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RESEARCH ARTICLE

A COMPARATIVE EVALUATION OF FEMORAL NERVE BLOCK AND INTRAVENOUS FENTANYL FOR POSITIONING DURING SPINAL ANAESTHESIA IN SURGERY OF FEMUR FRACTURE

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Abstract

Background: Femur surgeries are very common surgeries. Regional anaesthesia is common for that. Giving position for it is a real task for an anaesthetist. This challenge can be overcome by giving Femoral nerve block. Ultrasonography guided blocks are getting famous in last 5 years. We have studied USG guided femoral nerve block for positioning for spinal anaesthesia in fracture femur patients.

Methods:

This study was conducted at tertiary care hospital on 60 elective patients posted for elective femur fracture surgeries, with ASA grade I and II, in age group of 18-70 years. The patients were randomly divided into 2 groups – Group FNB and Group FENT.

In FNB group, patients received USG guided FNB 15 minutes prior to positioning with 15 ml, 1.5 % lignocaine with Adrenaline. In FENT group, patients received injection fentanyl 1 µg/kg IV 15 minutes prior to positioning for SA. Both the groups were evaluated for Hemodynamic changes, VAS score, Rescue requirements of fentanyl aliquots, Performance time, Patient's satisfaction, Anaesthetist's satisfaction and Perioperative complications.

Results: Both the groups were comparable with respect to age, gender, ASA grade, HR and MAP. In our study, **Hemodynamic stability** was observed in both groups.

VAS Score was lesser in Group FNB (0.93±0.87 mins) compared to Group FENT (1.72±1.09 mins) prior to positioning for SA (p value <0.003).

Rescue requirement of fentanyl aliquots for positioning

It was less in Group FNB (0.06±0.25 mins) compared to Group FENT (0.34±0.61 mins) (p value <0.02).

Performance time was shorter in Group FNB (15.33±1.27 mins) compared to Group FENT (16.72±3.07 mins) (p value <0.02).

Patient's satisfaction was less in Group FENT as compared to Group FNB. (p value < 0.03).

Anaesthetist's satisfaction was less in Group FENT as compared to Group FNB. (p value < 0.02).

Perioperative complications: In FNB group out of 30 patients, 1 patient had shivering. In FENT group out of 30 patients, 2 patients had shivering and 1 patient had hypotension.

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Conclusion: US guided femoral nerve block is more advantageous than IV fentanyl for position of fracture femur patients.

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Introduction:-

Fracture femur is one of the common fractures following trauma in all age groups which causes severe pain and distress. So any overriding of the fracture ends is extremely painful and any movement of the patient leads to severe pain and that makes positioning patients with fractured femur challenging. So providing adequate pain relief not only increases comfort in these patients but has also been shown to improve positioning and decrease time for spinal block.⁽¹⁾

Central neuraxial block such as subarachnoid block is the preferred and universally accepted technique for providing anesthesia and muscle paralysis for surgeries of fracture femur.⁽¹⁾ It provides less morbidity, less chances of vein thrombosis and less mortality are the main advantages of this technique over general anesthesia. During central neuraxial block ,proper positioning is the most important factor. So multiple modalities like Fascia iliaca compartment block(FICB), Femoral nerve block with local anesthetics and Intravenous analgesia with opioids, midazolam, ketamine, propofol, fentanyl have been advocated to reduce the pain preoperatively and improve positioning of the patient before SA.⁽³¹⁾

The management of acute pain combines the use of systemic opioids, paracetamol and non-steroidal antiinflammatory drugs. Fentanyl is a lipophilic opioid stronger than morphine. It was developed 40 years ago for parenteral administration because due to a fast first-pass metabolism, oral administration is not available. Fentanyl belongs to phenylpiperidine family and is 50-100 times more potent than morphine. It can provide cardiovascular stability even in sick patients, but there is a direct concentration-effect relation between the fentanyl and respiratory depression. Doses higher than 2 µg/mL are associated with clinically significant respiratory depression.⁽³³⁾

Femoral nerve block is a safe, simple and easy to perform peripheral nerve block. LA is injected through the landmark method or PNS or under USG. We have used real time ultrasound guided FNB as it provides inj. Of LA at a particular target site with less volume. Peripheral nerve block reduces pain on movement within 10-15 minutes of block placement more effectively than an intravenous analgesics.

In this prospective randomized observational study, we compared the analgesic efficacy and hemodynamic stability of a ultrasound guided FNB and IV fentanyl when administered before SA in patients undergoing surgery for fracture of femur.

Aims & Objectives:-

To compare the analgesic effects of FNB and IV fentanyl for positioning of Spinal anesthesia in patients posted for surgical fixation of femur fracture.

Primary outcome :-

- VAS score before and during positioning for SA

Secondary outcomes :-

- Performance time
- Hemodynamic changes
- Patient's acceptance
- Anesthetist's satisfaction for quality of patient's position
- Complications (systemic toxicity of LA, hematoma, Itching, allergy to drug)

Material & Methods:-

In this prospective randomized observational study, 60 adult patients with physical status ASA grade I and II aged between 18 – 70 years, scheduled for elective femur fracture surgeries were included in this study after obtaining informed consent from patients and their relatives. Study was conducted at Tertiary Care Hospital, during the year of 2020- 2022.

Selection of patients:

I. Inclusion Criteria –

- All patients undergoing elective surgery for femur fracture
- Age >18 yrs and <70yrs
- ASA grade 1 & 2

II. EXCLUSION CRITERIA

- Patients with poor GCS
- Patients with known local anesthetic allergy
- Patients with bleeding tendencies and coagulopathy
- Patient's refusal
- Emergency femur fracture surgeries
- Patients with skin lesion at block site
- Patients who can sit comfortably
- Contraindication to SA

Method:-

Thorough pre-anesthetic evaluation including history taking, local examination and systemic examination were carried out on day before surgery. Patients were explained about the procedure day before surgery and all pros and cons were explained before taking consent. Informed written consent for procedure was taken from the patient and his/her close relative. All patients were explained about Visual Analogue scale (VAS) and were made well conversant with it. All patients were advised nil by mouth as per standard fasting guidelines.

1) *Preparation:*

An intravenous line was secured and intravenous fluids started. After taking patient in the operation theatre, Pulse oximeter, Non-invasive blood pressure cuff and ECG electrodes were applied and baseline pulse, blood pressure, oxygen saturation were recorded.

a) *Group Allocation:*

Patients were randomly divided into two groups.

- 1) Femoral nerve block group (FNB group)
15 ml 1.5 % lignocaine with 1:20,000 adrenaline
- 2) Intravenous fentanyl group (FENT group)
1 ug/kg IV fentanyl

III. EQUIPMENTS FOR GIVING FEMORAL NERVE BLOCK:

A portable sterile tray containing:

- Disposable syringes of 10 ml.
- Disposable 23G 1 and half inch block needle.
- Bowls containing povidone iodine, spirit and normal saline solutions.
- Sponge holding forceps.
- Sterile towel and towel-clip.
- Ultrasound machine and its probe (6-12 MHz) properly cleaned and aseptically prepared for the procedure in each patient.

Nerve Imaging with Ultrasound

Fascicles of peripheral nerves can be detected with high-resolution ultrasound imaging. This fascicular echo texture is the most distinguishing feature of nerves ("honeycomb" architecture). More central nerves, such as the cervical ventral rami, have fewer fascicles and therefore can appear monofascicular on ultrasound scans. Ultrasound frequencies of 10 MHz or higher are required to distinguish tendons from nerves based on echo texture alone. One of the most powerful techniques to identify nerve fascicles is to slide a broad linear transducer over the known course of a peripheral nerve with the nerve viewed in short axis (transverse cross section).



Figure 4:- Showing structures on ultrasound: N-nerve, V-vein and A- artery.

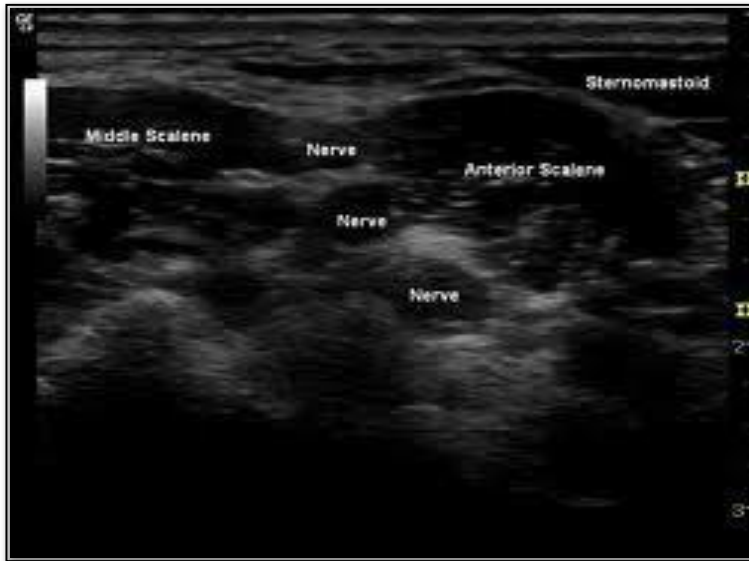


Figure 5:- Showing nerves and muscles on Ultrasonographic image.

Emergency resuscitation equipments:

- The anesthesia workstation.
- Oxygen source with Bain's circuit and appropriate size mask
- Working laryngoscope with appropriate size blade.
- Emergency intubation kit including bougie
- Working suction apparatus.
- Intravenous crystalloid and colloid infusion bottles.
- Emergency drugs including lipid emulsion for treatment of LAST
- Working defibrillator.

Premedication :-

Inj. Glycopyrrolate 0.004mg/kg was given to the patients in each group.

GROUP FNB:-

In this group, patients received FNB guided by USG 15 minutes prior to positioning. 15 ml, 1.5% lignocaine with Adrenaline was injected incrementally after a negative aspiration test.

USG guided Femoral Nerve Block⁽¹⁴⁾:

- For femoral nerve block, the patient was kept in supine position with leg extended. The ipsilateral extremity was abducted 10–20 degrees and slightly externally rotated with the lateral side of the foot resting on the table. After standard aseptic skin preparation, the linear transducer (6-12 Hz) was placed transversely on femoral crease to identify the femoral artery and nerve. Once the femoral nerve was identified, and local skin infiltration, the 23G 1.5 inches block needle was inserted in plane in a lateral-to medial orientation and

- advanced toward the femoral nerve.
- Once the needle tip was positioned adjacent to the nerve, after careful aspiration to rule out an intravascular needle placement, 15 mL of local anesthetic (1.5% Lignocaine with Adrenaline) was injected slowly with careful negative aspiration of blood.

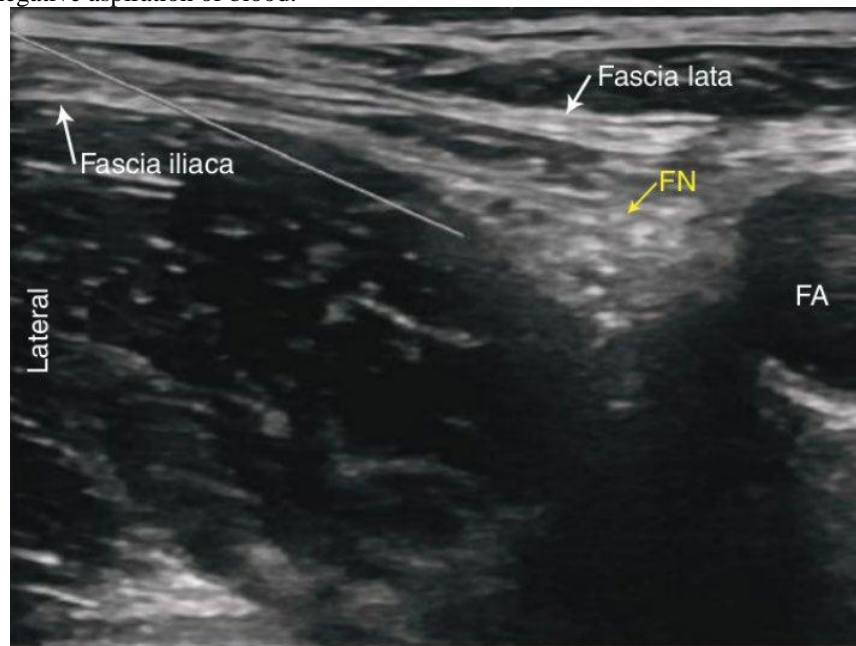


Figure 8:- (FN – Femoral nerve, FA –Femoral artery)

We have used real time ultrasound for visualization of LA agent in femoral sheath. Sensory onset was assessed by pin prick and VAS was measured.

GROUP FENT:-

In this group, patients were received injection fentanyl 1µg/kg IV 15 minutes prior to positioning.

If any patients in either group were reported pain scores > 4 during positioning, IV fentanyl aliquots 0.5 µg/kg were given every 5 min. Until the pain score will be decreased to ≤4 as per rescue analgesia.^(1,12,23,24)

After performing FNB and giving I.V. fentanyl in respective groups, a spinal block was performed in sitting position when VAS ≤4, in the midline or paramedian approach at the L2/3 or L3/4 level by using hyperbaric bupivacaine 0.5% according to the anesthesiologist’s decision. Patients were asked to describe their pain from 0 to 10, where 0 means no pain and 10 means worst pain.

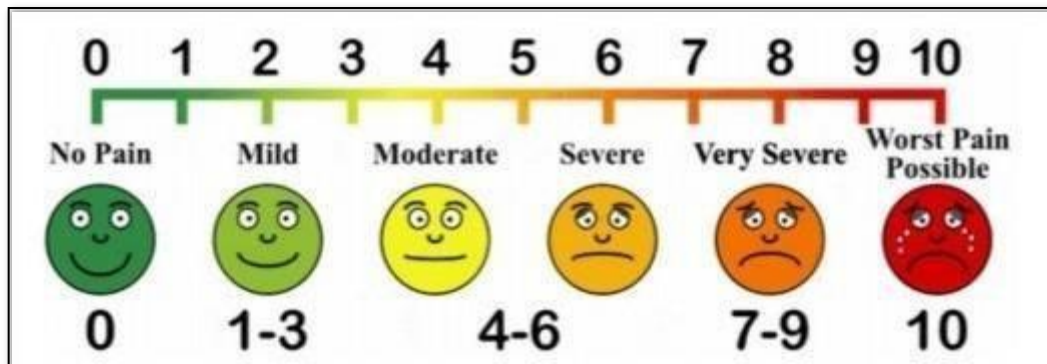


Figure 10:- Visual Analog Scale for pain assessment ⁽³⁹⁾.

When VAS score was ≤ 4 , patient was made to sit for positioning of spinal anaesthesia. Positioning for spinal anaesthesia after giving study drug in both groups was end point of the study. Various parameters were monitored periodically in the study in following manner.

1) *Intra-operative hemodynamic parameters :*

Patients were observed for intra-operative vitals periodically throughout the operation and recorded at the time of femoral nerve block and IV Fentanyl(0 min.) and then 3 min., 5 min., 10 min., 15 min., 20 min. after FNB and IV Fentanyl and before position for spinal anaesthesia.

Performance time:

The time from beginning of patient positioning to the end of performance of SA after giving analgesia.⁽³⁰⁾

Patient Satisfaction:-

Yes/ No

Anaesthesiologist satisfaction with quality of positioning for spinal anaesthesia:-

0 – not satisfactory

1 – satisfactory

2 – good

3 – optimal

Patients were managed conventionally after giving spinal anaesthesia and monitored for any adverse reaction of study drug or complications related to spinal anaesthesia. (Patients received NBM + maintenance solution of Ringer lactate as calculated according to the Holiday Segar formula and cardiovascular status of patients. Perioperative blood loss in surgery was managed with crystalloids, blood and blood products.)

Adverse Reactions And Complications:

A change of $\pm 20\%$ in mean arterial blood pressure from baseline, is defined as Hypertension or Hypotension and corrected pharmacologically.

A change of $\pm 20\%$ in Heart rate from baseline, is defined as Tachycardia or Bradycardia (Bradycardia is either $<20\%$ of baseline or <60 beats/min) and corrected pharmacologically.

- Hypertension and Tachycardia were treated by Inj. Fentanyl 50 μg intravenously.
- Hypotension was managed by i.v. fluids and Inj. Mephentermine 6 mg i.v. in aliquots.
- Bradycardia was corrected by Inj. Atropine 0.6 mg i.v.
- Intraoperative shivering – treated with warm fluids.
- Intraoperative Respiratory depression is defined as RR $<12/\text{min}$ or SpO₂ $<90\%$ - Treated with 100% oxygen by mask.
- For LAST intralipid emulsion was kept ready.
- If Difficulty in breathing occurred, airway assistance was given and oxygenation was provided.
- Nausea / vomiting : Was assessed by 4 point scale –

Grade		Treatment
1	No Nausea/ vomiting	Ventimask oxygenation and head low position
2	Minor form	
3	Moderate form	Inj. Ondansetron 4 mg i.v.
4	Severe form	

2) *Statistical Analysis*

- All data were collected in Microsoft Excel Spreadsheet.
- Statistical analysis was done by SPSS software.
- Descriptive data of both the groups were compared using unpaired 't' tests .
- Mean is used to derive the central tendency of the data at a particular time in one study group.

- Standard deviation is a measure of dispersion of a set of data from its mean.
- Categorical data were analysed by Chi Square test.
- 'P' value <0.05 was considered statistically Significant (S) and <0.001 was considered Highly Significant (HS). 'P' value >0.05 is non – significant (NS)

Table 1:- Comparison Of Demographic Data.

	Group FNB (N=30)	Group FENT (N=30)	p value	Inference
Gender				
Male	8(26.67%)	9(30%)	-	-
Female	22(73.33%)	21(70%)	-	-
ASA grade (I/II)	(12/18)	(14/16)	-	-
Age (years)	52.27±13.29	52.65±12.03	0.91	NS
Duration of surgery (mins)	86.33±16.02	86.37±15.23	0.99	NS

It shows various demographic parameters and duration of surgery(P > 0.05)

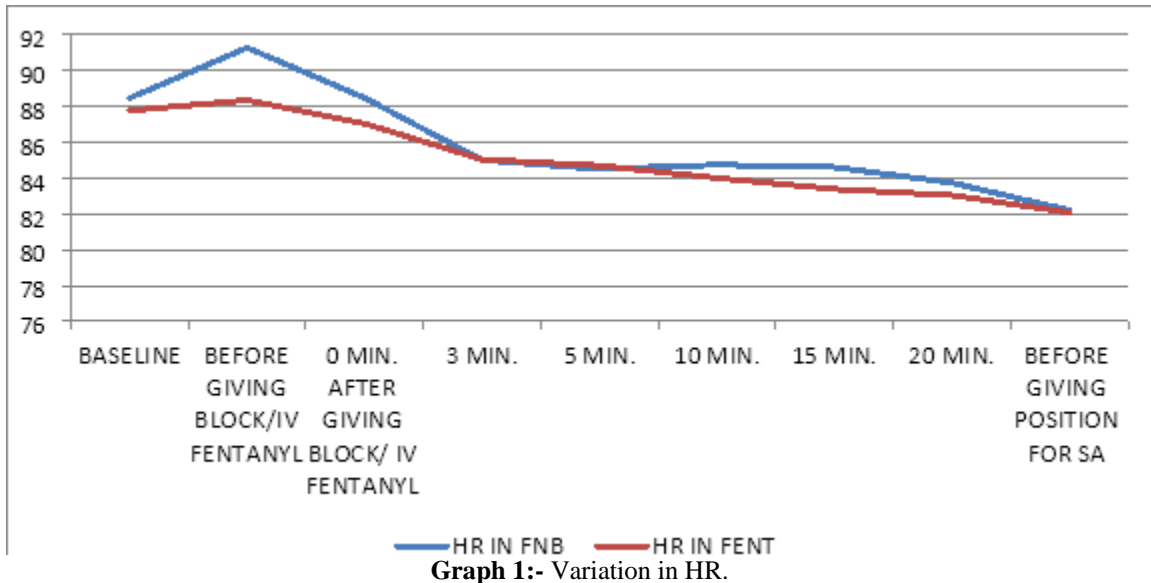
Table 2:- Types Of Surgeries.

Type of Surgery	Group FNB	Group FENT
IT FEMUR # - PFN	15	13
IT FEMUR # - DHS	7	6
IT FEMUR # - CC Screw	6	6
NOF # - Bipolar	2	5

All surgeries in Table 2 were successfully performed under spinal block.

Table 3:- Variation in HR

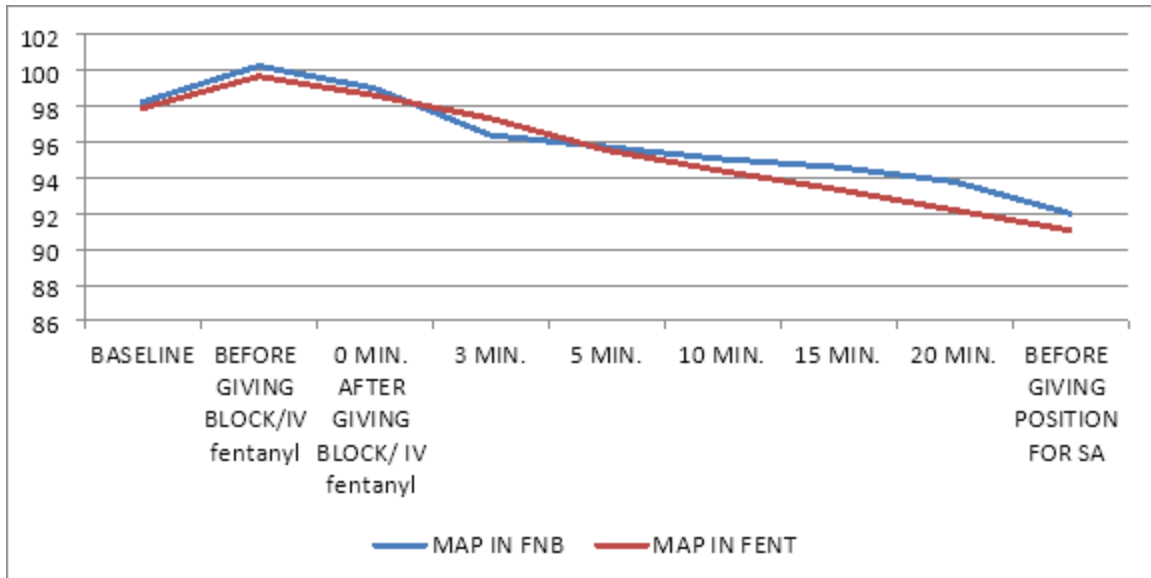
Time duration	Group FNB (N=30)	Group FENT (N=30)	p value	Inference
	Heart rate (per min) (Mean ± SD)	Heart rate (per min) (mean ± SD)		
Baseline HR	88.47±12.54	87.76±11.25	0.82	NS
INTRAOPERATIVE PERIOD				
Before giving Block / IV fentanyl	91.26±12.75	88.34±9.64	0.32	NS
After giving block / IV fentanyl (0 min.)	88.47±12.33	87.03±10.60	0.63	NS
3 min.	85±11.26	85.03±9.89	0.99	NS
5 min.	84.5±11.12	84.69±9.62	0.94	NS
10 min.	84.73±10.98	84±9.22	0.78	NS
15 min.	84.6±10.09	83.37±9.06	0.62	NS
20 min.	83.73±9.29	83.03±9.45	0.77	NS
Before giving spinal anaesthesia	82.2±8.52	82.06±9.80	0.95	NS



From Table 3 and graph 1, it is evident that there was stable mean HR in each group. (p>0.05)

Table 4:- Variation In Mean Arterial Pressure.

Time duration	Group FNB (N=30) MAP (mmhg) (Mean ± SD)	Group FENT (N=30) MAP (mmhg) (Mean ± SD)	p value	Inference
Baseline HR	98.22±7.24	97.88±6.86	0.85	NS
INTRAOPERATIVE PERIOD				
Before giving Block / IV fentanyl	100.24±5.43	99.65±5.74	0.68	NS
After giving block / IV fentanyl (0 min.)	99±5.33	98.59±5.33	0.77	NS
3 min.	96.37±4.87	97.31±4.68	0.45	NS
5 min.	95.71±4.68	95.54±4.14	0.88	NS
10 min.	95.04±4.18	94.36±4.01	0.52	NS
15 min.	94.57±4.04	93.33±4.20	0.24	NS
20 min.	93.77±4.09	92.18±4.43	0.15	NS
Before giving spinal anaesthesia	92±5.47	91.05±5.64	0.51	NS

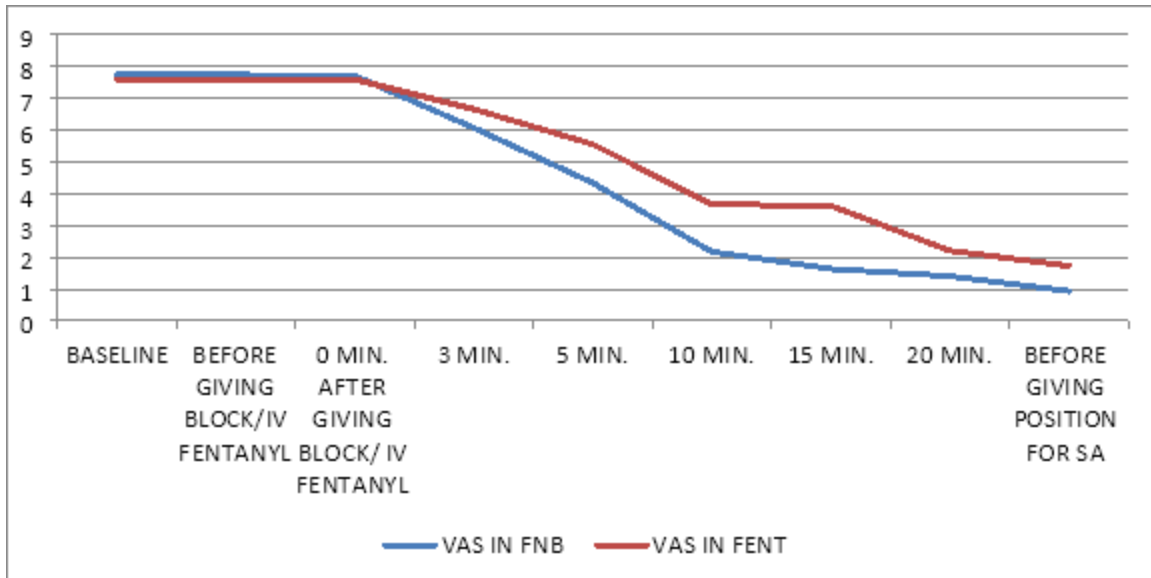


Graph 2:- Variation in MAP.

From Table 4 and graph 2, it is evident that there was stable mean arterial pressure in each group. (p>0.05)

Table 5:- Variation in VAS.

Time duration	Group FNB (N=30)	Group FENT (N=30)	p value	Inference
	VAS (Mean ± SD)	VAS (Mean ± SD)		
Baseline VAS	7.73±0.74	7.58±0.68	0.42	NS
INTRAOPERATIVE PERIOD				
Before giving Block / IV fentanyl	7.73±0.74	7.58±0.68	0.42	NS
After giving block / IV fentanyl (0 min.)	7.7±0.75	7.58±0.68	0.54	NS
3 min.	6.06±0.74	6.65±0.67	0.0021	S
5 min.	4.33±0.84	5.55±0.68	<0.0001	HS
10 min.	2.16±1.17	3.65±1.20	<0.0001	HS
15 min.	1.63±1.03	3.62±1.14	<0.0001	HS
20 min.	1.4±0.81	2.20±1.29	<0.009	HS
Before giving spinal anaesthesia	0.93±0.86	1.72±1.09	<0.003	HS

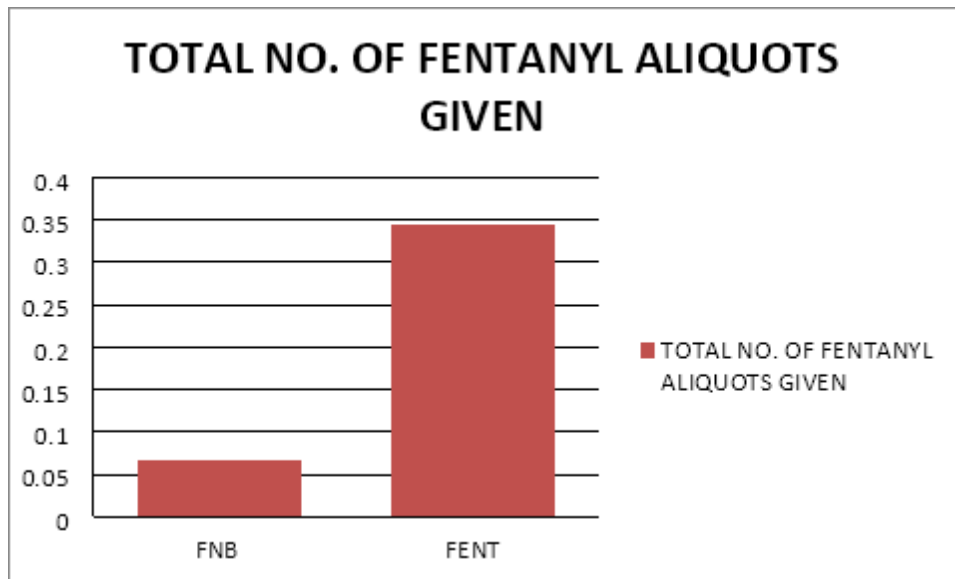


Graph 3:- Variation in VAS.

It is evident from Table 5 and graph 3 that VAS score after 15 min of analgesia and before giving SA was significantly lower in Group FNB as compared to VAS score in Group FENT which was highly significant. (p value <0.001) VAS score was decreased in both groups over the time after the study drug.

Table 6:- Rescue Requirement Of Fentanyl Aliquots.

	GROUP FNB	GROUP FENT	P value	Inference
Rescue requirement of fentanyl aliquots given (Mean ± SD)	0.06±0.25	0.34±0.61	0.025	S



Graph 4:- Rescue requirements of fentanyl aliquots.

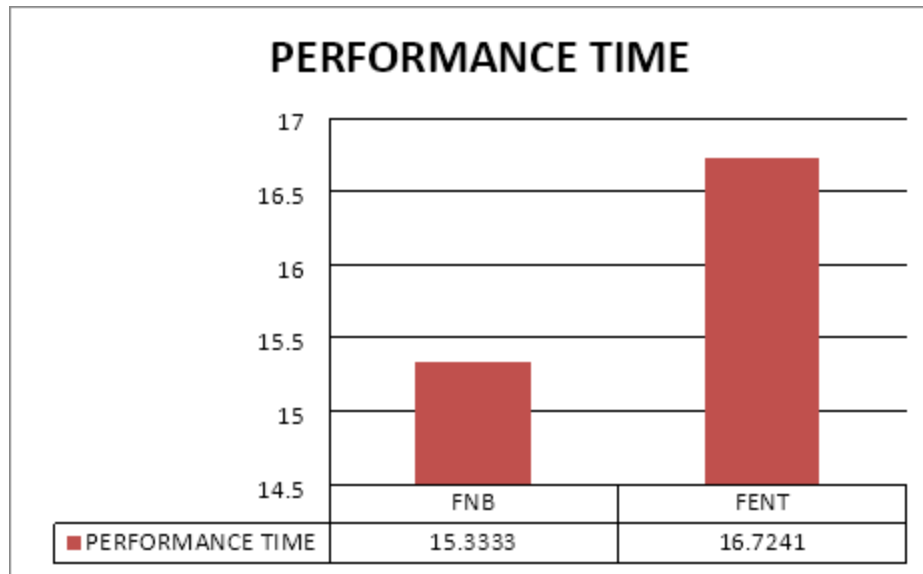
Table 6 and graph 4 shows additional analgesic requirement in both the groups. In FNB group, out of 30 patients, 1 patient required additional one aliquots of inj. Fentanyl 0.5µg/kg i.v.

In FENT group, Out of 30 patients, 2 patients required two aliquots of inj. Fentanyl 0.5mcg/kg iv. 5 min. apart and 7 patients required single aliquots of fentanyl. Total 9 patients required additional fentanyl aliquots.

This suggests that additional analgesic requirement (total no. of fentanyl aliquots) is more with FENT group than FNB group which was statistically significant as shown in Table 6 and graph 4.

Table 7:- Performance Time.

PERFORMANCE TIME(min.)	GROUP FNB (n=30)	GROUP FENT (n=30)
MEAN	15.33	16.72
SD	1.26	3.06
p VALUE	0.025	



Graph 5:- Performance Time.

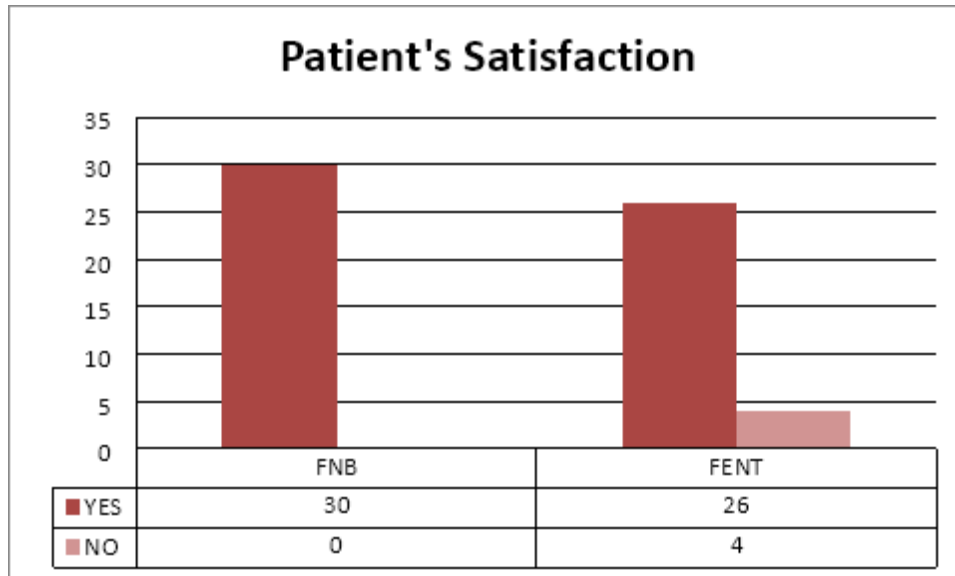
Table 7 shows the mean performance time (mins) after giving analgesia.

In FNB group, mean performance time was 15.33 min and in FENT group it was 16.72 min. The patients in group FNB required less performance time as compared to patients in group FENT.

Thus, there was statistically significant difference observed among both the groups for the mean performance time (mins) as shown in table. 7 and graph 5. (p Value < 0.05)

Table 8:- Patient's Satisfaction.

PATIENT'S SATISFACTION	GROUP FNB (n=30)		GROUP FENT (n=30)	
	NO OF PATIENT	%	NO OF PATIENT	%
YES	30	100%	26	86.67%
NO	0	0	4	13.33%
TOTAL	30	100%	30	100%
P VALUE	0.038			



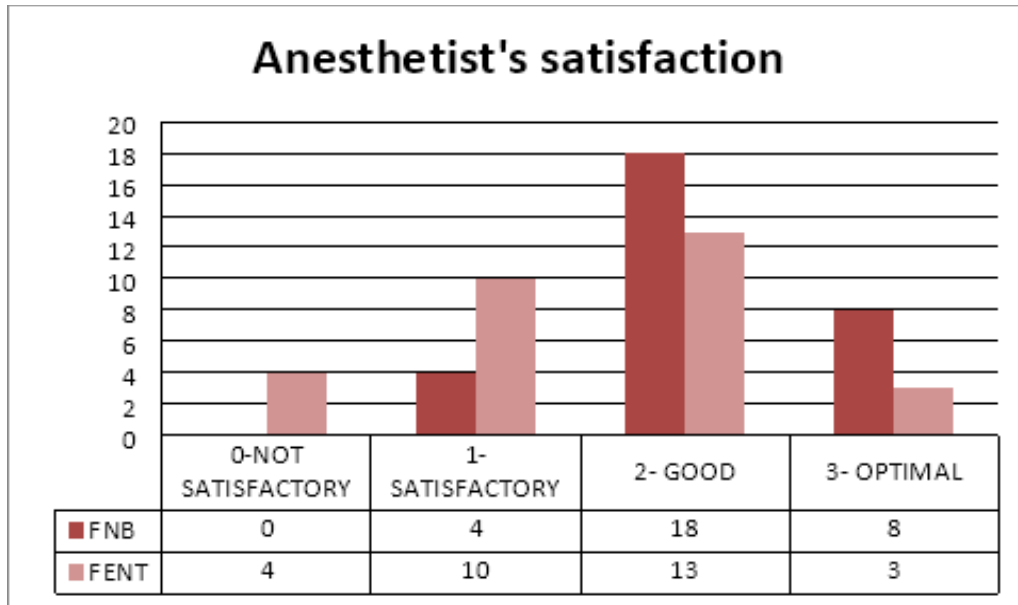
Graph 6:- Patient’s Satisfaction.

Table 8 shows that all the 30 patients in group FNB(100%) were satisfied.

Out of 30 patients in Group FENT, 26 (86.67%) patients were satisfied and 4(13.33%) patients were not satisfied. Patient’s satisfaction was less in Group FENT as compared to Group FNB. There was statistically significant difference observed among both the groups for patients satisfaction (p Value <0.05) as shown in table 8 and graph 5.

Table 9:- Anesthesiologist’s Satisfaction With Quality Of Patient’s Position.

ANESTHESIO-LOGIST’S SATISFACTION	GROUP FNB (n=30)		GROUP FENT (n=30)	
	NO OF PATIENT	%	NO OF PATIENT	%
0 - NOT SATISFACTORY	00	0%	04	13.34%
1 - SATISFACTORY	04	13.33%	10	33.33%
2 - GOOD	18	60%	13	43.33%
3 - OPTIMAL	08	26.67%	03	10%
TOTAL	30	100%	30	100%
p VALUE	0.02			



It is evident from table 9 and graph 6 that maximum number of patients were presented with good quality of positioning for spinal anaesthesia in both groups. So, from the above observation there was statistically significant difference observed among the both groups .(p Value <0.05)

Table 10:- Perioperative Complications.

Complications	Group FNB (N=30)	Group FENT (N=30)
Hypotension	Nil	01
Bradycardia	Nil	Nil
Respi. Depression	Nil	Nil
Nausea/vomiting	Nil	Nil
Itching	Nil	Nil
Shivering	01	02
Others	Nil	Nil

As shown in table 10, perioperative complication were observed in both groups. In FNB group out of 30 patients, 1 patient had shivering. In FENT group out of 30 patients, 2 patients had shivering and 1 patient had hypotension. Shivering was treated by warm IV fluids. In group FENT patient developed hypotension but it was physiological effect of SA.

Discussion:-

Over the past few years, the numbers of patients presenting with fractured femur have been increasing. As a result, surgical repair which requires anesthesia has also increased. Urwin et al⁽³⁸⁾ reported that there were marginal advantages for regional anesthesia (RA) compared with GA in terms of one-month mortality and deep vein thrombosis. Sorenson et al⁽³²⁾ reported that the risk of deep vein thrombosis was greater for patients receiving GA. Furthermore, time to ambulation may be quicker in patients receiving RA. However, the choice of anesthetic technique depends on the anesthesiologist’s preference and experience. At our institution, spinal block was used more frequently than GA for surgical repair of fractured femur. The subsequent problem concerned was pain on positioning for spinal block.⁽¹⁷⁾

3) *When considering the technique used to aid positioning patients for spinal block, Sandby-Thomas et al⁽²⁸⁾ reported that the most frequently used agents were midazolam, ketamine, and propofol. Alternative agents were fentanyl, remifentanyl, morphine, nitrous oxide, and sevoflurane, whereas nerve blocks were used infrequently. Schiferer et al⁽²⁹⁾ demonstrated that FNB provided analgesia after femoral trauma which was adequate for patient transport. Parker et al reported that nerve blocks reduced pain score and analgesic requirements.⁽²²⁾*

4) *Group Allocation :*

We have studied 60 patients with physical status ASA I-II aged 18-70 years, scheduled for femur fracture after fulfilling inclusion criteria. They were randomly divided into 2 groups. Two groups were Group FNB and Group FENT. In FNB group, patients were received USG guided FNB 15 minutes prior to positioning. 15 ml, 1.5% lignocaine with Adrenaline. In FENT group, patients were received injection fentanyl 1ug/kg IV 15 minutes prior to positioning.

Demographic data:

In our study, Table 1 shows comparison of demographic data like age, gender showed no statistically significant differences between both the groups. Duration of surgery was also comparable in both groups.

Vats A et al¹, Durrani H et al¹¹, Sia S et al³⁰, Jadon A et al¹², Ranjit S et al²³, Lamaroon A et al¹⁷, Singh AP et al³¹, George I et al⁸ had comparable demographic data and duration of surgery.

5) *Method of Block:*

We used Ultrasound technique for giving femoral nerve block as by using this technique, we can give less volume of drug at perfect site, so very less chances of local anesthetic toxicity and transient neurological complications. Drug is injected into the sheath so less chances of nerve damage. Use of FNB to relieve pain from fracture of the femur is being used for positioning during SA. **George I et al⁸, Vats A et al¹** had done their study of PNS guided femoral nerve block prior positioning for giving spinal anaesthesia in femur fracture patients. **Ranjit S et al²³** had done their study of USG guided femoral nerve block prior positioning for giving spinal anaesthesia in femur fracture patients.

6) *Drug & Dosage for femoral nerve Block:*

We have taken 15 ml 1.5% lignocaine with adrenaline in our study of USG Guided femoral nerve Block and hyperbaric bupivacaine for SA to prevent toxic dose of LA. The effect of lignocaine in FNB comes in 5 min. but we waited for 15 min. to maximize the effect of FNB. ⁽¹²⁾

Jadon A et al¹², Reddy ED et al²⁴, Vats A et al¹, George I et al⁸ used 20 ml 1.5 % lignocaine with adrenaline for PNS guided FNB.

Sia A et al³⁰ used 15 ml 1.5 % lignocaine for FNB.

Ranjit S et al²³ used 15ml 1.5% lignocaine and adrenaline for USG guided femoral nerve block.

7) *Drug & Dosage for IV Analgesia:*

We have taken 1µg/kg inj. Fentanyl. Fentanyl is stronger opioid than morphine. It can be used as parenteral route due to fast first pass metabolism. Fentanyl can provide cardiovascular stability even in ill patients. ⁽³⁾

Sia S et al³⁰, Jadon A et al¹², Reddy E D et al²⁴, Ranjit S et al²³, Vats A et al¹, Lamaroon A et al¹⁷, Pakhare PV et al²¹, and Singh AP³¹ used fentanyl for IV Analgesia in different doses.

8) *TYPES OF SURGERY:*

In our study, Table. 2 shows various femur fracture (NOF #, IT femur #) surgeries conducted under SA. **Sia S et al³⁰, Jadon A et al¹², Reddy E D et al²⁴, Ranjit S et al²³, Vats A et al¹, Lamaroon A et al¹⁷, Pakhare PV et al²¹, Singh AP et al³¹, Durrani H et al¹¹ and George I et al⁸** included various femur fractures in their studies.

Changes In Haemodynamic Parameters:

In our study, changes in heart rate and mean arterial pressure were monitored. Mean HR was monitored in both groups. And it was stable and comparable between two groups as shown in table.3 and chart 1.

The above findings are in accordance to the studies done by **Jadon A et al¹², Pakhare PV et al²¹, Ranjit S et al²³, Lamaroon A et al¹⁷, Reddy E D et al²⁴, Vats A et al¹ and George I et al⁸**. MAP was monitored in both groups. And it was stable and comparable between two groups as shown in table.4 and chart 2.

The above findings are in accordance with **Ranjit S et al²³ and George I et al⁸**.

9) **Visual Analogue Scale (VAS Score):**

In our study, changes in VAS score (0=no pain, 10=maximum pain) was observed at baseline, after 0 min., 3 min., 5 min., 10 min., 15 min., 20 min. of analgesia and before giving spinal anesthesia in both the groups.

**At baseline and before giving analgesia, the mean VAS score of patient in Group FNB was 7.73±0.74 and in Group FENT was 7.59±0.68 which was not statistically significant. (p Value >0.05)

**At 0 min. after giving analgesia, the mean VAS score of patient in Group FNB was 7.7 ± 0.75 and in Group FENT was 7.59 ± 0.68 which was not statistically significant. (p Value > 0.05)

**At 3 min. after giving analgesia, the mean VAS score of patient in Group FNB was 6.07 ± 0.74 and in Group FENT was 6.66 ± 0.67 which was statistically significant. (p Value < 0.05)

**At 5 min. after giving analgesia, the mean VAS score of patient in Group FNB was 4.33 ± 0.84 and in Group FENT was 5.55 ± 0.68 which was highly significant. (p Value < 0.01)

**At 10 min. after giving analgesia, the mean VAS score of patient in Group FNB was 2.17 ± 1.18 and in Group FENT was 3.65 ± 1.20 which was highly significant. (p Value < 0.01)

**At 15 min. after giving analgesia, the mean VAS score of patient in Group FNB was 1.63 ± 1.03 and in Group FENT was 3.62 ± 1.15 which was highly significant. (p Value < 0.01)

At 20 min. after giving analgesia, the mean VAS score of patient in Group FNB was 1.4 ± 0.81 and in Group FENT was 2.17 ± 1.33 which was highly significant. (p Value < 0.01). Before giving SA, the mean VAS score of patient in Group FNB was 0.93 ± 0.87 and in Group FENT was 1.52 ± 1.06 which was statistically significant. (p Value < 0.05). In our study, VAS score was decreased in both groups over the time after the study drug. However, it was lower in FNB group as compared to FENT group which was highly significant ($P < 0.001$) as shown in table.4 and chart 5. The above findings are in accordance with **Jadon A et al¹², **Pakhare PV et al²¹**, **Ranjit S et al²³**, **Reddy E D et al²⁴**, **Vats A et al¹**, **Sia S et al³⁰**, **Durrani HD et al¹¹**, **Singh AP et al³¹** and **George I et al⁸**.

10) **Rescue Requirement Of Fentanyl Aliquots:**

The result of our study shows that in FNB group, out of 30 patients, 1 patient required additional one aliquot of inj. Fentanyl $0.5 \mu\text{g}/\text{kg}$ i.v.

**In FENT group, Out of 30 patients, 2 patients required two aliquots of inj. Fentanyl $0.5 \text{mcg}/\text{kg}$ iv. 5 min. apart and 7 patients required single aliquot of fentanyl. Total 9 patients required additional fentanyl aliquots.

This suggests that additional analgesic requirement (total no. of fentanyl aliquots) is more with FENT group than FNB group which was statistically significant as shown in table. 5. Study conducted by **Lamaroon A et al¹⁷** shows that both FNB and FENT groups needed a similar aliquots of additional fentanyl for better pain relief. Studies done by **Jadon A et al¹²**, **George I et al⁸** and **Amisha Vats et al¹** shows that no patient in either group required additional analgesic aliquots of inj fentanyl. Study conducted by **Ranjit S et al²³** shows that same no. of patients in each group required an intravenous dose of inj fentanyl.

Performance Time:

The result of our study shows that In FNB group, mean performance time was 15.33 min and in FENT group it was 16.72 min. The patients in group FNB required less performance time as compared to patients in group FENT.

Thus, there was statistically significant difference observed among both the groups for the mean performance time (mins) as shown in table. 7 and graph 4. (p Value < 0.05). The above findings are in accordance with **Sia et al³⁰**, **Ranjit S et al²³**, **Reddy ED et al²⁴**, **Singh AP et al³¹**, **Fletcher AK et al⁷**, **Durrani et al¹¹**, **Jadon A et al¹²**, **Vats A et al¹**, **George I et al⁸**.

11) **Patient's Satisfaction:**

The result of our study shows that all the 30 patients in group FNB (100%) were satisfied. Out of 30 patients in Group FENT, 26 (86.67%) patients were satisfied and 4 (13.33%) patients were not satisfied.

Patient's satisfaction was less in Group FENT as compared to Group FNB. There was statistically significant difference observed among both the groups for patient's satisfaction (p Value < 0.05) as shown in table 8 and graph 5. This findings are in accordance with **Sia S et al³⁰**, **Durrani et al¹¹**, **Jadon A et al¹²**, **Reddy ED et al²⁴**.

12) Anesthetist's Satisfaction:

The result of our study shows that In group FNB, out of 30 patients 4(13.33%) patient's quality of positioning for SA were satisfactory, 18(60%) patient's quality of positioning for SA were good and 8(26.67%) patient's quality of positioning for SA were optimal to the anesthesiologist.

In Group FENT, out of 30 patients only 4(13.34%) patient's quality of positioning for SA were not satisfactory, 10(33.33%) patient's quality of positioning for SA were satisfactory, 13(43.33%) patient's quality of positioning for SA were good and 3(10%) patient's quality of positioning for SA were optimal to the anesthesiologist.

It is evident from table 9 and graph 6 that there was statistically significant difference observed among the both groups. (p Value <0.05)

The findings are in accordance with **Sia S et al³⁰**, **Durrani et al¹¹**, **Jadon A et al¹²**, **Vats A et al¹**, **Ranjit S et al²³**.

13) Perioperative Complications:

The result of our study shows that in FNB group out of 30 patients, 1 patient had shivering. In FENT group out of 30 patients, 2 patients had shivering and 1 patient had hypotension. Shivering was treated by warm IV fluids. In group FENT patient developed hypotension but it was due to physiological effect of SA.

Conclusion:-

IV Fentanyl & USG Guided FNB both provide good positioning for SA for operation of femur fractures.

In nutshell, we conclude that in comparison to IV Fentanyl, USG guided FNB is more advantageous as it provides better analgesia in terms of VAS, excellent positioning and less time for performance of subarachnoid block, less rescue analgesic requirements in patients undergoing surgery for femur fractures.

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