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Original Research Paper

Anaesthesiology

COMPARATIVE STUDY OF 0.5% ROPIVACAINE VERSUS 0.5% BUPIVACAINE IN FEMORAL NERVE BLOCK FOR PREOPERATIVE POSITIONING IN FRACTURE OF FEMUR

Dr. Priyanka Bhale Jr Resident, Dept. of Anaesthesia

Dr. Nawab Jamadar Professor, Dept. of Anaesthesia

Dr. Saket Shingolikar Jr. Resident, Department of orthopaedics

ABSTRACT

Background: Fracture of femur is particularly a painful bone injury because the periosteum has the lowest threshold of deep somatic structure. Present study was aimed to evaluate and compare efficacy and safety between two local anaesthetics i.e., 0.5% bupivacaine and 0.5% ropivacaine in femoral nerve block in patients with femur fracture. **Material and Methods:** Present study was comparative, observational study, conducted in patients of age 18-70 years, either gender, ASA Grade I/II, scheduled for femur fracture surgeries under regional anaesthesia. Patient were randomized in group R(n=37) who received ropivacaine 0.5%20ml or group B (n=37) who received bupivacaine 0.5%, 20ml for femoral nerve block. **Results:** Mean age of the patients from Group R and Group B was 51.38±16.1 and 53.03 ± 11.17 years, difference was statistically non-significant. Mean onset of sensory block of the patients from Group R and Group B was 4.84 ± 0.99 and 4.95 ± 1.10 minutes, difference was statistically non-significant. Mean onset of motor block of the patients from Group R and Group B was 11.78±1.49 and 11.81 ± 1.33 minutes, difference was statistically non-significant. Mean time required to perform spinal anaesthesia from Group R and Group B was 12.24 ± 1.48 and 12.08 ± 1.23 minutes, difference was statistically non-significant.We observed that there was no statistically significant difference between two groups in terms of pulse rate, systolic blood pressure, diastolic blood pressure, mean arterial pressure, SpO2, VAS score (P>0.05).at different time intervals between Group R (Ropivacaine 0.5%) and Group B (Bupivacaine 0.5%). **Conclusion:** Duration of onset of sensory block and motor block is similar in Group B (Bupivacaine) and in Group R (Ropivacaine) for femoral nerve block for preoperative positioning in fracture of femur. Both drugs are equally safe with respect to hemodynamic parameters stability is concerned. Duration for positioning for spinal/epidural is similar in bupivacaine and ropivacaine.

KEYWORDS : Bupivacaine, Ropivacaine, fracture femur, femoral block

INTRODUCTION

Fracture of femur is particularly a painful bone injury because the periosteum has the lowest threshold of deep somatic structure. Hence requires adequate analgesia prior to definitive surgical management. Pain is worsened by movement due to overriding of bone ends hence positioning of patient while induction is challenging for anaesthesiologists.[1]

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 anaesthesia is preferred over general anaesthesia (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]

0.5% Bupivacaine requires shorter time for onset of motor and sensory block than 0.5% ropivacaine when used in femoral nerve block. Analgesic duration of 0.5% bupivacaine is more as compared to 0.5% ropivacaine.[6,7] Ropivacaine is less cardiotoxic and neurotoxic as compared to bupivacaine thus has been accepted as a safer option.[8,9]Present study was aimed to evaluate and compare efficacy and safety between two local anaesthetics i.e., 0.5% bupivacaine and 0.5% ropivacaine in femoral nerve block in patients with femur fracture.

MATERIAL AND METHODS

Present study was single-center, comparative, observational study, conducted in department of Anaesthesia, at tertiary health centre. Study duration was of 2 years (January 2021 to December 2022). Study approval was obtained from institutional ethical committee.

Inclusion criteria

- Patients of age 18-70 years, either gender, ASA Grade I/II, scheduled for femur fracture surgeries under regional anaesthesia, willing to participate in present study

Exclusion criteria

- Patients with uncontrolled cardiovascular and respiratory disease, Peripheral neuropathy.
- ASA Grade III and IV
- Patients with bleeding disorders, spinal deformity
- Drug allergy
- Psychiatric disorder

Study was explained to patients in local language & written consent was taken for participation & study. 74 patients aged 18-70 years of either sex, height, weight, ASA status I and II scheduled for elective fracture of femur surgeries were enrolled in this study. Patient's informed consent was taken, Nil per oral status was confirmed. The procedure of Femoral block was explained and the patient was informed to communicate to the anesthesiologists about perception of any pain or discomfort during the surgery. All the patients were subjected to detailed pre-anaesthetic evaluation with clinical history, General and Systemic examination of RS, CVS, CNS .Routine investigations like Haemogram, Random Blood Sugar, Renal Profile, X ray chest (PA view) and ECG for patients were done.

Patient were randomized in groupR (n=37) or groupB (n=37) for femoral nerve block.

GROUP R= received injection ropivacaine 0.5% 20 ml
GROUP B= received injection bupivacaine 0.5% 20 ml

The patient was placed supine, anterior superior iliac spine and pubic symphysis are identified and a line was 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 directed 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 at approximately a 30° to 45° angle. A tingling sensation (paresthesia) 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 anaesthestic is then given..

Various parameters such as Onset of sensory and motor block, hemodynamic changes after giving block & time required to perform spinal/epidural anaesthesia. After performing femoral nerve block, quantitative relief of pain using VAS scale and satisfaction score was assessed after giving drug at interval of 2min,5min,10min and during positioning.Time to perform spinal anaesthesia were also recorded.

Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi- square test or Fisher exact test as applicable. P value less than 0.05 was considered as statistically significant.

RESULTS

In present study, 37 patients in each group i.e. Group R (Ropivacine 0.5%) and Group B (Bupivacaine0.5%) were studied. Mean onset of sensory block of the patients from Group R and Group B was 4.84 ± 0.99 and 4.95 ± 1.10 minutes, difference was statistically non-significant. Mean onset of motor block of the patients from Group R and Group B was 11.78±1.49 and 11.81 ± 1.33 minutes, difference was statistically non-significant. Mean time required to perform spinal anaesthesia from Group R and Group B was 12.24 ± 1.48 and 12.08 ± 1.23 minutes, difference was statistically non-significant.

Table 1 – Anaesthesia characteristics

	Group R (n=37)_	Group B (n=37)	p value
Onset of sensory block in minutes	4.84 ± 0.99	4.95 ± 1.10	0.65
Onset of motor block in minutes	11.78 ± 1.49	11.81 ± 1.33	0.93
Time required to perform spinal anaesthesia (min)	12.24 ± 1.48	12.08 ± 1.23	0.61

We observed that there was no statistically significant difference between two groups in terms of pulse rate (P>0.05). & pulse rate was almost comparable in both the groups at different time intervals.

Table 2- Comparison of mean pulse rate

	Group R	Group B	p value
Preop	78.97 ± 13.13	78.54 ± 13.28	0.888
2 minutes	76.32 ± 12.98	76.05 ± 13.46	0.930
5 minutes	77.08 ± 12.05	74.81 ± 12.38	0.427
10 minutes	76.22 ± 13.07	74.38 ± 11.76	0.527
During positioning	75.22 ± 11.79	74.1 ± 12.39	0.833

We compared the mean MAP at different time interval, between Group R (Ropivacaine0.5%) and Group B (Bupivacaine 0.5%). It is observed that there was no statistically significant difference between two groups (P>0.05).

Table 3- Comparison of mean arterial blood pressure

	Group R	Group B	p value
Preop	101.49 ± 10.90	103.19 ± 14.06	0.562
2 minutes	98.19 ± 9.64	101.78 ± 11.17	0.143
5 minutes	94.16 ± 10.63	97.41 ± 9.88	0.178
10 minutes	93.78 ± 10.71	93.54 ± 10.37	0.921
During positioning	93.81 ± 7.22	93.54 ± 9.23	0.889

We compared the mean VAS at different time interval between Group R (Ropivacaine)and Group B (Bupivacaine). It is observed that there is statistically no significant difference between two groups (P>0.05).

Table 4: Comparison of mean VAS

	Group R	Group B	p value
2 minutes	5.41 ± 0.83	4.86 ± 0.89	0.69
5 minutes	3.62 ± 0.72	2.95 ± 0.81	0.78
10 minutes	2.41 ± 0.72	1.95 ± 0.81	0.9
During positioning	0.57 ± 0.50	0.24 ± 0.43	0.98

DISCUSSION

Administration of epidural anaesthesia requires relatively longer time than spinal hence positioning for patient becomes more problematic. Providing adequate pain relief not only increases comfort in these patients but has also been shown to improve positioning for regional anaesthesia. Femoral nerve block fulfills this requirement for adequate pain relief.

Mean onset of sensory block of the patients from GroupR and GroupB was 4.84±0.99 and 4.95±1.10 minutes.We observed no statistically significant difference between two groups (p>0.05). It means onset of sensory block is comparable in both group in our study. Marhofer P et al.[10] , Dilish G et al.,[6] ,Andrea Casati et al.,[15] demonstrated similar onset of analgesia between the bupivacaine and ropivacaine. Out study showed similar onset time of analgesia between the two groups.

Mean onset of motor block of the patients from GroupR and GroupB was 11.78±1.49and11.81±1.33 minutes. We observed no statistically significant difference between two groups (p>0.05). It means onset of motor block is comparable in both groups in our study. These finding correlates with the findings made by Greengrass RA et al.[16]

In our study, no significant difference was observed with respect to heart rate and mean arterial pressure. These findings consistent with Natarajan et al,[9]Marhofer Petal[13], Dilish G et al[6], Mc Glade D P et al[17]. Considering the literature regarding the cardiovascular and central nervous system toxicity of ropivacaine and bupivacaine, ropivacaine seems to be less toxic than bupivacaine. Another possible mechanism for the lower toxicity of ropivacaine compared with bupivacaine could be an intrinsic vasoconstrictive activity of ropivacaine with subsequent slow plasma uptake.

Mean time required to perform spinal anaesthesia of the patients from Group R and Group B was12.24±1.48 and 12.08±1.23 minutes. We observed statistically non-significant difference between two groups (p>0.05). It means mean time to perform spinal anesthesia was comparable in both the groups.

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, 0.5% Bupivacaine and 0.5%Ropivacaine, both these drugs shows no significant difference in time taken to perform spinal/ epidural anaesthesia.

CONCLUSION

Duration of onset of sensory block and motor block is similar in Group B (Bupivacaine) and in Group R (Ropivacaine)) for femoral nerve block for preoperative positioning in fracture of femur.. Both drugs are equally safe with respect to hemodynamic parameters stability is concerned. Duration for positioning for spinal/epidural is similar in bupivacaine and ropivacaine.

Conflict of Interest: None to declare

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