

Comparison of 0.2% Ropivacaine With 2% Lignocaine in Femoral Nerve Block for Preoperative and Postoperative Analgesia in Femur Fractures



Medical Science

KEYWORDS : femoral nerve block, lignocaine, ropivacaine.

Dr Vaneet Kaur

Anesthesiologist at Patiala

Dr Kanwarneet Singh

Senior Resident Oncosurgery at NIZAMS Institution, Hyderabad

ABSTRACT

Background: There is limited data on comparison of ropivacaine and lignocaine in femoral nerve block in preoperative and postoperative period in terms of analgesia.

Introduction: Femur fractures are very painful. The peripheral nerve block provides good analgesia in these patients before performing regional anesthesia. This study aims to compare 2 local anesthetics in femoral nerve block for analgesia in preoperative and postoperative period.

Methods: Prospective, randomized study was conducted on 60 patients (18-60 years) of ASA I&II scheduled for femur surgery under combined spinal epidural. In group I (n=30), femoral nerve block(FNB) was performed using nerve stimulator with 0.2% ropivacaine (15ml) and in group II(n=30), 2% lignocaine (15 ml) was used. Various parameters like numeric rating pain scale, time to spinal anaesthesia, sensory and motor block onset times and durations, time to first analgesic use, intraoperative & postoperative visual analog scale (VAS) data, postoperative epidural top ups, vitals and side effects were recorded for each patient.

Results: Pain assessed on visual analogue scale (VAS) during positioning was significantly less in FNB group using 2% lidocaine at 5 minutes. Time to perform spinal block was significantly shorter in FNB group using 2% lignocaine (8.30 min) versus ropivacaine group (17.30 min). But postoperative analgesic requirements were more in lignocaine group and duration of analgesia was prolonged in ropivacaine group.

Conclusion: With lignocaine time to perform spinal anesthesia was reduced but postoperative analgesia was better with ropivacaine group.

INTRODUCTION:

Fracture of femur is a very painful injury. Surgical repair most commonly involves either internal fixation of the fracture or replacement of the femoral head with arthroplasty.^[1,2] In these surgeries regional anesthesia is preferred over general anesthesia (GA).^[3] However, positioning of these patients is quite painful. Providing adequate pain relief not only increases comfort in these patients, but has also been shown to improve positioning for spinal block.^[4] Before positioning femoral nerve block can be given to the patient which is a very good mode of pain relief.^[5,6,7] This prospective study was performed to compare the analgesic effects of 2 local anesthetics i.e. 2% lignocaine and 0.2% ropivacaine in FNB prior to positioning for spinal block in patients with fractured femur and the analgesic requirements in both the groups in the post op period.

MATERIALS AND METHODS:

After obtaining institutional approval and written informed consent, we selected 60 patients with fracture femur for this prospective, randomized, controlled trial. Inclusion criteria were age 18–70 years, ASA physical status I–II, and being scheduled for surgery under spinal block. Exclusion criteria were multiple fractures, peripheral neuropathy, bleeding disorders, psychiatric disorders, allergy to local anesthetics, spinal deformities like kyphosis and scoliosis. Using computer generated random number tables and considering power of study to be >80% and alpha error of 0.5, the number needed were 28. So we selected 30 patients in each group. The patients were randomly allocated to two groups of 30 patients each. In group I, femoral nerve block was given with 15 ml of 0.2% ropivacaine whereas in group II 15 ml of 2% lignocaine was used.

On arrival all patients were monitored with electrocardiography, pulse oximeter, and non-invasive blood pressure measurement. An infusion of lactated Ringer's solution was started and all patients were supplied with oxygen via a face mask. Patients received FNB guided by a peripheral nerve stimulator.

Technique of femoral nerve block: The patient is placed supine, anterior superior iliac spine and pubic symphysis are identified and a line is drawn between these landmarks. This line represents the inguinal ligament. The femoral pulse is palpated and

it is marked at the inguinal crease. The most successful point of needle entry is directly lateral (1–1.5 cm) to the artery in the inguinal crease. At this location the femoral nerve is wide and superficial. The needle is directed cephalad towards the center of the inguinal ligament line.

Stimulation: The nerve stimulator is initially set at 1.0 to 1.2 mA. The needle is directed cephalad at approximately a 30° to 45° angle. A brisk "patellar snap" with the current at 0.5 mA or less is indicative of successful localization of the needle near the femoral nerve. The nerve is usually superficial, rarely beyond 3 cm from the skin and lateral to femoral artery. The local anaesthetic is then given. In our study we used 0.2% ropivacaine 15 ml in group I and 2 % lignocaine 15 ml in group II.



Fig.1: Nerve stimulator for femoral nerve block.

Then patient was then shifted to the operating room and combined spinal epidural was performed in sitting/ lateral position after 15 minutes of giving preemptive analgesia. After injecting local anaesthesia (at lumbar interspace) with 2% xylocaine epidural 18G touhy's needle was inserted at appropriate interspace. Epidural space was identified by using loss of resistance technique and epidural catheter was inserted. With close monitoring of heart rate test dose of 3ml lignocaine with adrenaline was given. The subarachnoid block using 25G Quincke needle was performed and 3ml of 0.75% ropivacaine injected after obtaining

free and clear flow of CSF one level below epidural catheter. The catheter was secured and patient made supine. In case of difficulty in performing epidural technique, spinal anaesthesia was performed. After performing femoral nerve block, quantitative relief of pain using VAS scale and satisfaction score was assessed after giving drugs at interval of 2 min, 5 min, 10min and 15 min and during positioning. Time to perform spinal anesthesia was also recorded.

Intraoperatively the time of onset, level and duration of sensory block were recorded. Motor bromage scale was used to assess motor block. No. of epidural top ups required were noted intraoperatively (given after 2 segment sensory regression). VAS was assessed postoperatively in ward till 24 hours and epidural top up with 0.2% ropivacaine 8ml was given when VAS ≥ 4 . On completion of the study, the results were compiled and statistically analyzed using Chi Square test for non-parametric data and ANOVA for parametric data. Post hoc students paired t test was applied whenever indicated using SSPS I or III software. P value of less than 0.05 was considered significant and less than 0.001 as highly significant.

RESULTS:

The demographic data was comparable in both groups [Table 1]. VAS at rest and movement for both groups was almost similar in both groups (Ropivacaine / lignocaine) at 2 minutes to 10 minutes (5.63 \pm 1.273 versus 4.20 \pm 1.157 at 2 minutes; 3.70 \pm 1.149 versus 2.90 \pm 1.296 at 10 minutes) though it was slightly in favor of group II. Time to perform spinal anesthesia was shorter in group II (8.30 \pm 2.178 versus 17.80 \pm 1.064) (Table 3) which was highly significant. The lignocaine group (group II) had less duration of analgesia and required first top up at 4 hours after surgery whereas it was required at 6 hours in ropivacaine group (group I). The difference was statistically significant (table 4). In group I no. of epidural top ups required were less as compared to group II (mean epidural doses 2.77 versus 3.70 (table 5)

DISCUSSION

The choice of the anesthesia management in patients with a fracture of the femoral shaft is greatly affected by the surgical needs. [8] Therefore, a technique that allows the complete paralysis of all the muscles acting on the femur is mandatory to facilitate the intraoperative realignment of a femoral shaft fracture.

Urwin et al reported that there were significant advantages for regional anesthesia (RA) compared with GA in terms of one-month mortality and deep vein thrombosis. [2]Furthermore, time to ambulation was quicker in patients receiving RA. However, the choice of anesthetic technique depends on the anesthesiologist's preference and experience. The subsequent problem concerned was pain on positioning for spinal block. When considering the technique used to aid positioning patients for spinal block, Sandby-Thomas et al reported that the most frequently used agents were midazolam, ketamine and propofol. [9] Alternative agents were fentanyl, remifentanyl, morphine, nitrous oxide, and sevoflurane, whereas nerve blocks were used infrequently. Schiferer et al demonstrated that FNB provided analgesia after femoral trauma which was a better technique to reduce pain. [10] In our study same volumes of 2 local anesthetics i.e. lignocaine and ropivacaine 15 ml were used, like those reported by Fanelli.[11]

Lidocaine is a widely used local anesthetic for nerve block in outpatient surgeries.[12] Usually, lidocaine 2% is used to block the femoral nerve.[13] In this study, combining a femoral nerve block with spinal anesthesia provided better pain free positioning for the spinal anesthesia procedure. Of the two used local anesthetics, ropivacaine showed a greater control of the pain in postoperative period. Our analysis showed that use of lignocaine for FNB provided less duration of analgesia requiring first top

up at 4 hours after surgery whereas it was required at 6 hours in femoral nerve block group. The difference was significant statistically. At 6 hours there was no difference. In both groups, number of epidural top ups required was reduced thus showing femoral nerve block had prolonged duration of action for postoperative analgesia also as supported by Marino et al who reported that femoral block significantly reduced the need for opioids postoperatively.[15] In ropivacaine group, no. of epidural top ups required were less as compared to lignocaine group (mean epidural doses 2.77 versus 3.70). One patient in group I developed bradycardia which was managed by inj. atropine 0.6 mg IV. In studies conducted by Mantouvalou et al.[16] Bradycardia was noted in 2 patients who had received ropivacaine which was managed with inj. atropine. To conclude we can say that lignocaine reduced the time to perform spinal anesthesia but postoperative duration of analgesia was prolonged with ropivacaine and thus had less analgesic requirements.

Table 1: DEMOGRAPHIC DATA

	GROUP I	GROUP II	P VALUE
AGE	51.70 \pm 15.02	48.20 \pm 15.18	.373
SEX (M/F)	19/11	19/11	

Table 2a: PREEMPTIVE ANALGESIA

Time	Group I	Group II	P value
Baseline	8.60 \pm 1.22	8.83 \pm 1.07	0.450 ^{NS}
A0	7.57 \pm 1.478	8.43 \pm .971	0.009
2	5.63 \pm 1.273	4.20 \pm 1.157	0.009
5	4.20 \pm 1.157	3.70 \pm 1.149	0.009
10	3.70 \pm 1.149	2.90 \pm 1.296	0.009
15	2.90 \pm 1.296	1.47 \pm .937	0.009
P0	6.53 \pm 1.456	5.03 \pm .615	0.009

Data: Mean \pm SD, S: significant (p <0.05);p<0.001 =highly significant(HS)

Table 2b: SATISFACTION SCORE

Time	Group I	Group II
VAS0	1.87 \pm 1.383	1.83 \pm 1.112
VAS15	1.97 \pm 1.351	1.60 \pm 1.062
VAS 30	2.07 \pm 1.230	2.03 \pm 1.165
VAS 45	2.07 \pm 1.230	2.03 \pm 1.165
VAS 60	2.50 \pm 1.137	2.07 \pm 0.999
VAS 75	2.63 \pm 1.189	2.00 \pm 0.952
VAS 90	2.73 \pm 1.112	2.00 \pm 0.898
VAS 105	2.97 \pm 1.189	2.00 \pm 0.900
VAS 120	3.07 \pm 1.258	2.00 \pm 0.932

Data: Mean \pm SD,NS:

Table 3: TIME TO PERFORM SPINAL ANAESTHESIA:

Group	N	Spinal anaesthesia time(minutes)	P value	Analysis
Group I	30	17.80 \pm 1.064	<0.001**	HS
Group II	30	8.30 \pm 2.178		

Data: Mean \pm SD, S: significant (p <0.05);<0.001 =highly significant

Table 4: COMPARING VAS IN WARD IN 2 GROUPS

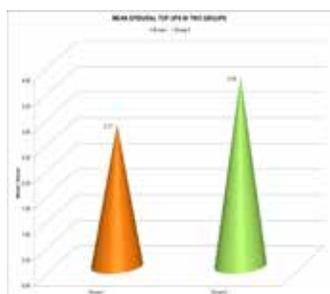
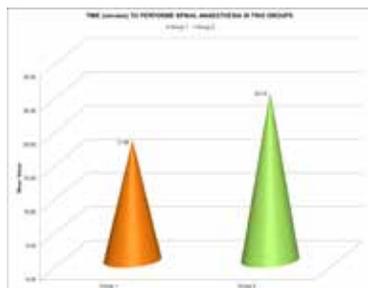
Time	Group I	Group II	P value	Analysis
4	4.33 \pm 1.398	5.33 \pm 1.422	.008	S
6	5.00 \pm 1.259	5.87 \pm 1.167	.008	S
8	7.13 \pm 1.137	7.13 \pm 1.137	1.00	NS
16	8.03 \pm 0.320	8.03 \pm 0.320	1.00	NS
24	8.00 \pm 0.455	8.00 \pm 0.00	1.00	NS

Data: Mean \pm SD,NS: Not significant (p >0.05); S: Significant (p<0.05)

Table 5: NO. OF EPIDURAL TOP UPS REQUIRED IN POSTOPERATIVE GROUP.

Group	Mean epidural doses	P value
I	2.77	.001
II	3.70	

Data: Mean \pm SD, S: significant ($p < 0.05$); < 0.001 = highly significant

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