Original Research Article

Indian Journal of Anesthesia and Analgesia
2018; 5 (2): 303-309
DOI: http://dx.doi.org/10.21088/ijaa.2349.8471.5218.25

A Comparative Study of the Effects of Intrathecal Levobupivacaine Vs Ropivacaine for Inguinal Hernioplasty

R. Gowthaman[1], V. Haribabu[2]

[1]Professor, [2]Post Graduate Final Year, Dept. of Anaesthesia, Annamalai University, Rajah Muthiah Medical College, Chidambaram, Tamilnadu 608002, India.

Abstract

Objective: To compare the onset and duration of sensory and motor block, haemodynamic responses, side effects associated with administration of intrathecal isobaric levobupivacaine (0.5%) and isobaric ropivacaine(0.75%) for inguinal hernioplasty. *Place and Duration of Study*: Rajah Muthaih Medical College, Chidambaram, 2016-17. *Methodology*: After obtaining approval from institutional ethics committee and written informed consent from all patients, a randomized controlled double blinded clinical trial was conducted on 50 ASA 1 and 2 adult patients undergoing elective inguinal hernioplasty. Patients were randomly allocated into two groups, group L and group R of 25 each. Patients in group L were to receive isobaric levobupivacaine 0.5% and group R 0.75% ropivacaine. Haemodynamic variables (heart rate, systolic and diastolic BP) and onset and duration of sensory and motor block, sensory regression time were recorded and compared.

Keywords: Levobupivacaine; Ropivacaine; Randomized Control Trial; Double Blinded Study.

Introduction

The quest for searching newer and safer anaesthetic agents is always present in anaesthesiology practice. The introduction of levobupivacaine and ropivacaine has satisfied the need of a drug with superior pharmacokinetic profile and equally efficacious as bupivacaine.

Levobupivacaine, an aminoamide local anaesthetic exerts its pharmacological actions through reversible blockade of neuronal sodium channels. It is S–enantiomer of bupivacaine with low cardiovascular and neurological toxicity [1]. Its long duration of sensory and motor blockade has led to its wide application as local anaesthetic.

Ropivacaine, synthesized by Ekenstam in 1957, introduced in clinical practice in 1996, is an aminoamide local anaesthetic [2], an almost pure S–enantiomer (>99% pure) of Propivacaine. It is less lipophilic than bupivacaine resulting in relatively reduced motor blockade and its less neuro and cardiotoxicity. This greater degree of motor sensory differentiation could be useful when motor blockade is undesirable [3].

Methodology

The study population was randomly divided into two groups with 25 patients in each group. The study was carried out as a randomized double blinded study. The study drugs were prepared and numbered and the register was maintained by another faculty member.

Group L consisting of 25 patients were to receive 0.5% isobaric levobupivacaine intrathecally. Group R consisting of 25 patients were to receive 0.75%

Corresponding Author: Dr. R. Gowthaman, Professor, Dept. of Anaesthesia, Annamalai University, Rajah Muthiah Medical College, Chidambaram, Tamilnadu 608002, India
E-mail: drrgowtham@hotmail.com

Received on 28.10.2017, **Accepted on** 04.11.2017

isobaric ropivacaine intrathecally. A thorough preanaesthetic evaluation was done to rule out any systemic disease. ASA 3 and ASA 4 patients were excluded from the study. Tab. Diazepam 10mg and Tab. Ranitidine 150mg were given on the night before surgery. Patients were maintained nil by mouth for a duration of 8 hours prior to the surgery.

On the day of surgery patient was shifted to the operating room. Intravenous access was secured. A multichannel monitor consisting of pulse oximeter, electrocardiogram, heart rate, noninvasive blood pressure was connected. The baseline heart rate, oxygen saturation, electrocardiogram, systolic, diastolic and mean arterial blood pressures were recorded. An observer new to the group assignments recorded the evolution of sensory block (using the pin prick sensation test) and the motor block (by modified bromage scale).

Modified Bromage Scale

0 – no impairment.

1 – unable to raise extended legs but able to move knees.

2 – unable to raise extended legs, as well as unable to flex knees, able to move the feet.

3 – unable to flex ankle, feet or knees.

The levels of sensory and motor block were recorded every 2mins. Maximum sensory and motor block levels were also recorded.

It was planned to treat bradycardia (HR < 50/min) with inj. Atropine 0.01mg/kg and hypotension (decrease in systolic arterial BP 30% < baseline) with Inj. Mephentramine (6-12mg). Patients were not sedated during surgery.

Observation

In the present study, the mean age(in yrs) in both group R and L is above 50 years.

The mean heart rate in group R is 75.76 and in group L is 74.64

The mean height in group R is 155.40 and in group L is 157.32

The preoperative mean systolic BP in group R is 128.72 and in group L is 126.08

The intraoperative mean systolic BP in group R is 109.52 and in group L is 112.56 and diastolic BP in group R 70.00, group L 69.12.

The onset of sensory block is between 3-5.30mins in group R and 2-3.30mins in group L.

The mean duration of sensory block is 162.80mins in group R and 211.20mins in group L.

The onset of motor block is between 5-6mins in group R and 2-3mins in group L.

The mean duration of motor block in group R is 112.40mins and 209.60mins in group L.

Side effects like hypotension, nausea, vomiting and other adverse effects were not encountered in both the groups.

There is no significant change in age and height distribution between the two groups (Group L and Group R) and majority of patients are above 50 years in both groups.

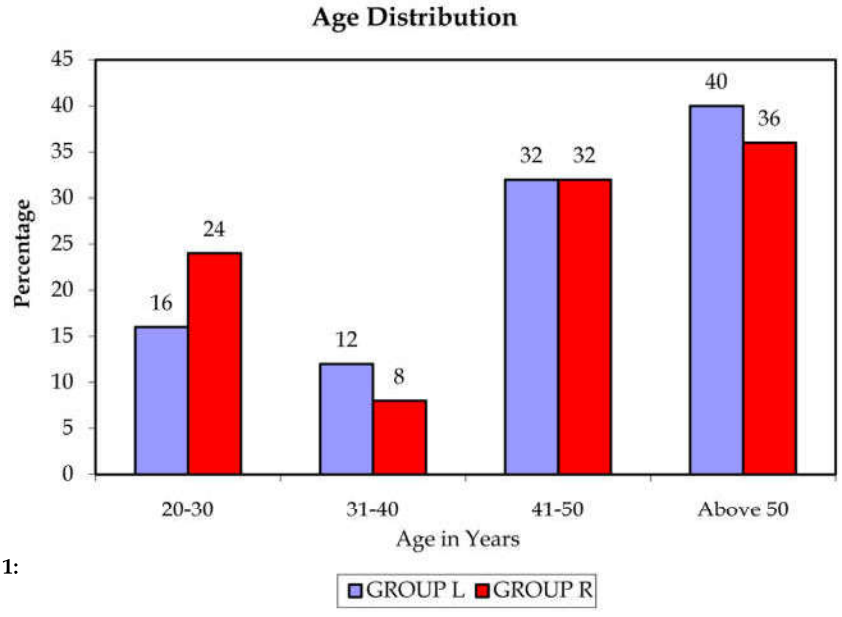

Fig. 1:

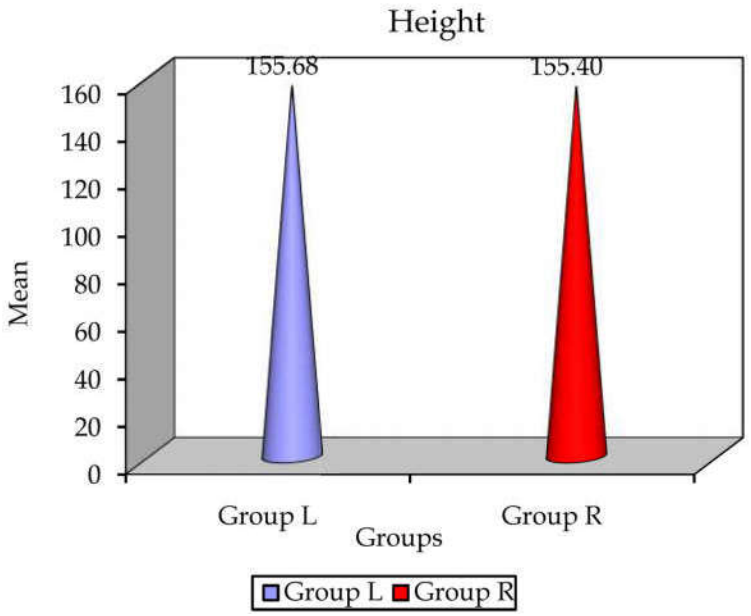

Fig. 2:

Calculated t-value	P Value	Level of Significant
0.348	0.731	Not Significant

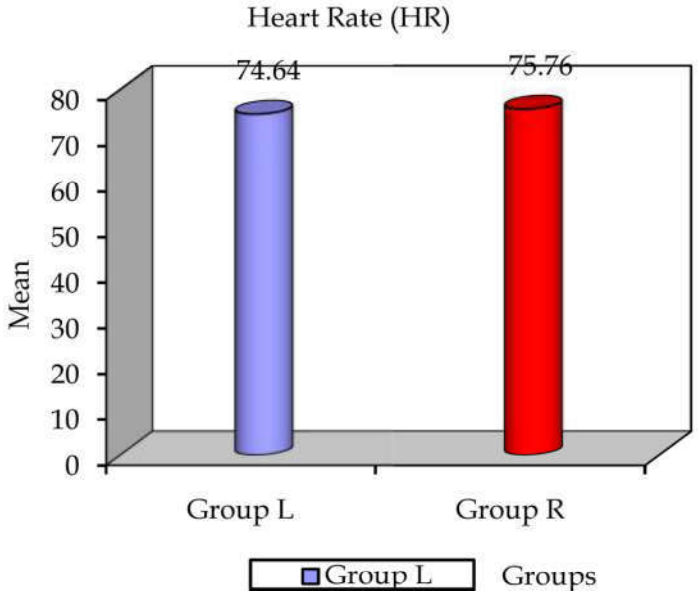

Fig. 3:

Calculated t-value	P Value	Level of Significant
0.698	0.492	Not Significant

There is no significant change in heart rate between the two groups (Group L and Group R)

	Pre-op Systolic	Pre-op Diastolic	Intra-op systolic	Intra-op Diastolic
t-value	1.826	0.532	1.470	0.515
p-value	0.080	0.600	0.153	0.611

Blood Pressure Changes

There is no significant change in pre-operative and intra-operative systolic, diastolic blood pressures between the two groups (Group L and Group R)

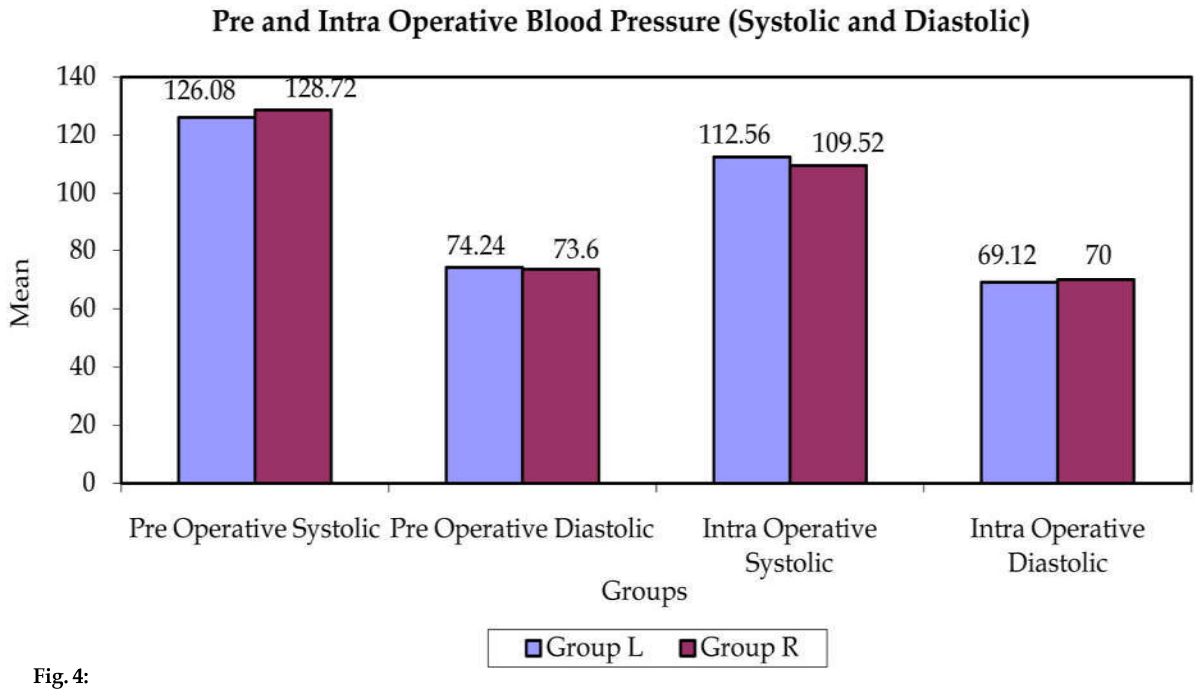

Fig. 4:

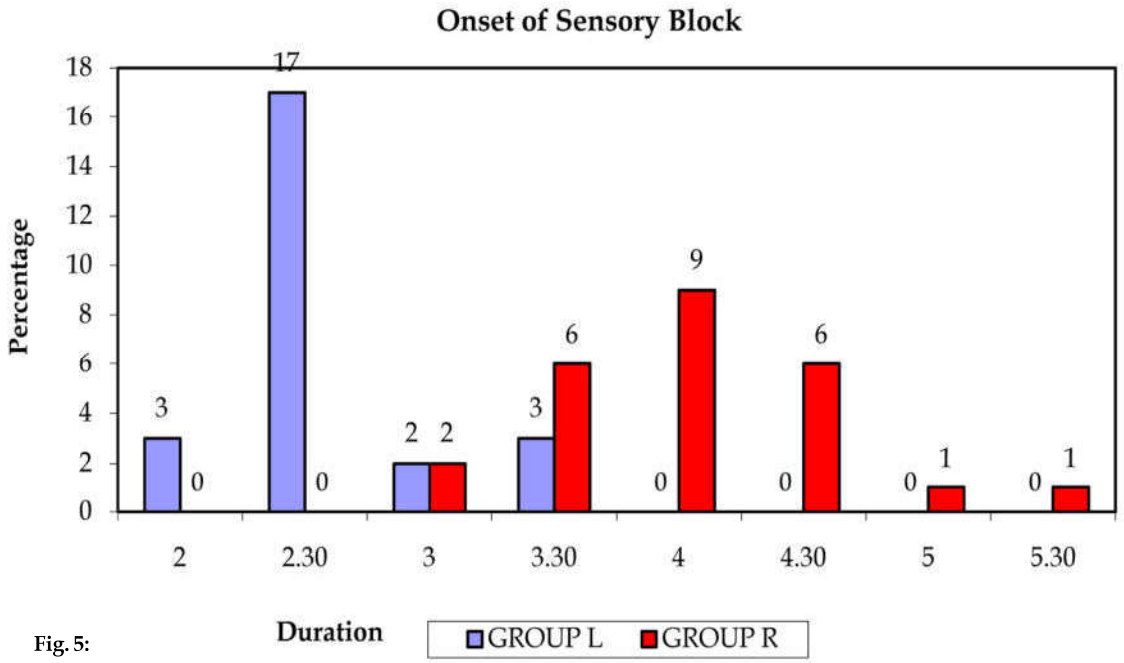

Fig. 5:

Calculated Chi-square Value	Degrees of Freedom	Probability Value
38.00	7	0.0001

Group L has a quicker onset of sensory block as compared to group R.

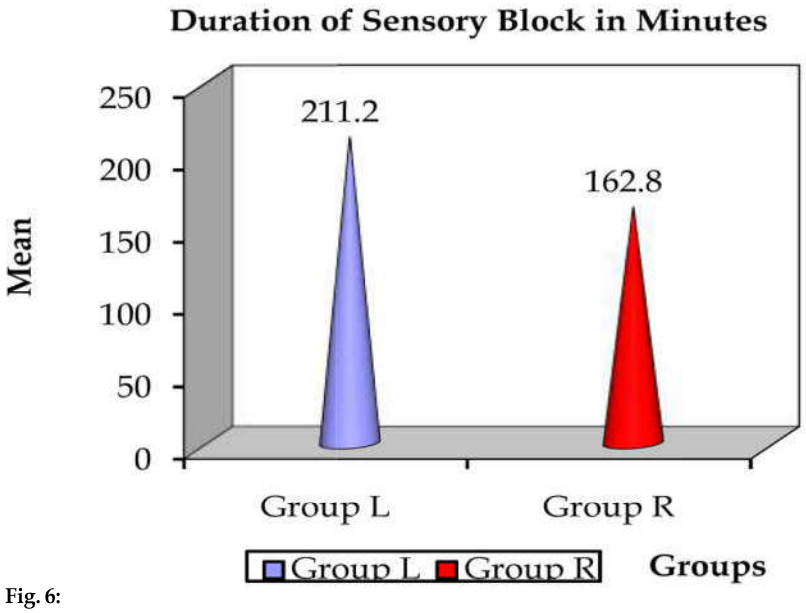

Fig. 6:

Calculated t-value	P Value	Level of Significant
11.894	0.001	Significant

P<0.01

Group L has longer duration of sensory block as compared to group R.

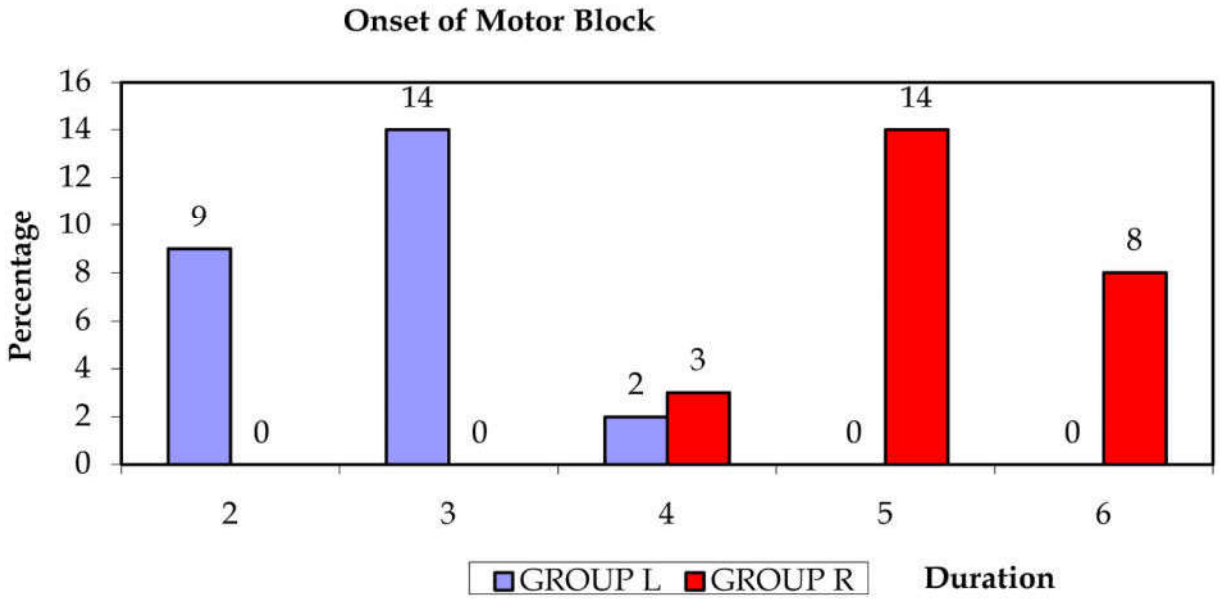

Fig. 7:

Calculated Chi-square Value	Degrees of Freedom	Probability Value
45.20	4	0.0001

Group L has quicker onset of motor block as compared to group R.

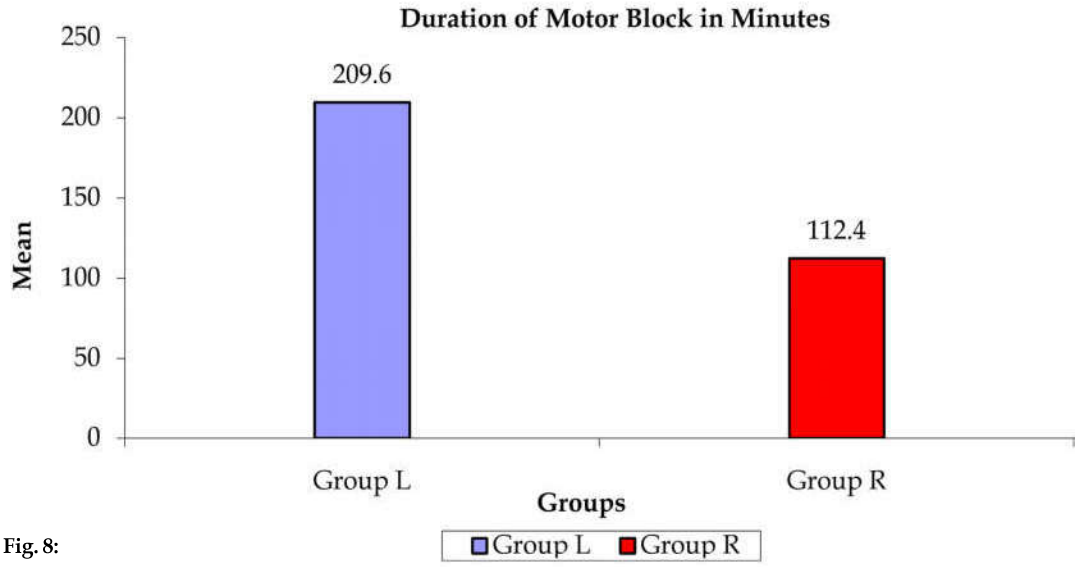

Fig. 8:

Calculated t-value	P Value	Level of Significant
31.525	0.001	Significant

P<0.01

Group L has significant longer duration of motor block as compared to group R.

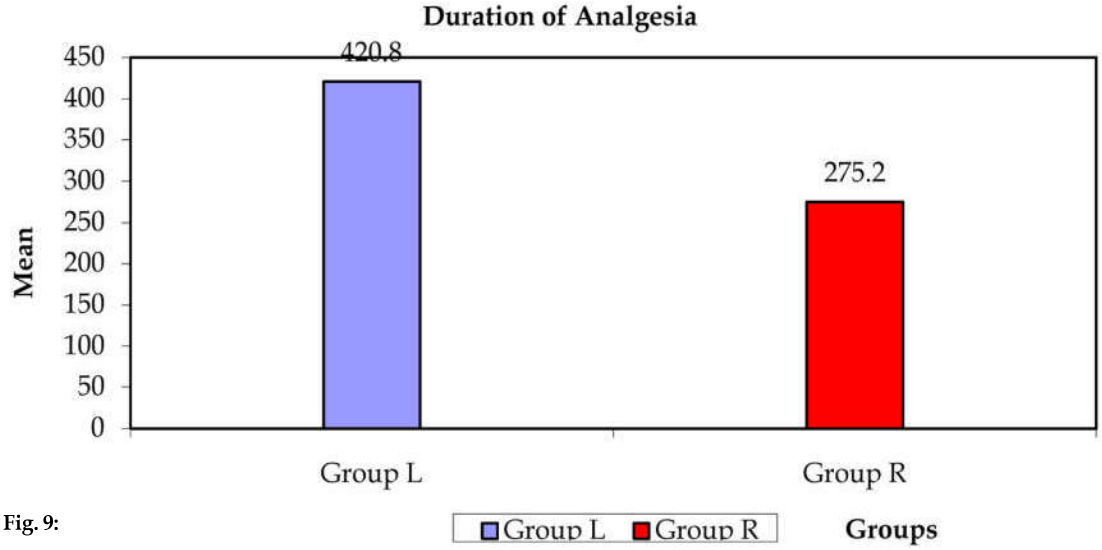

Fig. 9:

Calculated t-value	P Value	Level of Significant
23.307	0.001	Significant

P<0.01

Group L has significant longer duration of analgesia as compared to group R.

Discussion

The intrathecal administration of local anaesthetic agent is commonly employed to avoid the risk of general anaesthesia which involves airway management, aspiration and polypharmacy. It is safe inexpensive and easy to administer, offers high level of postanaesthetic satisfaction for patients. The quality of sensory blockade, motor blockade,

haemodynamic changes and side effect profile are some considerations in selecting a drug for spinal anaesthesia.

Levobupivacaine, a newer local anaesthetic used for lower limb [10], abdominal (inguinal Hernia) surgeries [4,5,6] has long duration of action and minimal cardiovascular and neurological toxicity [7].

Ropivacaine, another new agent is being increasingly used for spinal anaesthesia in caesarean section, labour analgesia [8,9], lower abdominal and perineal surgeries including lower limb surgeries [10]. Advantages claimed are shorter duration of motor block and lesser cardiotoxicity, minimizing the psychological discomfort of being immobile for longtime.

Conclusion

The onset of sensory and motor block is fast in group L than in group R. the mean duration of motor block is prolonged in group L than in group R.

Haemodynamically, both the drug groups showed comparable and stable results. None of the patients needed any intraoperative analgesic topups. We conclude that both 0.5% levobupivacaine and 0.75% ropivacaine can be successfully used in inguinal hernioplasty. Both the drugs in their respective concentrations are equally potent. The side effects are minimal in both the drug groups and both the drugs exhibited stable and comparable results.

References

1. Stewart J, Kellet N, Castro D. The central nervous system and cardiovascular effects of Levobupivacaine and Ropivacaine in healthy volunteers Anaesth Analg 2003;97;412-6.
2. Agarwal A, Verma RK,S rivasta S. Ropivacaine the latest local anesthetic in Indian market. J Anaesth clin Pharmacol 2010;26:223-8.
3. Camorcia M, Capogna G, Berritta C, Columb MO. The relative potencies of motor block after intrathecal ropivacaine, levobupivacaine and bupivacaine. Anesth Analg 2007;104:904-7.
4. Girgin NK, Gurbet A, Turker G,Bulut T, Demir S, Kilic N, et al. Combinaton of low dose levobupivacaine and fentanyl for spinal anaesthesia in ambulatoty hernioplasty.J Int Med Res 2008;36:1287-92.
5. Kehlet H, White PF. Optimizing anesthesia for inguinal hernioraphy: Anesth Analg 2001;93:1367-1369.
6. Kehlet H, Dahl JB. Spinal anesthesia for inguinal hernia repair:Acta Anaesthesiol Scand 2003;47:1-2.
7. Bajwa SJ,Kaur J.Clinical profile of levobupivacaine in regional anaesthesia:A systematic review.J Anaesthesiol clin Pharmacol 2013;29:530-9.
8. Viscomi CM, Rathmell JP, Pace NL. Duration of intrathecal labour analgesia:Anesth Analg 1997;84: 1108-12.
9. Sia AT, Goy RW, Lim Y, Ocampo CE. A comparison of median effective doses of intrathecal Levobupivacaine and Ropivacaine for labour analgesia. Anesthesiology, 2005;102:651-6.
10. A Mehta, V Gupta, R Wakhloo, A Gupta, R Bakshi,B Kapoor, S Gupta. Comparison of efficacy of intrathecal ropivacaine and levobupivacaine for lower limb surgeries.Intrenet journal of anaesthesiology, 2007;17(1):1-7.