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A Comparision between Femoral Nerve Block, Intravenous Fentanyl and Ketamine as Preemptive Analgesics in Lower Limb Fractures

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Abstract

Background: Spinal & combined spinal epidural anaesthesia are the preferred techniques for facilitation of surgical fixation of the fractures of the lower limb. Extreme pain does not allow ideal positioning for these procedures. Intravenous fentanyl and femoral nerve block are commonly used techniques to reduce the pain during positioning for central neuraxial blockade. *Aim:* To compare the analgesic effect provided by femoral nerve block, IV fentanyl and low dose IV ketamine given prior to positioning for central neuraxial block in patients undergoing surgery for lower limb fractures. *Material and methods:* This is a prospective, randomized, comparative study conducted at Nizam's Institute of Medical Sciences from June 2017 to August 2017**.** 60 patients with lower limb fractures were divided into 3 groups of 20 each - Group A (Femoral Nerve Block with 1% Lignocaine), Group B (IV Fentanyl - 1µg/kg) and Group C (low dose IV Ketamine – 0.1mg/kg). Baseline/pre-intervention VAS score was noted. Pain assessment was done using visual analog scale (0 = no pain, 10 = maximal pain). Depending on the group to which they were included, a particular intervention amongst the three was done for evaluating the analgesic efficacy for positioning for central neuraxial blockade.VAS pain scores were noted again 10 mts after the intervention. The difference in VAS pain score 10 mts after the intervention and baseline was derived at. Significant pain control was identified as the difference of at least 2 points on the VAS score before and after the procedure in an alert and conscious patient. Percentage of patients in each VAS strata (0= no pain, 1-3= mild pain, 4-6= moderate pain, 7-9= severe pain & 10= very severe pain) in comparision to total number of patients in each group (FNB, IV Fent, Low dose IV Ketamine) at different time points (before and 10 minutes after the specified intervention in each group) was also noted and the percentage change in the specific vas strata of a group at different points of time was also calculated. Total number of patients in each group with VAS ≤ 3, 10 minutes after the intervention was noted. *Results:* Baseline VAS scores in the 3 groups – Group A (FNB group): 7.55±1.47 vs Group B (IV Fentanyl group): 7.25±1.29 vs Group C (Low dose IV Ketamine group): 7.55±1.43, p = 0.737, statistically not significant . The baseline VAS scores were comparable amongst the 3 groups. The VAS score after 10 min in the 3 groups - Femoral nerve block group: 2.5±1.43 vs IV fentanyl group: 3.45±2.06 vs Low dose IV Ketamine group: 2.70±1.98, p= 0.238, statistically not significant. The difference of VAS scores before and after 10 min after the specific intervention amongst the 3 groups - Femoral nerve block group: 5.00±1.75 vs IV Fentanyl group: 3.7±1.66 vs IV Low dose IV Ketamine group: 4.65±1.35 with p = 0.035 which was significant (p ≤ 0.05 was considered significant). VAS score difference of before/after was significantly less in Group B, or higher outcome (pre-post difference of VAS score) was observed in Group A, followed by Group C. The number of patients whose VAS score after 10 min came down to ≤ 3, corresponding to mild pain in the VAS strata: 11(55%) in FNB group vs 10(50%) in IV Fentanyl group vs 15 (75%) in IV Low dose Ketamine group. The number of patients with VAS score ≤3, 10 minutes after the intervention were higher in Group C, followed by Group A and Group B. Though the pre/post VAS score difference and the separate mean VAS score at 10 mts was significantly low in the FNB group compared to the other groups, the total no of patients with a VAS score of ≤ 3, 10 minutes after the intervention were more in the IV low dose ketamine group. *Conclusion:* Femoral nerve block with 1% lignocaine appeared to provide better analgesia than IV fentanyl and IV low dose ketamine for positioning for central neuraxial block in patients with lower limb fractures. However, IV low dose ketamine appears to alter the pain scores to clinically comfortable levels for the patient in a quick and non-invasive way.

Keywords: Femoral Nerve Block; Low dose Ketamine; Fentanyl; Lower Limb Fractures; Central Neuraxial Blockade; Positional Pain.

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Introduction

Fracture is an orthopaedic problem following trauma in patients of all ages and central neuraxial block such as spinal anaesthesia is the preferred technique for providing anaesthesia for the surgical procedures for the lower limb fractures . Regional anaesthesia compared to general anaesthesia has many advantages in decreasing morbidity and mortality [1]. Correct positioning during central neuraxial block is the prerequisite for a successful procedure. The patients with lower limb fractures may experience severe pain, especially during the time taken in changing the position from lying flat to sitting up or to the lateral position, &/or throughout the time of performing the block until the effect of spinal anaesthesia is established. Limb immobility and extreme pain are the deterrents for an ideal positioning for this procedure.

Various modalities like intravenous (IV) Fentanyl , Femoral Nerve Block (FNB) or Low dose IV Ketamine have been advocated to reduce the pain pre-operatively and improve the positioning of these patients. This study contemplated to compare the analgesic effect provided by femoral nerve block, IV fentanyl and low dose IV ketamine prior to positioning for central neuraxial block in patients undergoing surgery for lower limb fractures.

Material and Methods

This was a prospective, randomized, comparative study conducted in the Department of Anesthesiology and Intensive care at Nizam's Institute of Medical Sciences (NIMS), Panjagutta, Hyderabad from June 2017 to August 2017. Institutional ethics committee approval and informed consent from the patient were taken for the study.

Sixty patients with lower limb fractures were included in the study-sample size based on previous studies [4,10]. Considering a mean VAS pain score difference of >2, pre/post intervention , assuming $p<0.05$ as of acceptable statistical significance, power of 80%, a confidence interval of 95% (α=0.05), standard deviation of approximately 0.35 and effect size between study groups as 10% (0.1), the calculation yielded a sample size of 20 subjects per arm amounting to 60 subjects for this study. Visual analogue scale was explained to the patients at the time of consent.

Inclusion Criteria

Patients of ASA class I ,II and III, of either gender, between the age group of 18 to 80 years, who sustained fracture of lower limb & scheduled for fracture surgery under central neuraxial block, but unable to sit due to pain .

Exclusion Criteria

Patients who tolerated pain well prior to surgery or refused to participate, patients who received strong analgesics (opioid) less than 6 hours prior to surgery, uncooperative patients or patients with dementia, contraindications to ketamine, fentanyl, femoral or central neuraxial block (coagulopathy, local infection, sepsis etc.)

No premedication was offered to the patients . It was made sure that the patients fasted for 6 hours prior to the elective surgery. Patients were distributed to 3 groups of 20 each through computer randomisation, wherein a particular intervention amongst the three was contemplated in each of the groups for evaluating the analgesic efficacy prior to positioning for central neuraxial blockade (SAB or CSE depending on the type and duration of surgery contemplated).

Group A (Femoral nerve block), Group B (IV Fentanyl) , Group C (Low dose IV Ketamine).

After being shifted into the operating room, IV line was secured , fluids started and monitors (NIBP, HR, SpO_2) attached and baseline parameters were recorded. Baseline /pre-intervention VAS score was noted. Pain assessment was done using visual analog scale (0 = no pain, 10 = maximal pain) .

Visual analogue scale scores: 0 = no pain,1 – 3 = mild pain, 4 – 6 = moderate pain, 7 – 9 = severe pain, 10 = very severe (worst imaginable pain).

Depending on the group to which they were included, a particular intervention amongst the three was done for evaluating the analgesic efficacy for positioning for central neuraxial blockade.

Group A (Femoral Nerve Block)

Femoral triangle was identified under strict aseptic precautions, entry point was infiltrated with 2%lignocaine 1 ml and then, a 21-23 gauge blunt needle was introduced 1cm lateral to the femoral artery and 1.5cm below the inguinal ligament. The pop up technique (blind technique) was used and upto 20ml of local anaesthetic 1% lignocaine (max dose ≤ 4mg/kg) given after a negative aspiration test. Block was instituted 10 min prior to positioning and VAS score noted after 10 min.

Group B (IV Fentanyl group)

Patients received IV Fentanyl 1µg/kg 10 min prior to positioning and VAS score noted after 10 min.

Group C (low dose IV Ketamine)

Patients received IV Low Dose Ketamine 0.1mg/kg 10min prior to positioning and VAS score noted after 10 min.

VAS pain scores were noted again 10 mts after the intervention. The difference in VAS pain score 10 mts after the intervention and baseline was derived at. Significant pain control was identified as the difference of at least 2 points on the VAS score before and after the procedure in an alert and conscious patient .

Percentage of patients in each VAS strata (0= no pain, 1-3 = mild pain, 4-6 = moderate pain, 7-9 = severe pain & 10 = very severe pain) in comparision to total number of patients in each group (FNB , IV Fent , Low dose IV Ketamine) at different time points (before and 10 minutes after the specified intervention in each group) was also noted and the percentage change in the specific vas strata of a group at different points of time was also calculated. Total number of patients in each group with VAS ≤3, 10 minutes after the intervention was noted

After it was made sure the patients were reasonably comfortable 10 mts after the intervention , positioning was done and a spinal block/CSE instituted either in the midline or paramedian approach in sitting position, at the L2/3 or L3/4 level .

Vital parameters: Heart rate (HR), Mean arterial pressure (MAP) by non-invasive blood pressure and Oxygen saturation (SpO_2) were monitored throughout the procedure.

Statistical Analysis

Statistical analysis was conducted using Software Package for Social Science (SPSS)18. For parametric data, mean and standard deviation were considered and P value was calculated by ANOVA. In Non-parametric setting for Qualitative data analysis, Chi-square/ Fisher Exact test was used to find the significance of study parameters on categorical scale between the groups. Fisher Exact test was used when cell samples were very small. Intergroup comparison was done with appropriate Post-hoc tukey test and p-values obtained. p value ≤ 0.05 was considered to be statistically significant.

Table 1: Demographic Data, ASA Status & Mode of Anaesthesia

Variable	Group A (FNB)	Group B (IV Fentanyl)	Group C (IV Low dose Ketamine)	p value
Age	42.75±9.57	42.90±10.8	39.65±11.2	P=0.551
Weight	57.75±11.5	57.50±12.5	52.90±9.28	p=0.311
Gender Male/Female	12/8	15/5	16/4	P=0.344
ASA I/II/III	15/5/0	15/5/0	17/3/0	P=0.789
Mode of anaesthesia CSE/SAB	5/15	7/13	6/14	P=0.788

Mean ±SD (standard deviation); p value ≤ 0.05 significant

Demographic details, ASA status & Mode of Anaesthesia were comparable across the 3 groups and not statistically significant.

Table 2: Diagnosis distribution in the three groups of patients studied

Diagnosis	Group A FNB	Group B IV Fentanyl	Group C Lowdose IV Ketamine	Total
#Femur shaft	1(5%)	11(55%)	12(60%)	24(40%)
IT#femur	12(60%)	0(0%)	0(0%)	12(20%)
#Proximal Tibia	1(5%)	3(15%)	3(15%)	7(11.7%)
IC#Femur	1(5%)	4(20%)	0(0%)	5(8.3%)
Compound#Femur	2(10%)	0(0%)	1(5%)	3(5%)
Acetabulum#	0(0%)	1(5%)	1(5%)	2(3.3%)
Crush injury #BBLEG	2(10%)	0(0%)	0(0%)	2(3.3%)
#BB leg	0(0%)	0(0%)	1(5%)	1(1.7%)
#Distal Femur	0(0%)	0(0%)	1(5%)	1(1.7%)
#Patella Femur	0(0%)	0(0%)	1(5%)	1(1.7%)
#SC Femur	0(0%)	1(5%)	0(0%)	1(1.7%)
BB#leg & # Femur shaft	1(5%)	0(0%)	0(0%)	1(1.7%)
Total	20(100%)	20(100%)	20(100%)	60(100%)

Most of the patients in the study were those with # Femur shaft - 24(40%)

Table 3: Duration of surgery distribution in three groups of patients studied

Duration of Surgery (in hrs)	Group A FNB	Group B IV Fentanyl	Group C Lowdose IV Ketamine	Total
1	0(0%)	0(0%)	0(0%)	0(0%)
2	0(0%)	2(10%)	0(0%)	2(3.3%)
3	15(75%)	13(65%)	13(65%)	41(68.3%)
4	5(25%)	5(25%)	7(35%)	17(28.3%)
Total	20(100%)	20(100%)	20(100%)	60(100%)

p=0.529, Not Significant, Fisher Exact Test
Duration of surgery was 3 hrs in most of the patients - 68.3%.

Table 4: Visual analogue scale score distribution in three groups of patients studied

Visual analogue scale score	Before	After 10 min	% change
Group A (n=20) FNB			
• 0	0(0%)	0(0%)	0.0%
• 1-3	0(0%)	11(55%)	55.0%
• 4-6	6(30%)	9(45%)	15.0%
• 7-10	14(70%)	0(0%)	-70.0%
Group B (n=20) IV Fentanyl			
• 0	0(0%)	0(0%)	0.0%
• 1-3	0(0%)	10(50%)	50.0%
• 4-6	7(35%)	9(45%)	10.0%
• 7-10	13(65%)	1(5%)	-60.0%
Group C (n=20) IV Low dose Ketamine			
• 0	0(0%)	0(0%)	0.0%
• 1-3	0(0%)	15(75%)	75.0%
• 4-6	6(30%)	4(20%)	-10.0%
• 7-10	14(70%)	1(5%)	-65.0%

Chi-Square/Fisher Exact Test

Results

The number of patients whose VAS score after 10 min came down to ≤ 3, corresponding to mild pain in the VAS strata: 11 (55%) in FNB group vs 10 (50%) in IV Fentanyl group vs 15 (75%) in IV Low dose Ketamine group . The number of patients with VAS score ≤ 3, 10 minutes after the intervention were higher in Group C, followed by

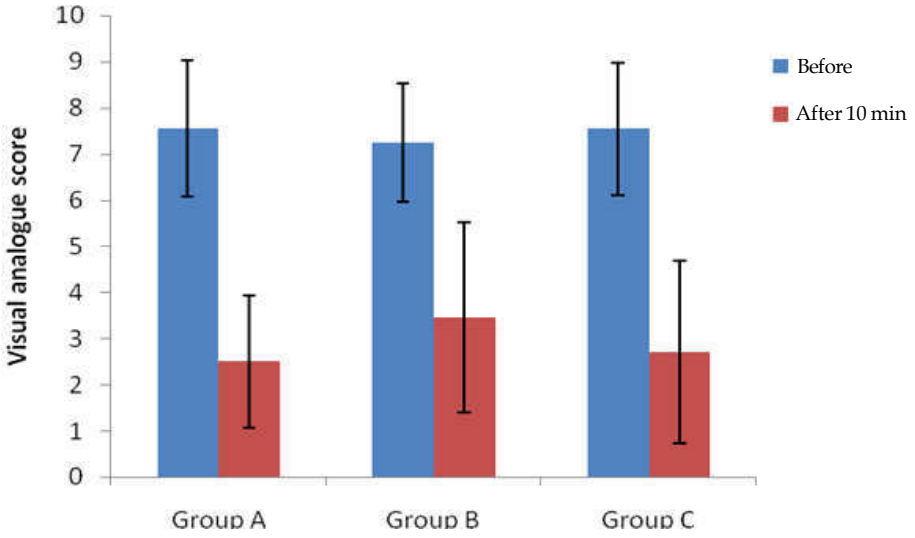

Fig. 1: Visual analogue scale score: comparative assessment of VAS scores in three groups studied

Group A and Group B.

ANOVA test was used for the comparative assessment of VAS scores at different time points and the difference in pre/post intervention VAS scores in the 3 groups .

Baseline VAS scores in the 3 groups – Group A (FNB group): 7.55±1.47 vs Group B (IV Fentanyl group): 7.25±1.29 vs Group C (Low dose IV Ketamine group): 7.55±1.43, p = 0.737, statistically not significant. The baseline VAS scores were comparable amongst the 3 groups .

The VAS score after 10 min in the 3 groups - Femoral nerve block group: 2.5±1.43 vs IV fentanyl group: 3.45±2.06 vs Low dose IV Ketamine group: 2.70±1.98, p= 0.238 , statistically not significant .

The difference of VAS scores before and after 10 min after the specific intervention amongst the 3 groups - Femoral nerve block group: 5.00±1.75 vs IV Fentanyl group: 3.7±1.66 vs IV Low dose IV Ketamine group: 4.65±1.35, with p = 0.035 which was significant ($p \leq 0.05$ was considered significant). VAS score difference of before/after was significantly less in Group B, or higher outcome (pre-post difference of VAS score) was observed in Group A followed by Group C.

Discussion

Fracture is a common problem in orthopaedics, among them, lower limb fractures account for almost one third of all fractures. The incidence of lower limb fractures are equally distributed among males and females till middle age after which the incidence is more in females. As the age advances the lower limb fracture incidence doubles. It was for the said reasons, we designed our study in patients with lower limb fractures. The most dreaded fear associated with any fracture is pain which has got wide psychological, clinical, and behavioural ramifications. Numerous researches and innovations have been carried out to give relief from this most unpleasant experience during intra-operative and postoperative period [2,3].

Fractures are excruciatingly painful because the periosteal tissue is richly supplied by nerve fibres from nerves and has lowest pain threshold among the deep somatic structures [1,4]. Thus, adequate pain management before surgical preparation for any positioning, transfer, and immobilization of patients is crucial for management. In general lower limb fractures are corrected with regional anaesthesia techniques rather than general anaesthesia. Spinal anaesthesia is universally accepted and preferred technique of anaesthesia for surgery of lower limb fractures. In a study on hip fractures by Rizwan HR et al., regional anaesthesia showed a significantly positive association with shorter operative time than general anaesthesia in hip fractures [5]. In another study by Yi-ju-shih et al., they found that regional was a safer option [6].

Spinal/epidural technique has many advantages over general anaesthesia like early mobility, less chances of deep vein thrombosis and mortality. A Cochrane review 2 stated that, RA was associated

with a decreased mortality at one month, even though this decrease was of borderline statistical significance [7]. Furthermore, time to ambulation may be quicker in patients receiving RA [7,8]. In addition, Urwin SC et al., reported that there were advantages for RA compared with GA in terms of 1-month mortality and deep vein thrombosis [8].

Most of these fractures have surgical interventions which are done under regional anaesthesia in our institution, i.e. under spinal/ epidural block. The major problem for spinal/ epidural block is the pain during positioning in these patients. These problems are further accentuated if we encounter obese patients for such surgical procedures. This pain hinders the patient to cooperate with the anaesthesiologist which can end up in multiple attempts or increase in failure chance of the central neuraxial blockade procedure. Many studies were conducted in this aspect, regarding various agents that reduce this pain. Sandby-Thomas M et al., reported that amongst the different medications used to aid positioning for central neuraxial block, the most frequently used agents were midazolam, ketamine, propofol, fentanyl, remifentanil, morphine, nitrous oxide, and sevoflurane [9]. Singh AP et al., suggested femoral nerve block with 0.2% ropivocaine as preemptive analgesic for fracture femur [4]. Amal A Mohammed et al., suggested the use of IV ketamine to reduce positional pain of femur fracture [10].

In this regard , our study aimed at comparing the reduction of positional pain in 3 groups i.e., among femoral nerve block with (1% lignocaine), IV fentanyl (1µg/kg) and IV low dose ketamine (0.1mg/kg), given 10 min before positioning in any of the lower limb fracture patients who were unable to sit due to extreme pain. We, chose femoral nerve block with 1% lignocaine in one of the groups as femoral nerve block has been successfully used in adults for fracture analgesia. Previously, nerve blocks were infrequently used to aid positioning in spinal-epidural block. However, there is sufficient data to show the usefulness of FNB to relieve pain from fracture of the femur and now, is being used for positioning during central neuraxial blockade as well [4,11]. As depicted in Table 2 , majority of the patients in the FNB group (>75%) are those with fracture femur for which femoral nerve block is very effective. Majority of patients in other 2 groups too were those with fracture femur (> 75% in IV Fentanyl group & Low dose IV Ketamine group) having a fair comparibility in the lesion causing the pain and these interventions measuring analgesic efficacy in similar type of lesions.

Demographic details (Age, weight & sex ratio), ASA status & Mode of Anaesthesia were comparable across the 3 groups and not statistically significant as depicted in Table 1, making the 3 groups comparable and avoiding any bias in this regard.

In a randomized controlled trial of femoral nerve blockade administered preclinically for pain relief in femoral trauma , Schiferer A et al., demonstrated that FNB provided analgesia which was adequate for patient transport [12]. A randomized control study by Fletcher AK et al., suggested three-in-one femoral nerve blockade as analgesia for fractured neck of femur in the emergency department [13] & a study on Femoral nerve block in extracapsular femoral neck fractures by Haddad FS et al., reported that Femoral nerve block reduced pain score and analgesic requirements [14]. A study by Parker MJ et al., on nerve blocks (subcostal, lateral cutaneous, femoral, triple, psoas) for hip fractures stated the use of blocks for analgesia [15].

Femoral nerve block can be performed using peripheral nerve stimulator, ultrasound guided technique or by loss of resistance technique. Geier KO concluded that there were no significant differences regarding efficiency between loss of resistance and peripheral nerve stimulator methods [16]. His study reflected that the loss of resistance technique is an effective and feasible alternative to peripheral nerve stimulator technique. Time for peripheral nerve stimulator block was significantly longer ($p < 0.001$).We used Loss of resistance technique for blocking the femoral nerve using a single needle placement as described by Khoo ST and Brown TC [17]. We preferred 1% lignocaine in FNB, as the onset and peak effects of lignocaine are faster (5min) [11,18]. Gosavi CP et al., demonstrated the efficacy of FNB (using Khoo & Brown method) with lidocaine, in providing pain relief for patients with fracture of shaft or neck of femur, while positioning during conduct of regional anaesthesia [18]. Sia et al., compared IV fentanyl with FNB using lidocaine for analgesia before performing spinal block in sitting position for patients with fracture shaft of femur and demonstrated a better efficacy of FNB over IV fentanyl [11].

In prior studies on patients with femoral shaft fracture, by Singh AP et al. [4], and Sia S et al. [11], comparing preemptive analgesia of Femoral nerve block vs IV Fentanyl for patient positioning for spinal block they used IV Fentanyl at a dose of 0.5µg/kg & 3 µg/kg respectively. The time at which

the final VAS was noted (after FNB/IV Fentanyl) before positioning for spinal block in these studies was 15 minutes and 5 minutes respectively. We included IV fentanyl in group B, at a dose of 1µg/kg in our study, as compared to the different doses used in these prior studies, for faster and reliable onset of action and the minimal side effects as has been demonstrated in the previous studies where fentanyl at this dose was used as an adjuvant in Regional anaesthesia [19]. The time interval between the intervention (FNB/IV fentanyl/IV Low dose Ketamine) and noting the VAS scores before positioning for central neuraxial blockade was 10 minutes in our study. IV low dose ketamine (0.1mg/kg) was considered in group C for its analgesic properties [20,21]. In agreement with our study, Suzuki M et al., found that ketamine in subanesthetic doses possesses analgesic properties [20]. In the review article by Gorlin AW et al., they concluded that sub-anaesthetic dose of ketamine improves pain scores and reduces perioperative opioid consumption in a broad range of surgical procedures with a minimal risk of side effects [21].

Sub-anaesthetic ketamine has efficacy when given as an intraoperative bolus alone or as an intraoperative dose followed by a postoperative infusion of 24-72 h. The ideal dose of sub-anesthetic ketamine is 0.1-0.3 mg/kg as a bolus and 0.1-0.3 mg/kg/h as an infusion [21]. At sub-anaesthetic doses, ketamine has a minimal physiologic impact though it is associated with a low incidence of mild psychomimetic symptoms as well as nystagmus and double vision. Relative contraindications to its use do exist and due to ketamine's metabolism, caution should be exercised in patients with renal or hepatic dysfunction [21]. Psychosensory effects increase at doses above 0.3 mg/kg, so this can be considered a soft upper limit for bolus doses in awake patients [21].

In the study by Menigaux C et al., they used single intraoperative dose of ketamine 0.15mg/kg in patients scheduled for outpatient arthroscopic menescectomies under general anaesthesia and observed that at the said dose , it reduced the pain scores postoperatively at rest and during mobilisation [22]. In a case series by Lester L et al., they described the use of low dose ketamine (< 0.6 mg/kg) as a safe and effective analgesic for patients in Emergency department [23]. There are experimental studies indicating that, at low doses ketamine inhibits NMDA (N-methyl-D-aspartate) receptors ion channels of the postsynaptic membrane of neurons of spinal dorsal horn [21,24-27]. Low-dose ketamine inhibits nociception through its high affinity for the NMDA receptor. It may be that low-dose ketamine interacts more selectively with NMDA receptors, whereas, at full-anaesthetic doses, ketamine activates different types of opioid receptors with various affinities (µ, κ, and σ opioid receptors) [28-31].

The routine use of ketamine as an analgesic is avoided for the fear of it's side effects, however, several studies have shown that low dose ketamine was safe, a potent opioid adjuvant in pain relief quality and that it decreased postoperative opioid consumption [20,24-27]. As enumerated by Suzuki M et al., in their study, subanesthetic doses of ketamine and its enantiomers have been shown to produce a feeling of "high" and to be anxiolytic at low doses, but anxiogenic at higher doses [32].

In the study by Oda A et al., ketamine, 5 mg IV,was as effective as 50 µg fentanyl IV, in alleviating patient anxiety and in providing adequate sedation during the procedures necessary for epidural catheter placement, without inducing severe complications suggesting the use of ketamine [33]. Generally side effects of emergence and psychomimetic changes are a hindrance for its use but at such low dose of 0.1mg/kg in our study there were no such side effects observed . In support to this, the study by Badrinath S et al.,[34] concluded that subhypnotic dosage of ketamine, administered in combination with propofol for sedation, contributed significant analgesia without hemodynamic and respiratory depression or psychotomimetic side effects & larger doses of ketamine were associated with a clinically significant increase in psychotomimetic side effects.

Kumar VR et al.,[35] in their study of comparision of efficacy of three different subanaesthetic doses of IV ketamine (0.3mg/kg , 0.4mg/kg & 0.5mg/kg) for allaying the procedural discomfort during establishment of subarachnoid block demonstrated that the in the dose of 0.3 mg/kg , ketamine provided sufficient sedation for allaying procedural discomfort due to less sedation, less positional difficulty, early verbal response, no hallucinations, no recall of performance of procedure, and good patient satisfaction but patients in this dosage group had higher spinal needle prick response and scores as opposed to other 2 groups (0.4mg/kg & 0.5 mg/kg).

As priorly stated , in our study we used sub anaesthetic - analgesic IV ketamine dose of 0.1mg/kg (without any supplemental benzodiazepine or any other drug for premedication), which would be devoid of complications if any, less than that used in other studies in varied settings (Menigaux

C et al. [22]- 0.15mg/kg for analgesia after arthroscopic menescectomies, Lester L et al. [23] - 0.1 to 0.6mg/kg for analgesia in emergency department, Mohammed AA et al. [10] - 0.15 to 0.25mg/kg for analgesia before spinal anaesthesia for fractured femur).

Severity of pain was assessed by the visual analogue scale because it is an easy method for assessment of pain especially for the elderly [36].

All the patients in the 3 groups were haemodynamically stable after 10 min of the intervention depicting the safety of all the 3 interventions as such, to decrease positional pain.

In this prospective, randomised, comparative study, we found FNB with 1% lignocaine to be a better analgesic than IV Low dose Ketamine and IV Fentanyl in positional pain relief with VAS score difference (between baseline and 10mts after intervention) of 5.00±1.75 in FNB group vs 3.70±1.66 in IV Fentanyl group vs 4.65±1.35 in Low dose Ketamine group as is depicted in Figure 1. There are many studies comparing femoral nerve block with fentanyl, demonstrating the efficacy of FNB over I V fentanyl [4,11]. Similarly there are studies showing ketamine's role as an analgesic in relieving fracture pain [10].

However, in our study we compared all the 3 groups. Taking the VAS score before and after 10 min of administration into consideration, FNB appeared to provide superior pain relief, with VAS difference of (5.00±1.75) (p=0.035) compared with IV Low dose Ketamine (4.65±1.35) or IV Fentanyl (3.70±1.66) as represented in Figure 1. Another significant observation to note from the results depicted in Table 4 , is in the ketamine group regarding the VAS score after 10 min. The patients whose VAS scores have come down to ≤ 3 referred as mild pain are more in comparison with the FNB group (15 in ketamine vs 11 in FNB out of 20 in each group, accounting to 75% in ketamine and 55% in FNB group), suggesting that, the relief of pain is noteworthy, adding to the comfort of the patient clinically. Hence, IV Low dose Ketamine can be preferred in those patients who refuse to give consent for FNB or who have contraindications for FNB [10].

Conclusion

Reduction of positional pain can be addressed in several ways. In this study Femoral Nerve Block with 1% lignocaine appeared to provide better analgesia than IV Fentanyl and IV Low dose Ketamine. However, IV Low dose Ketamine appears to alter the pain scores to clinically comfortable levels for the patient in a quick and non-invasive way, & so can be preferred in cases where patients refuse to give consent or have contraindications for FNB.

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