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Original Research Article

Levobupivacaine versus racemic bupivacaine: a comparative study on spinal anaesthesia in lower limb surgeries

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ABSTRACT

Background: This study aims to compare the anaesthetic potency of intrathecally administered levobupivacaine with racemic bupivacaine in lower limb surgeries.
Methods: 60 adult cases ranging in age from 18 to 60 years with ASA Grade I and II, presenting for elective lower limb surgery were randomly allocated into two groups containing 30 cases each. Cases in Group L received 3ml of 0.5% levobupivacaine and those in Group R received 3ml of 0.5% levobupivacaine.
Results: Cases in both groups showed similarity and no statistically significant differences were observed. Cardiovascular parameters were stable and similar between both groups.
Conclusions: Levobupivacaine and racemic bupivacaine show equally effective potencies for spinal anaesthesia in lower limb surgeries.

Keywords: Bupivacaine, Intrathecal, Lower Limb, Racemic, Surgeries

INTRODUCTION

Lower limb surgeries are often performed under spinal anaesthesia. Caudal epidural block remains a popular and conventional anaesthetic tool for lower limb surgeries. Bupivacaine is the currently available local anaesthetics with long duration of action and its maximum analgesic effect is up to 6-12 hours.[1,2] Several clinical methods and techniques have been implemented to extend the duration of regional anaesthesia with local anaesthetics. Placement of catheter invites a high risk of infection.[3] Many drugs including epinephrine, opioids, clonidine, ketamine, midazolam and neostigmine have been tried as adjuvants with caudal bupivacaine to improve the quality of analgesia and extend its duration but each of these has its own documented adverse effects.[4-6] The primary aim of this study was to compare the pharmacological anaesthetic efficacy of levobupivacaine with bupivacaine and observe the risk of cardiotoxicity and neurotoxicity.

METHODS

The present study was carried out in the department of Anaethesiology, Katihar medical college and hospital, Katihar, Bihar, India. After obtaining ethical clearance from the institutional ethics committee and obtaining written consents from the participants. 60 adult cases ranging in age from 20 to 60 years with ASA Grade I and II requiring elective lower limb surgery under epidural anaesthesia were selected for this prospective, randomized, double-blind study. Cases were randomly allocated into two groups containing 30 cases each. Cases in Group L received levobupivacaine 3ml of 0.5% and those in Group R received racemic bupivacaine 3ml of 0.5%.

Inclusion criteria

All stable cases requiring elective lower surgery

Exclusion criteria

- Cases who did not want to participate in this study
- Cases who had a contraindication to use of Bupivacaine
- Cases with history suggestive of cardio-respiratory illness
- Cases with history of drug sensitivity to the drugs in this study
- Cases with pre-existing neurologic, spinal or sacral degenerations
- Cases with infection at or around the site of injection
- Cases with existing increased intracranial or intraocular pressure
- Cases receiving medications likely to have interaction with local anaesthetics.

All cases were briefed and examined one day before the study. The intrathecal technique was explained to them. They were told that in case of failure of epidural anaesthesia they would be induced with general anaesthesia in that case they would automatically be removed from the study. All cases were directed to remain nil by mouth from the morning of the study. They were premeditated with 5mg Diazepam orally on the night before surgery. All cases were preloaded with 1000ml of Ringer's Lactate trough a 16G intravenous cannula before proceeding for the operation theatre.

Equipment for both epidural and general anaesthesia were kept prepared in the operation theatre. For administration of epidural anaesthesia, 18G Tuohy needle an epidural catheter were prepared. In conventional position for spinal anaesthesia the L3-L4 intervertebral space was marked and a small wheal was made by subcutaneous infiltration of 2ml of 2% lignocaine.

A small nick was then made over the wheal and the 18G Tuohy needle was introduced until the ligamentum flavum was pierced. The stylette was withdrawn and a 5ml glass syringe with smoothly moving piston was attached tightly to the hub of the Tuohy needle. The needle was slowly moved until there was loss of resistance. This indicated the epidural space. The catheter was then threaded to the epidural space and the needle was removed.

The catheter was then fixed with a transparent occlusive dressing and 15ml of 2% xylocaine was injected through the catheter. This produced desirable anaesthesia for the surgeon to perform surgery. Post-surgery the cases were transferred to the postoperative ward for pain management and resuscitation. The cases were now randomly allocated to one of the study groups.

The drugs under this study were randomly injected when analgesic effect was demanded by the subject. This was the first dose and the time was recorded. Each case was visited at 2^{nd}, 4^{th}, 8^{th}, 12^{th} and 24 hours after the first dose. At each visit the VAS score was recorded along with pulse rate, blood pressure and breathing rate. The drug was repeated on demand by the cases and time of each additional dose was recorded. A maximum of four doses of each drug were permissible under this study and cases with sever persistent pain were given a rescue dose of 75mg intravenous Pethidine and excluded from the study being considered a failure case. The time of administration of rescue dose was also noted. After 24 hours, the epidural catheter was removed and pain management was left at the discretion of the attending specialist.

RESULTS

60 adult cases ranging in age from 20 to 60 years with ASA Grade I and II, requiring elective gynaecological surgery under epidural anaesthesia were selected for this study. Cases were randomly allocated into two groups containing 20 cases each. Cases in Group B received Bupivacaine 0.25% and those in Group T received Tramadol 100mg.

Table 1: Age in years of each participant in each group.

Case no.	Group L (levo-bupivacaine)	Group R (racemic-bupivacaine)
01	29	30
02	28	45
03	41	57
04	54	47
05	52	37
06	38	58
07	39	28
08	51	60
09	59	46
10	37	51
11	48	54
12	54	29
13	28	41
14	42	35
15	55	24
16	29	36
17	36	39
18	24	29
19	43	51
20	40	40

Note: It was observed that the cases in both groups were comparable on the basis of mean age being 41.35 years and SD 10.51 (Group L) and mean age of 41.85 years and SD 10.97 (Group R).

Table 2: Sensory block characteristics.

Duration (seconds)	Group L (n =30)	Group R (n =30)
Onset time	8.33±3.79	9.13±3.81

Note: It was observed that sensory block onset time was similar in both groups.

Table 3: Comparison of maximum thoracic level of sensory block.

Thoracic level	Group L	Group R (minutes)
Level	T 4.92±0.96	T 5.04±0.94

Table 4: Motor block characteristics.

Duration (seconds)	Group L (*n* =30)	Group R (*n* =30)
Onset time	6.33±3.03	6.43±3.19

Note: It was observed that motor block onset time was similar in both groups.

Table 5: Incidence of adverse effects in both groups.

Side effect	Group L (*n* =30)	Group R (*n* =30)
Hypotension	2	3
Bradycardia	1	2
Shivering	0	2

Note: Most common side effect was Hypotension, which was observed in 3 cases in Group R.

DISCUSSION

Bupivacaine is most commonly used spinal anaesthesia since its introduction in 1965 however cases of myocardial depression and cardiac arrest have been reported. Resuscitation after bupivacaine administered cardiovascular collapse may be difficult.[4]

Although, levobupivacaine has very similar pharmacological properties to racemic bupivacaine, it is noted for lower toxicity.[5] In present study in Tables 1-4 we have compared the two forms of bupivacaine and found in Table 5, that incidence of side effects especially hypotension was observed. Hypotension was observed in 2 and 3 cases of Group L and Group R respectively.

Bupivacaine is a potentially cardiotoxic drug.[6-8] Levobupivacaine and racemic bupivacaine show equally effective potencies for spinal anaesthesia with regard to time of onset, duration of motor and sensory block, and haemodynamic changes produced after any form of bupivacaine. Intrathecal levobupivacaine in general is a safer and more reliable local anaesthetic for lower limb surgeries.[9,10]

CONCLUSION

Current study concluded that both intrathecally administered levobupivacaine and racemic bupivacaine are safe and effective local anaesthetics for lower limb surgeries. Overall parameters observed in this study showed no significant difference between the two forms of the same drug. However, intrathecal levobupivacaine produces less toxicity.

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