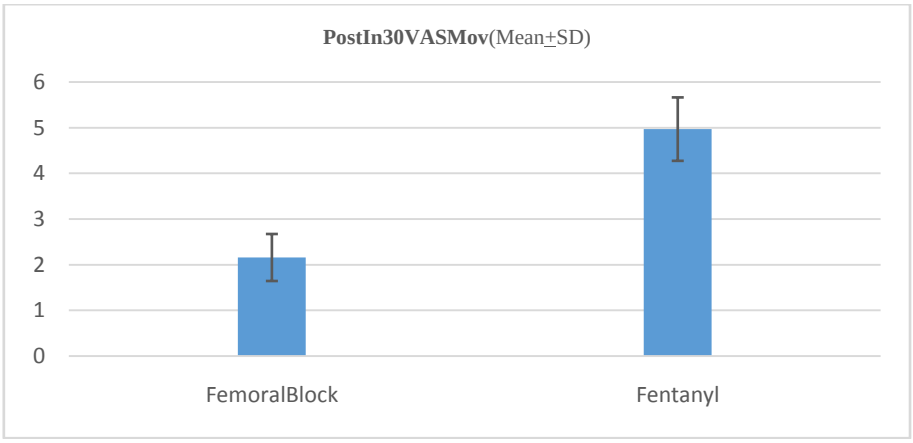


Figure24: post-intervention 30 minute VASmov(visual analog score) score at movement of fractured limb in groupA(fentanyl) and groupB(femoralblock)

Mann Whitney testing of VAS score on movement of fractured limb between groupA(fentanyl) and groupB(femoral block) at 30 minute post-intervention period shows $p<0.05$ and hence the difference is significant.

Rescue analgesia and side effects:5 patients showed break through pain in fentanyl group and required additional analgesics where as in femoral block no additional analgesic were required.Side effects like pruritus and mild sedation were noted in 4 patients in fentanyl group but none in femoral block group

Table10:shows rescue analgesia requirements post-intervention in groupA(fentanyl) and groupB(femoralblock)

	Fentanyl	Femoral block	Test applied	P value, interpretation
Rescue analgesia	Yes: 5 No: 27	Yes: 0 No: 32	**Fisher's Exact Test**	0.052. The need for rescue analgesia is not significantly different between the 2 groups.

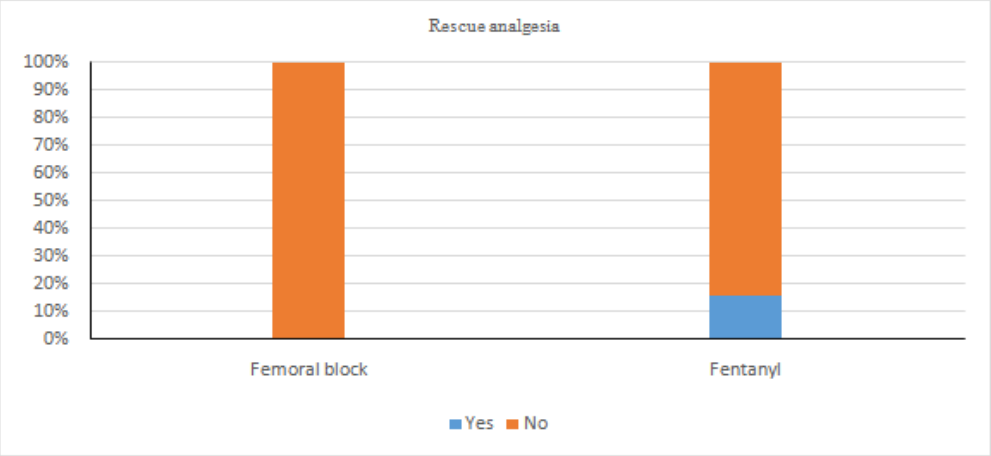


Figure25: comparison of rescue analgesia requirements by Fisher's Exact Test of groupA(fentanyl) and groupB(femoralblock) shows a p value > 0.05 and hence the difference is not significant

Trends charts

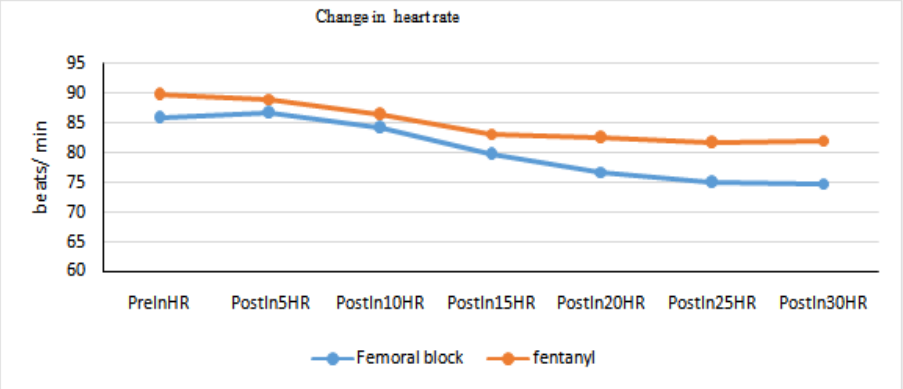


Figure26: trends of heart rate changes in groupA(fentanyl) and groupB(femoralblock) during the intervention

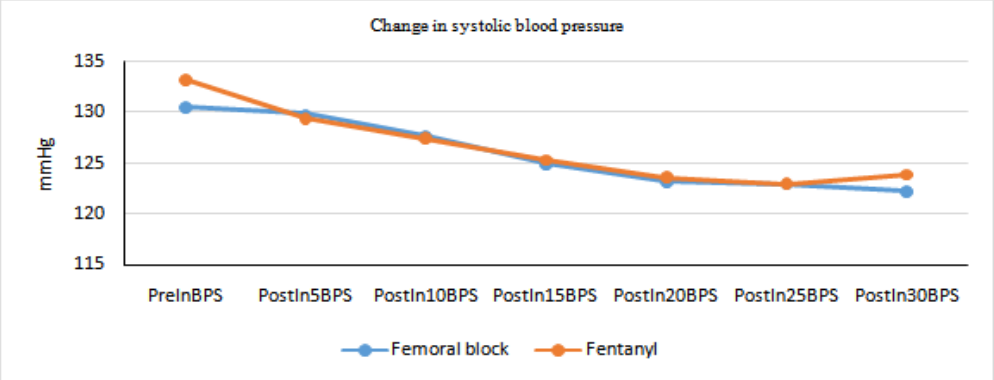


Figure27: trends of systolic blood pressure changes in groupA(fentanyl) and groupB(femoralblock) during the intervention

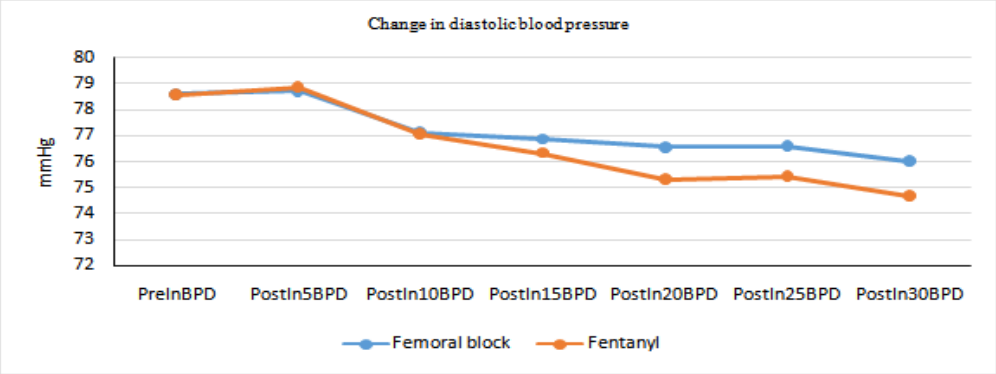


Figure28: trends of diastolic blood pressure changes in groupA(fentanyl) and groupB(femoralblock) during the intervention.

IV. Discussion

Femur bone fractures are particularly painful and do not allow the patient to move. Hence, sitting position for central neuraxial anaesthesia requires pre-emptive analgesia in the form of intravenous analgesics or nerve blocks.

Salvatore Sia, MD, Francesco Pelusio, MD]et al[15] studied- "Analgesia before performing a spinal block in sitting position in patient with femoral shaft fracture: a comparison between femoral nerve block and intravenous fentanyl". They concluded that femoral nerve block is more advantageous than IV administration of fentanyl to facilitate the sitting position for spinal anesthesia in patients undergoing surgery for femoral shaft fractures.

Mutty CE, Jensen EJ et al[16] studied efficacy of femoral nerve block for diaphyseal and distal femoral fractures in µemergency department in pain management. They found that the acute pain of a diaphyseal or distal femoral fracture can be significantly decreased using femoral nerve block, which can be administered safely in the hospital emergency department.

Arissara Iamaroon, Manee Raksakietisak, Pathom Halilmien et al[17] studied "Femoral nerve block versus fentanyl: Analgesia for positioning patients with fractured femur." They were unable to demonstrate significant benefit of femoral nerve block over IV fentanyl in positioning for spinal block. They found femoral nerve block provides good postoperative analgesia and side effects were less in block than IV fentanyl.

Our study was a prospective, randomized study in which the feasibility and analgesic effect of femoral nerve block and IV fentanyl were compared to facilitate sitting positioning for central neuraxial anaesthesia . Here 64 patients were randomly divided in 2 groups. 15 minutes prior to giving sitting position: group-A received intravenous fentanyl 2µg/kg, group-B was administered ultrasound guided femoral nerve block. Pain score in the form of visual analogue scale was noted.Changes in vital parameters before and after intervention for pain relief were noted.

Demographic data

In our study, demographic data (age, sex) was comparable in both groups.(table 1,2,3)

The age of cases were ranging from 18 to 65 years with the mean for group A (femoral nerve block) was 37.34+16.48 and mean for group B (IV fentanyl) was 36.81+16.51 which is not statistically significant (table 2).

Out of 32 patients in group A, 26 were males and 6 were females. In group B, 27 were males and 5 were females. This was also statistically not significant (figure1,2,3).

Haemodynamic parameters

In this study we also aimed to compare the hemodynamic changes occurring in the two different interventions. It was found that there was a slight decrease in heart rate after 10 minutes of femoral nerve block as well as after intravenous fentanyl, but the significant difference was seen after 15 minutes in both groups (table 4)(figure4,5,6,7,8,9,10). SPO_2 was maintained in both the groups(table7), systolic and diastolic blood pressure changes were comparable in both the groups.(table5,6)

Pain score

Parker et al[9]reported that nerve blocks reduce pain score and analgesic requirements.

Gosavi et al[18] assessed pain during change of position from supine to sitting after femoral nerve block with lidocaine; VAS scores were 2.7 ± 1.1.

Mosaffa et al[19]compared IV fentanyl with fascia iliaca block using lidocaine. VAS values during placement in the lateral decubitus position were lower in fascia iliaca block group [0.5(0-1) versus 4 (2-6) for fascia iliaca block and IV fentanyl, respectively].

Sia et al[15] compared IV fentanyl with femoral nerve block using lidocaine. VAS values during placement in the sitting position were lower in the femoral nerve block group (0.5 ± 0.5 versus 3.3 ±1.4 for femoral nerve block group and IV fentanyl, respectively).

Schiferer et al[20] demonstrated that femoral nerve block provided analgesia after femur bone trauma was adequate for patient transport.

In our study, Mann Whitney test comparison is used for statistical analysis as VAS score is ordinal data. Mean rank of VAS score on movement of fractured limb in femoral nerve block after 10 minutes is 4.18 + 0.89 and IV fentanyl group 5.46 + 0.98 (table 9)(figure20). This shows that onset of analgesia starts after 5 minutes in case of femoral nerve block while peak of analgesia was found after 20 minutes.With the use of IV fentanyl, VAS score started decreasing after 10 minutes and peak action was after 15 minutes.

It was found that analgesic effect of femoral nerve block was better than that produced by IV fentanyl but this is not statistically significant. The analgesic effect and the paralysis of the quadriceps allowed better patient positioning and a shorter neuraxial blockade performance time in group femoral nerve block with more patient satisfaction. The administration of femoral nerve block is also more useful when the anaesthetic procedure is expected to be more complex than a simple spinal anaesthesia (e.g. placement of an epidural or lumber plexus catheter or spinal abnormalities), where the patient have to stay in the sitting position for a longer time. Besides the excellent analgesic effect, the procedure used in femoral nerve block group shows a high feasibility. Femoral nerve block was easy to perform, even when patient's legs were placed in traction. The onset of the analgesic effect produced by the femoral nerve block was rapid. For very rapid action of femoral nerve block, 0.5% lignocaine was added. The placement of spinal block was easier and faster in femoral nerve block than in IV fentanyl group. The only disadvantage noted in femoral nerve block group was the additional cost for needle, local anaesthetic mixture and need of USG machine.

Rescue analgesics and side effects

Arissara Iamaroon, Manee Raksakietisak, Pathom Halilmien et al[17] studied Femoral nerve block versus fentanyl: Analgesia for positioning patients with fractured femur. They found no difference between two groups and required rescue analgesic in the form of 0.5 µg/kg IV fentanyl. They gave reason that they compared it for 15 minutes which is very short time to compare.

In our study, we compared all groups for 30minutes. And at the end of 30 minutes, if VAS score is more than 4, then rescue analgesia is given in the form of injection tramadol 1mg/kg. it is found that in femoral nerve block group no rescue analgesia is required, and in IV fentanyl group rescue analgesia was required in 5 patients, but this is not statistically significant (p value 0.052) using Fisher's Exact Test (table 10)(figure25)

No adverse systemic toxicity of bupivacaine and lignocaine, such as seizure, arrhythmia or cardiovascular collapse was noted in the femoral nerve group. Neither vascular puncture nor paresthesia occurred. No complications, such as hematoma, infection or persistent paresthesia were observed within 24 hours after the operation. In IV fentanyl group there was mild pruritus and mild sedation, but no active intervention was needed for this.

In this study we were unable to demonstrate a benefit of femoral nerve block over IV fentanyl for patient positioning before spinal block. However, femoral nerve block can provide postoperative pain relief, whereas side effects of fentanyl must be considered. It is found that femoral nerve block gives excellent analgesia for positioning to give neuraxial blockade in proximal femur surgeries

V. Conclusion

Both, the femoral nerve block and intravenous fentanyl provide good analgesia and hemodynamic stability during positioning in patients with fracture femur.Time of onset of analgesic effect is faster and less side effects seen in ultrasound guided femoral nerve block as compare to intravenous fentanyl.

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