

Original Research

Comparative evaluation of haemodynamical changes with different doses of ropivacaine in lower limb surgery- A clinical study

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ABSTRACT:

Background: The introduction of safe drugs enhanced the popularity of spinal anaesthesia. The present study was conducted to compare haemodynamical changes associated with different doses of ropivacaine in lower limb surgery. **Materials & Methods:** The present study was conducted on 84 patients of American Society of Anesthesiologists (ASA) physical status I and II of age group 20 - 65 years of both genders. Patients were divided into 2 groups of 42 patients each. Group I (42 patients) received 22.5 mg (3 mL) of 0.75% isobaric ropivacaine hydrochloride and group II (42 patients) received 15 mg (3 mL) of 0.5% isobaric ropivacaine hydrochloride. Mean pulse rate, respiratory rate, systolic and diastolic blood pressure was compared in both groups. **Results:** The mean pulse rate, SBP, DBP, respiratory rate recorded in both groups pre-operatively, at 0 min, 5, 10, 20, 40, 60, 75, 90, 120, 150 and 180 minutes found to be non-significant ($P > 0.05$). Hypotension was present in 5 in group I and 6 in group II, bradycardia in 4 in group I and 5 in group II, headache in 3 in group I and 2 in group II and nausea in 6 in group I and 5 in group II. The difference was significant ($P > 0.05$). **Conclusion:** Both ropivacaine 0.75% and 0.5% equal in providing anesthesia with minimal side effects and thus recommended for lower limb surgeries.

Key words: Ropivacaine, Respiratory rate, Systolic blood pressure

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INTRODUCTION

The introduction of safe drugs enhanced the popularity of spinal anaesthesia. Lignocaine is a well-established long-acting local anaesthetic used for spinal anaesthesia.¹ It has been used frequently in spinal anaesthesia with a very little incidence of transient neurological symptoms. But it is associated with cardiovascular and central nervous system toxicity when used in high concentration or when accidentally administered intravascularly.²

Ropivacaine was introduced into clinical practice in 1996. Ropivacaine was approved for a new route of administration, the intrathecal route, in the European Union in February 2004.³ It was initially used in epidural anaesthesia in lower extremity surgery, where it was compared with bupivacaine where they concluded that ropivacaine produced similar sensory and motor blockade with less cardiotoxicity.⁴ The efficacy and tolerability of

ropivacaine for spinal anaesthesia in orthopedic surgery have been demonstrated in several studies. It has shown to produce sufficient surgical anaesthesia and analgesia and consistently shown reduced side effect profile. Due to its propensity of blocking sensory fibers more readily it serves all purposes for day care surgery.⁵

Different concentrations of intrathecal ropivacaine 0.5% and 0.75% were compared for vascular surgery, which concluded that 15 mg of plain ropivacaine 0.75% is effective and safe and gives complete spinal anaesthesia in high risk patients without side effects and cardiovascular modifications.⁶ The present study was conducted to compare haemodynamical changes associated with different doses of ropivacaine in lower limb surgery.

MATERIALS & METHODS

The present study was conducted in the department of Anesthesia. It comprised of 84 patients of American Society of Anesthesiologists (ASA) physical status I and II of age group 20 - 65 years of both genders. The study was approved from institutional ethical committee. All participants were informed regarding the study and written consent was obtained.

Information such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 42 patients each. Group I (42 patients) received 22.5 mg (3 mL) of 0.75% isobaric ropivacaine hydrochloride and group II (42 patients) received 15 mg (3 mL) of 0.5% isobaric ropivacaine hydrochloride. Mean pulse rate, respiratory rate, systolic and diastolic blood pressure was compared in both groups. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I: Distribution of patients

Total- 84			
Groups	Group I (0.75% ropivacaine)	Group II (0.5% ropivacaine)	
Number	42	42	

Table I shows that group I (42 patients) received 22.5 mg (3 mL) of 0.75% isobaric ropivacaine hydrochloride and group II (42 patients) received 15 mg (3 mL) of 0.5% isobaric ropivacaine hydrochloride.

Table I shows that mean pulse rate recorded in both groups pre-operatively, at 0 min, 5, 10,20,40,60,75,90,120,150 and 180 minutes found to be non- significant (P> 0.05).

Graph I shows that mean systolic blood pressure recorded in both groups pre-operatively, at 0 min, 5, 10,20,40,60,75,90,120,150 and 180 minutes found to be non- significant (P> 0.05).

Graph II shows that mean diastolic blood pressure recorded in both groups pre-operatively, at 0 min, 5, 10,20,40,60,75,90,120,150 and 180 minutes found to be non- significant (P> 0.05).

Graph III shows that mean respiratory rate recorded in both groups pre-operatively, at 0 min, 5, 10,20,40,60,75,90,120,150 and 180 minutes found to be non- significant (P> 0.05).

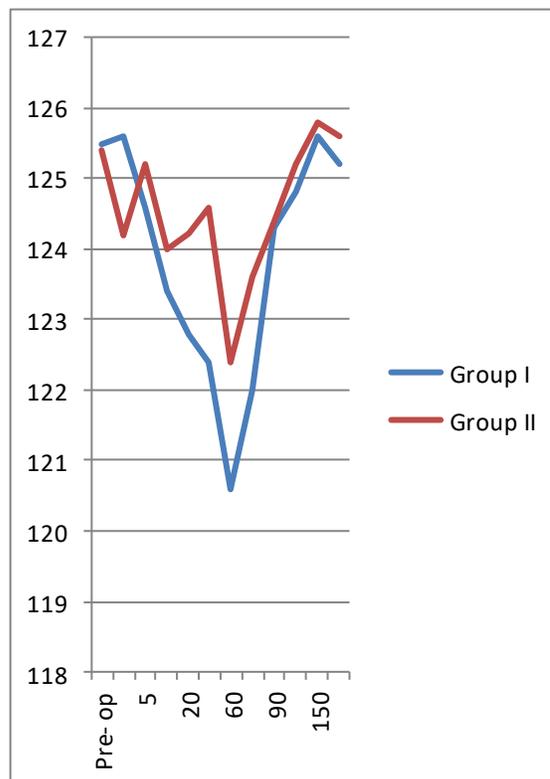
Table III shows hypotension was present in 5 in group I and 6 in group II, bradycardia in 4 in group I and 5 in group II, headache in 3 in group I and 2 in group II and nausea in

6 in group I and 5 in group II. The difference was significant (P> 0.05).

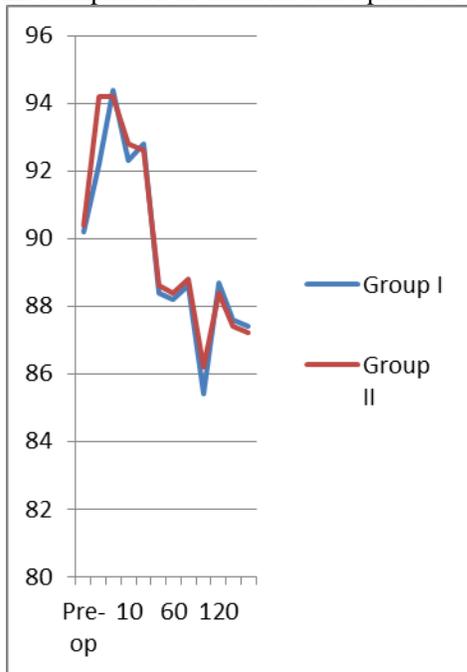
Table II: Comparison of pulse rate

Parameters (mins)	Group I	Group II	P value
Pre- op	80.2	80.4	0.51
0	78.4	78.5	
5	76.4	76.2	
10	75.2	76.4	
20	75.6	75.1	
40	74.4	74.5	
60	73.2	73.4	
75	73.8	73.5	
90	74.0	74.6	
120	75.1	75.4	
150	75.2	74.4	
180	75.5	75.2	

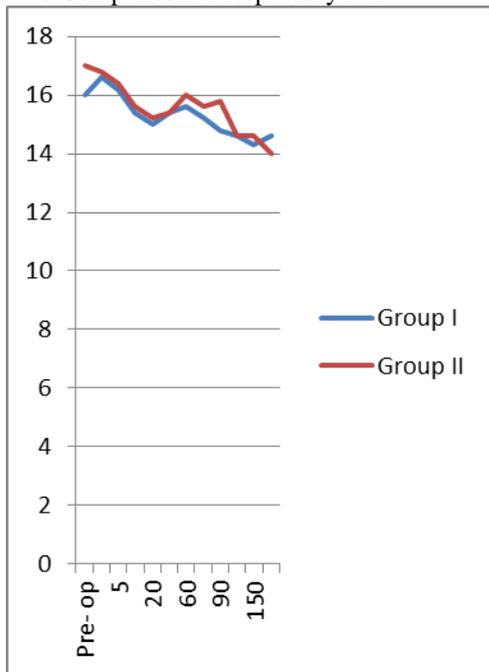
Graph I: Comparison of systolic blood pressure



Graph II: Comparison of diastolic blood pressure



Graph III: Comparison of respiratory rate



DISCUSSION

Spinal anesthesia is unparalleled in the way in which a small quantity of drug can produce profound surgical anesthesia. Further, by altering the amount of drug, different types of spinal anesthetics can be produced.⁷ Low spinal anesthesia, a block below T10, carries a different physiologic impact than does a block performed to produce higher spinal anesthesia (>T5).

Table III: Comparison of side effects in both groups

Side effects	Group I	Group II	P value
Hypotension	5	6	0.78
Bradycardia	4	5	0.92
Headache	3	2	0.81
Nausea/vomiting	6	5	0.54

The block is unexcelled for lower abdominal or lower extremity surgical procedures. The main reasons for the popularity of spinal block are that the block has well-defined endpoints, and the anesthesiologist can produce the block reliably with a single injection.⁸ Lofgren and Lundqvist introduced the most commonly used drug, Lignocaine. One of the disadvantages of Lignocaine was the association with transient neurological symptoms, which presents as low backache and lower extremity dysesthesia. Bupivacaine was introduced by Ekenstam in 1957.⁹ The present study was conducted to compare haemodynamical changes associated with different doses of ropivacaine in lower limb surgery.

In present study, group I (42) patients received 22.5 mg (3 mL) of 0.75% isobaric ropivacaine hydrochloride and group II (42) patients received 15 mg (3 mL) of 0.5% isobaric ropivacaine hydrochloride. Rashid et al¹⁰ conducted a prospective, randomized, double blind study in which 80 patients of age group 20 - 65 years of either sex which were scheduled to undergo lower limb orthopaedic surgeries under spinal anaesthesia with two different doses of Ropivacaine Hydrochloride were included. The patients were randomly divided into 2 groups of 40 each. Group A received 22.5 mg (3 mL) of 0.75% isobaric Ropivacaine Hydrochloride. Group B patients received 15 mg (3 mL) of 0.5% isobaric Ropivacaine Hydrochloride. The haemodynamic profile of both the groups was comparable, both intra- as well as post-operatively. In terms of safety, both doses of intrathecal ropivacaine provided high degree of cardiovascular stability with a low incidence of bradycardia and hypotension. On comparing side effects and complications, both the doses of intrathecal ropivacaine had low incidence of adverse effects.

We found that mean pulse rate, systolic blood pressure, diastolic blood pressure and respiratory rate recorded in both groups pre-operatively, at 0 min, 5, 10,20,40,60,75,90,120,150 and 180 minutes found to be non- significant (P> 0.05). Patil et al¹¹ in their study found that the onset of sensory blockage in group I was 3.17 ± 1.29 min and 2.60 ± 1.19 min in group II which was statistically not significant. The onset of motor blockade in Group I was 3.90 ± 1.54 min and 3.10 ± 0.96 min in group II which was statistically significant. Median time to reach the highest level of analgesia was 12.4 ± 2.81 min in group

I, and 10.7 ± 2.56 min in Group II. The difference was statistically significant. Regression of sensory level to T10 dermatome in Group I was 99.64 ± 21.30 min and 139.66 ± 25.70 min in group II which was statistically significant. Duration of the motor blockade in group I was 126 ± 14.53 min and 175 ± 30.60 min in group II which was statistically significant. The time of the first request of analgesics in group I was 130 ± 16.24 min and 171.1 ± 32.77 min in group II which was statistically significant. There were no significant differences in the adverse effects of both drugs. We found that hypotension was present in 5 in group I and 6 in group II, bradycardia in 4 in group I and 5 in group II, headache in 3 in group I and 2 in group II and nausea in 6 in group I and 5 in group II. In study by Kallio et al¹², hyperbaric and plain ropivacaine 15 mg were compared in spinal anaesthesia in lower limb orthopaedic study, only 5 patients out of 56 patients had post dural puncture headache.

CONCLUSION

Authors found both ropivacaine 0.75% and 0.5% equal in providing anesthesia with minimal side effects and thus recommended for lower limb surgeries.

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