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Original Research Article

Comparison of lumbar epidural analgesia using 0.25% bupivacaine (10ml) and 0.2% ropivacaine (10ml) for post-operative analgesia in abdominal surgeries

[1]Dr. C Aravind Sekaran, [2]Dr. Subbulakshmi Sundaram, [3]Dr. Sittaramane S

[1]Junior Resident, Department of Anaesthesiology, Government Medical College and Hospital, Cuddalore District (Erstwhile Rajah Muthiah Medical College and Hospital), Chidambaram, Tamil Nadu, India

[2]Associate Professor, Department of Anaesthesiology, Government Medical College and Hospital, Cuddalore District (Erstwhile Rajah Muthiah Medical College and Hospital), Chidambaram, Tamil Nadu, India

[3]Assistant Professor, Department of Anaesthesiology, Government Medical College and Hospital, Cuddalore District (Erstwhile Rajah Muthiah Medical College and Hospital), Chidambaram, Tamil Nadu, India

Corresponding Author:

Dr. C Aravind Sekaran (aravindsekar46@gmail.com)

Abstract

Introduction: The goal for postoperative pain management is to reduce or eliminate pain and discomfort with a minimum of side effects. Post-operative epidural analgesia provides better static and dynamic pain relief. Ropivacaine is less neuro and cardiotoxic when compared to Bupivacaine with minimal motor blockade thus facilitating early post-operative mobilization.

Aims and Objectives: To Compare Lumbar Epidural Analgesia using 0.25% Bupivacaine (10ml) and 0.2% Ropivacaine (10ml) for post-operative analgesia in abdominal surgeries.

Materials and Methods: A Randomized Comparative Study was conducted on Sixty (60) adult patients of either sex divided in to two equal groups with age group 20-65 years with physical status ASA I, II undergoing abdominal surgeries. At the end of surgery when the patient complained of pain Group B received 10ml of 0.25% bupivacaine and Group R received 10ml of 0.2% ropivacaine as post-operative analgesia.

Results: Both the group B (236.40 ± 29.55 minutes) and group R (244 ± 27.95 minutes) produced almost same duration of post-operative analgesia, but hemodynamic instability was seen with Group B (53.3% reported hypotension and 13.3% reported nausea) along with delay in recovery of motor activity.

Discussion: Group B shows statistical significance with Group R in (HR, SBP, DBP) in first 60 minutes required vasopressor. Group B shows statistical similarity with Group R (P value >0.05) in (HR, SBP, DBP) after 60 minutes, RR, SPO2, onset and duration of analgesia, VAS score, Patient satisfaction score. Group R has less complications than Group B, hence proves statistically significant (P value <0.05).

Conclusion: Post-operative analgesia with 0.2% Ropivacaine provides excellent pain relief with hemodynamic stability and early post-operative ambulation.

Keywords: Post-operative analgesia, bupivacaine, ropivacaine

Introduction

According to the American Society of Anesthesiologist practice guidelines for acute pain management in the perioperative setting, acute pain is defined as pain present in a surgical patient after a procedure [1]. The World Health Organization and International Association for the Study of Pain have recognized pain relief as a human right. Poorly managed postoperative

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pain can lead to complications and prolonged rehabilitation. Uncontrolled acute pain is associated with the development of chronic pain with reduction in quality of life.

The goal for postoperative pain management is to reduce or eliminate pain and discomfort with minimum of side effects. Various agents (opioid vs. nonopioid), routes (oral, intravenous, neuraxial, regional) and modes (patient controlled vs. "as needed") for the treatment of postoperative pain exist. Although traditionally the mainstay of postoperative analgesia is opioid based, increasingly more evidence exists to support a multimodal approach with the intent to reduce opioid side effects (such as nausea and dependency, respiratory depression) and improve pain scores [2].

Post-operative epidural analgesia provides excellent analgesia by blunting the stress response associated with surgery, decreases postoperative morbidity, attenuates catabolism and accentuates post-operative functional recovery compared with other forms of post-operative analgesia. Epidural analgesia provides better static and dynamic pain relief [3].

Local Anaesthetics mainly acts by blocking sodium channel. Ropivacaine is less neuro and cardiotoxic when compared to Bupivacaine with minimal motor blockade thus facilitating early post-operative mobilization.

Methodology

After approval of Institutional Human Ethical committee prospective randomized comparative study was conducted on Sixty (60) adult patients of either sex divided into two equal groups with age group 20-65 years with physical status ASA I, II admitted in Government Medical College and Hospital, Cuddalore District undergoing abdominal surgeries Informed consent was obtained from all the patients.

Inclusion criteria

- ASA grade I and II.
- Age 20-65 years.
- BMI- 18-35 kg/cm2
- Patients scheduled for abdominal surgeries.

Exclusion criteria

- Any contra-indications to Epidural catheter placement.
- Patient refusal.
- History of Epilepsy.
- History of allergy to local anesthetics.

Patients was randomized in to two groups. Drug was prepared and numbered by anaesthesiologist who was not involved in the study and was handed over the drug to the study performing anesthesiologist. At the end of the surgery and when patient complaints of pain, the study drug was administered through epidural catheter. Time of onset of analgesia and the level of sensory block was recorded. Baseline hemodynamic parameters was recorded before the procedure. End of injection was taken as time 0, there after patients was monitored

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at 5, 10, 15, 20, 25, 30 minutes and every 15 minutes there after. Post operatively VAS score was monitored till the VAS score reaches 4. Rescue analgesic (10 ml of 0.25% Bupivacaine) was administered and there after post-operative team will take care of the patient. At that point of time study was completed. Randomization was decoded at the end of study and was subjected to statistical analysis.

Statistics

For describing the qualitative variables, frequency and percentages were used. For describing the quantitative data, mean and standard deviation were used. In order to find out difference in distribution of qualitative variable between the experimental arms, chi-square test was applied. To find out the difference in mean between two groups, independent samples T test was applied. To find out the difference in change of mean between the groups for a repeatedly measured variables, Repeated measures analysis of variance (RM-ANOVA) was used. A P value of less than 0.05 was considered to be statistically significant.

Table 1: Age, Sex, Weight, ASA of both Ropivacaine and Bupivacaine group

Parameters	Bupivacaine	Ropivacaine	Special test	P value
Age (mean, SD)	44.67, 12.08	48.20, 10.31	-1.219 (t test)	0.228 (similar)
Sex (N, %)	M-16, 53.3 F-14, 46.7	M-15, 50% F-15, 50%	0.067 (chi square)	0.796 (similar)
Weight (mean, SD)	63.47, 7.99	62.93, 7.55	0.266 (t test)	0.792 (similar)
ASA (N, %)	I-12, 40 II-18, 60	I-9, 30 II-21, 70	0.659 (chi square test)	0.417 (Similar)

The mean age among the participants in the bupivacaine group was 44.67 ± 12.08 years and that of the ropivacaine group was 48.20 ± 10.31 years. The mean age of both the groups were found to be similar with P value of more than 0.05.

Among the participants in the bupivacaine group, 53.3% were males and among those in the ropivacaine group, 48.3% were males. The distribution of sex was found to be similar between the groups with P value of more than 0.05.

The mean weight among the participants in the bupivacaine group was 63.47 ± 7.99 Kgs and that of the ropivacaine group was 62.93 ± 7.55 Kgs. The mean weight of both the groups were found to be similar with P value of more than 0.05.

Among the participants in the bupivacaine group, 40% were ASA I and among those in the ropivacaine group, 30% were ASA I. The distribution of ASA was found to be similar between the groups with P value of more than 0.05.

Table 2: Distribution of procedures between the groups

Variables		Bupivacaine		Ropivacaine		X^{2*}	P value
		N	%	N	%		
Procedure	Anatomical repair	4	13.3	4	13.3	4.64	0.704
	Hernioplasty	13	43.3	12	40		
	Herniorrhaphy	0	0	1	3.3		
	Laparotomy	3	10	3	10		
	Appendicectomy	1	3.3	1	3.3		
	Cholecystectomy	0	0	1	3.3		
	Prostatectomy	0	0	2	6.7		
	TAH with BSO	9	30	6	20		

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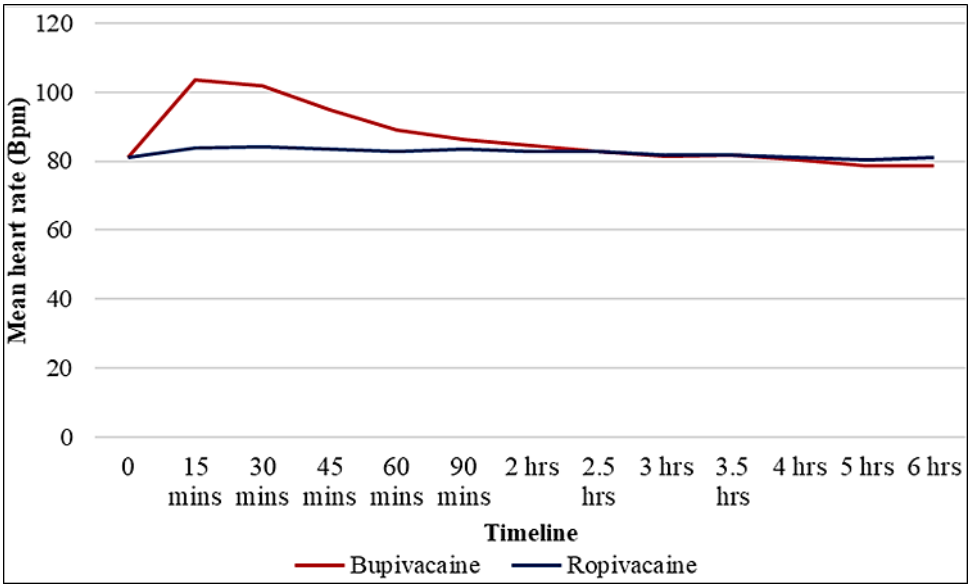
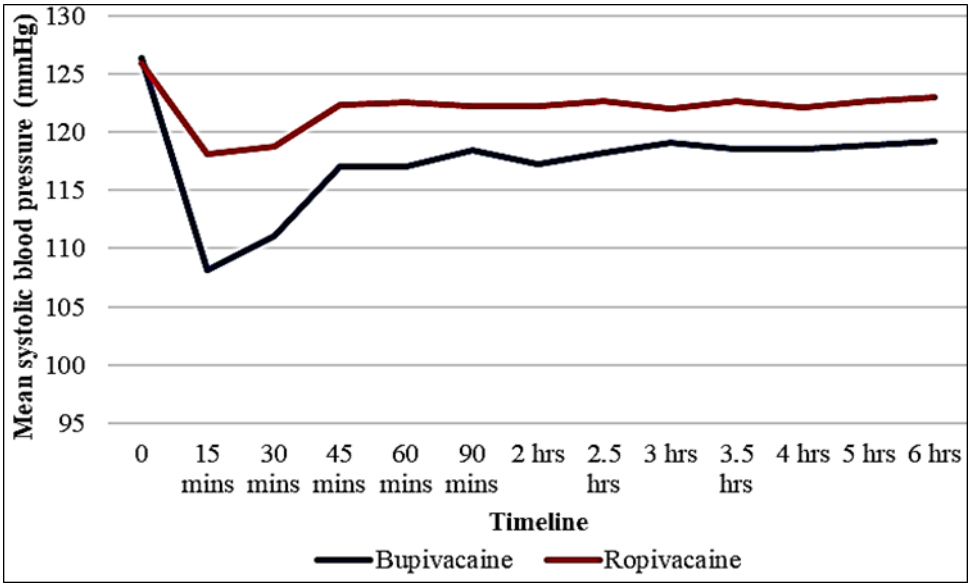
Among the participants in the bupivacaine group, 60% were diagnosed with hernia followed by 20% with fibroid uterus and 10% with ovarian cyst. Among the participants in the ropivacaine group, 56.7% were diagnosed with hernia followed by 13.3% with AUB and 6.7% with fibroid uterus and ovarian cyst, respectively. Both the groups were found to be similar with P value of more than 0.05.

Among the participants in the Bupivacaine group, 43.3% had undergone hernioplasty followed by 30% TAH with BSO and among the participants in the ropivacaine group, 40% had undergone hernioplasty followed by 20% TAH with BSO. Both the groups were similar with regard to procedures (P value > 0.05).



Graph 1: Heart rate

The mean heart rate was greater in the bupivacaine group than in the ropivacaine group with P value of less than 0.05(Significant) at 15, 30, 45 and 60 minutes respectively. After 60 minutes both the groups were found to have almost similar heart rate with P value of more than 0.05.



Graph 2: Systolic blood pressure

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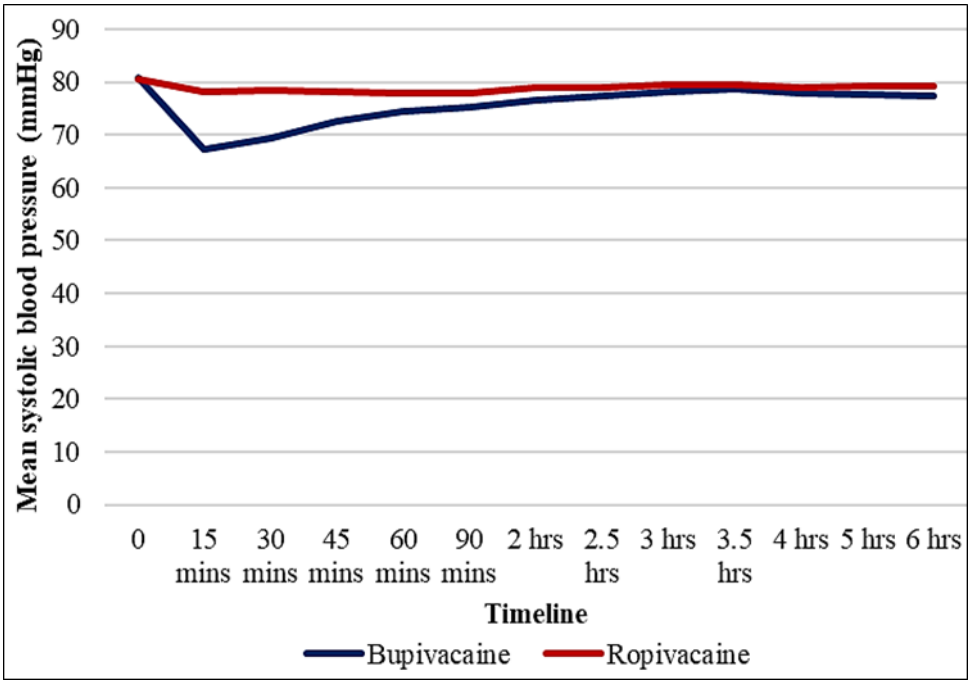
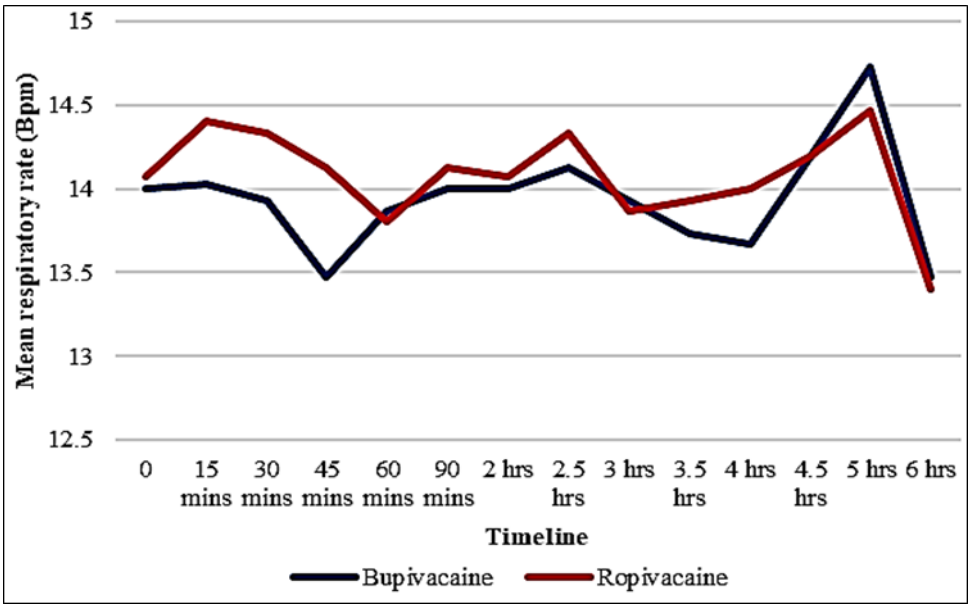
The mean systolic blood pressure between the groups were found to be similar at the baseline (P value > 0.05). Following which the mean was lesser in the bupivacaine group than in the ropivacaine group with P value of less than 0.05 at 15, 30, 45 and 60 minutes respectively (P value < 0.05 Significant). After 60 minutes both the groups were found to have almost similar heart rate with P value of more than 0.05.



Graph 3: Diastolic blood pressure

The mean diastolic blood pressure at 15 minutes was significantly lesser for the bupivacaine group than the ropivacaine group and the same lesser diastolic blood pressure sustained at 30 minutes, 45 minutes and 60 minutes (P value < 0.05 Significant). In rest of the follow up period the mean was found to be similar (P value > 0.05).



Graph 4: Respiratory rate

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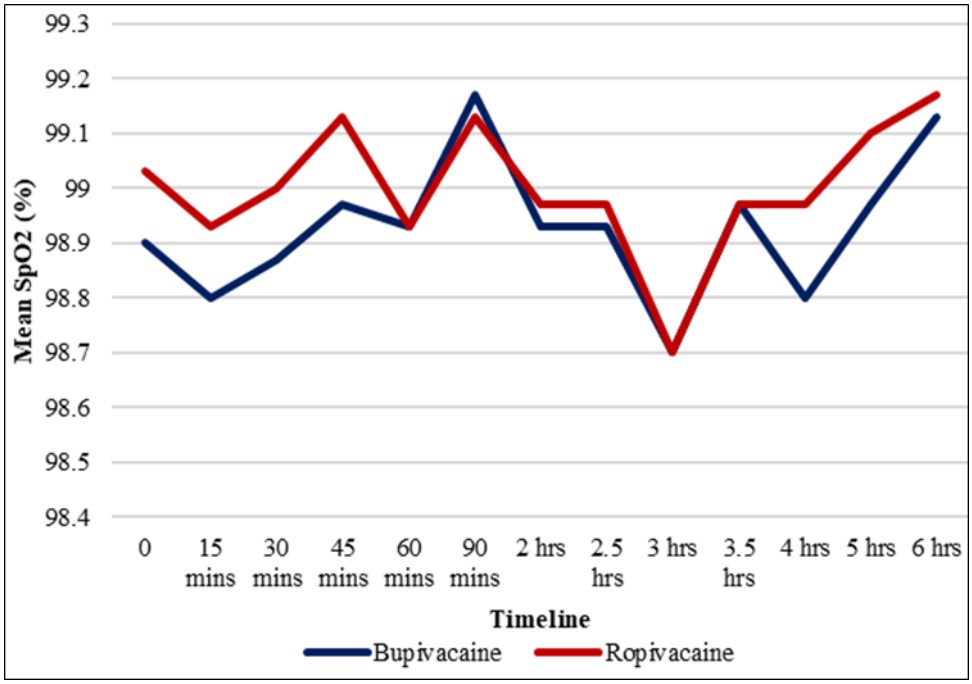
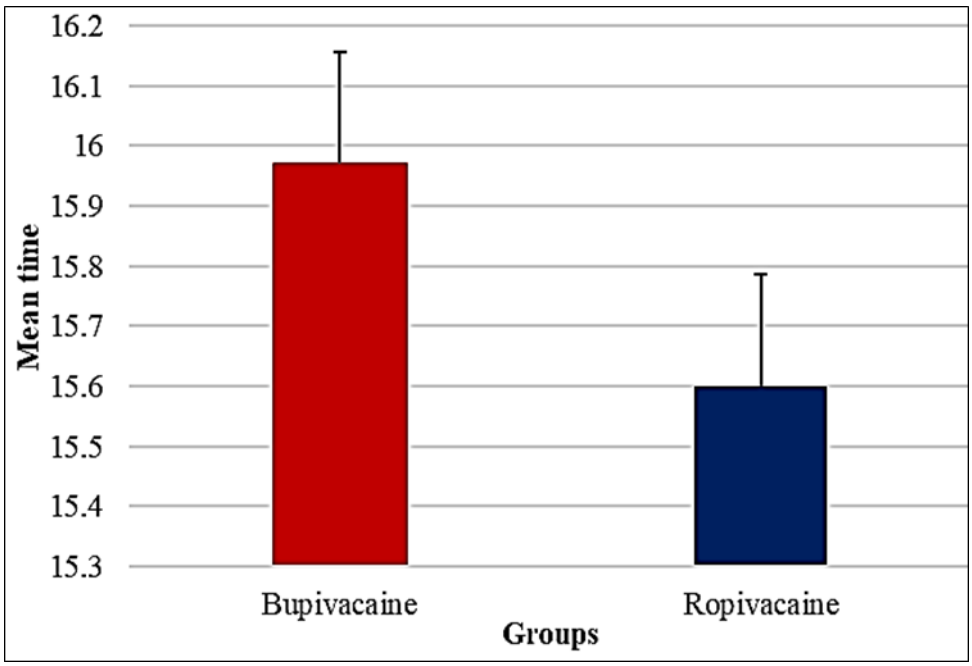


Graph 5: Oxygen Saturation

Both respiratory rate and oxygen saturation were found to be statistically similar in both the groups (with p value > 0.05).



Graph 6: Onset of Analgesia

The mean time for Onset of Analgesia among the participants in the bupivacaine group was 15.97 ± 2.53 minutes and that of the ropivacaine group was 15.60 ± 2.21 minutes. The mean time of both the groups were found to be similar with P value of more than 0.05.

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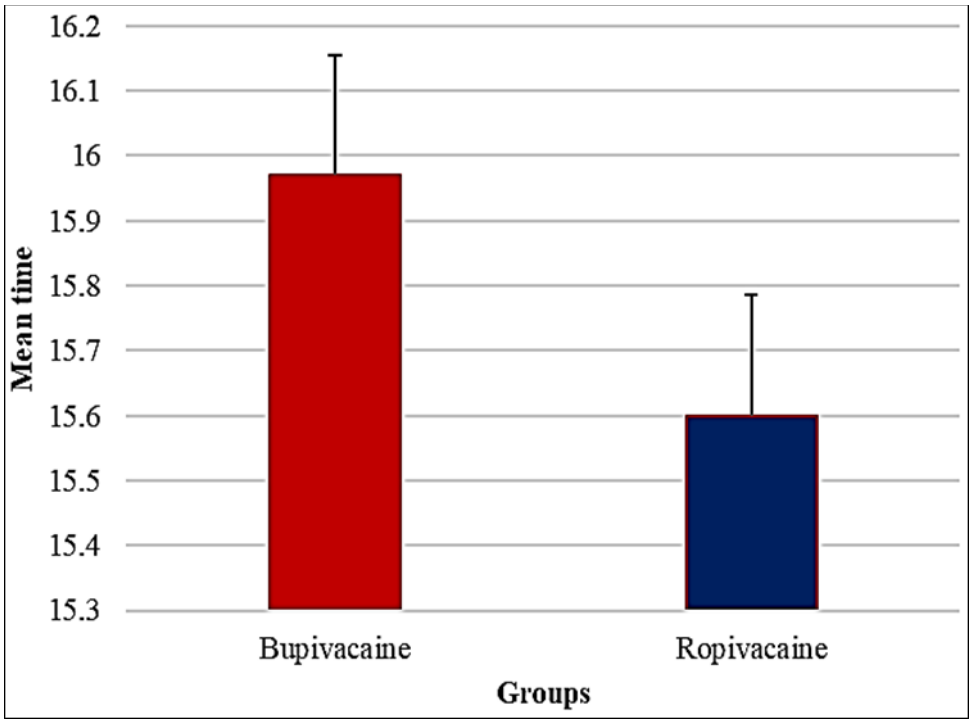
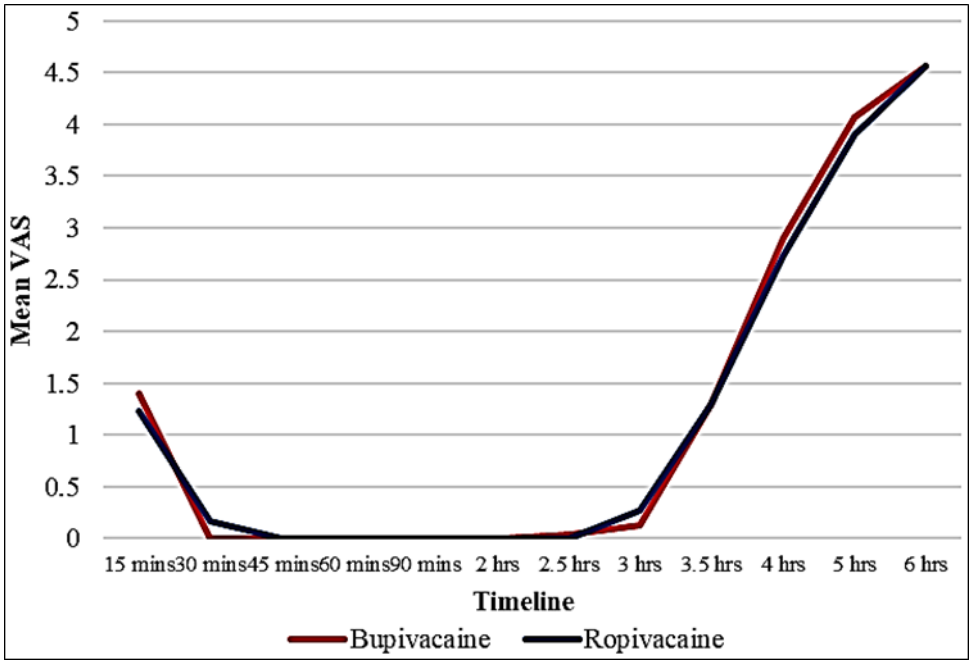


Graph 7: Duration of analgesia

The mean time for duration of analgesia among the participants in the bupivacaine group was 236.40 ± 29.55 minutes and that of the ropivacaine group was 244 ± 27.95 minutes. The mean time of both the groups were found to be similar with P value of more than 0.05.



Graph 8: VAS

Over the follow up period the mean VAS was found to be almost similar in both the groups. There was no significant change in VAS within each group with P value of more than 0.05. The trend between the groups was similar with P value of more than 0.05.

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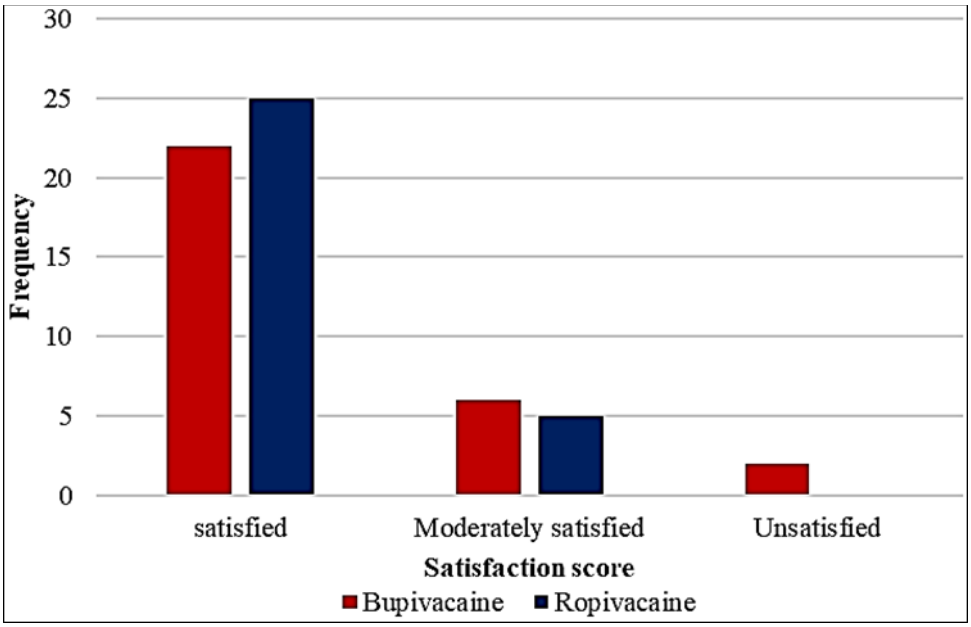
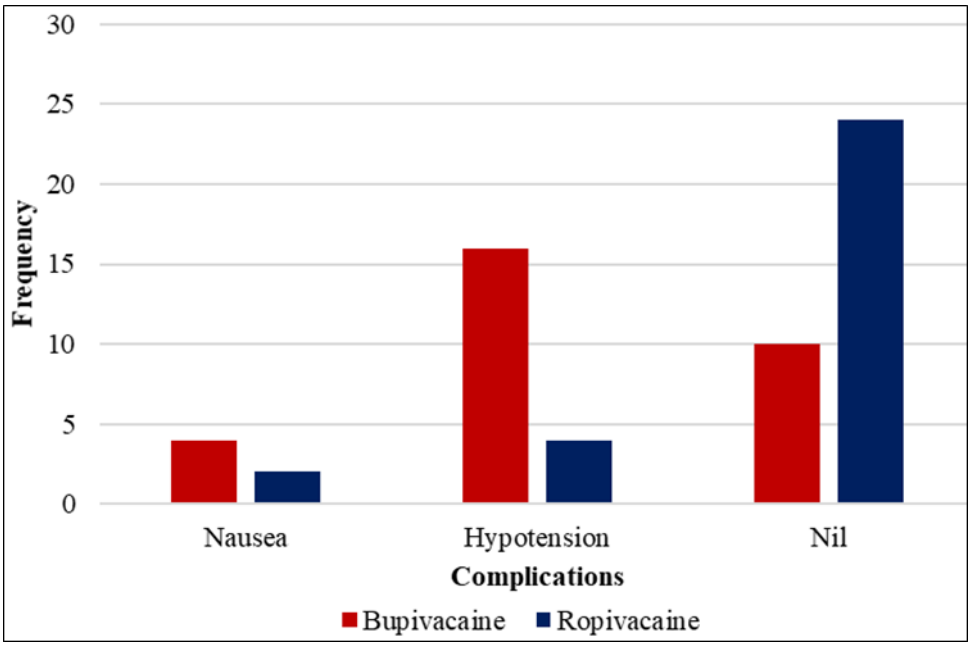


Graph 9: Satisfaction score

Among the participants in the bupivacaine group, 73.3% were satisfied followed by 20% were moderately satisfied. Among those in the ropivacaine group, 83.3% were satisfied and 16.7% were moderately satisfied. Both the groups were found to be similar with regard to distribution of satisfaction score with P value of more than 0.05.



Graph 10: Complications

Among the participants in the bupivacaine group, 53.3% reported hypotension and 13.3% reported nausea and among those in the ropivacaine group, 13.3% reported hypotension and 6.6% reported nausea. Complications were found to be more among the participants in the bupivacaine group than those in the ropivacaine group with P value of less than 0.05.

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Discussion

Our knowledge of acute pain mechanisms has advanced sufficiently over the past decades so that rational rather than empirically derived therapy can be used by aiming specifically at interrupting the mechanisms responsible for the generation of clinical pain. The use of epidural techniques also offer the advantage of effective prolonged postoperative analgesia as compared to nerve blocks and local infiltrations [7-8].

Post-operative analgesia is an essential component in perioperative patient management epidural analgesia provides better patient compliance and decreased systemic side effects. Not only is it possible to get sufficient anaesthesia for several hours, but also postoperative pain and analgesic consumption are reduced for a considerable time.

Onset of analgesia is slightly early with prolonged duration in ropivacaine group when compared to bupivacaine group visual analogue scale was similar in both groups patient satisfaction was slightly higher in ropivacaine group when compared to bupivacaine group [9].

In Comparison of Epidural Analgesia Using 0.2% Bupivacaine and 0.2% Ropivacaine for the management of postoperative pain in major orthopedic surgery by Sumedha Mehta *et al*. concluded patients undergoing major lower limb orthopedic surgery under subarachnoid block, epidural ropivacaine 0.2% produces effective postoperative analgesia similar to bupivacaine 0.2% with a distinct sensory-motor dissociation resulting in analgesia without motor blockade [4].

In comparison of Ropivacaine versus Bupivacaine in postoperative pain control by Noha Ahmed Mansour *et al*. this study recommends ropivacaine 7.5 mg/ml as an alternative to bupivacaine as a long acting local anaesthetic [5].

In Comparison of efficacy of bupivacaine and ropivacaine for postoperative analgesia in continuous epidural infusion in lower limb surgeries under combined spinal-epidural analgesia Srivastava Meghana *et al*. concludes ropivacaine can be used as an alternative to bupivacaine for postoperative analgesia by epidural infusion, as it provides effective pain control with the added advantage of lower incidence of motor blockade [6].

Ropivacaine offers excellent hemodynamic stability by maintaining basal blood pressure, heart rate than bupivacaine thus minimising vasopressor use although there is mild hypotension but this change does not demand vasopressor [10].

Conclusion

Post-operative analgesia with 10ml of 0.2% ropivacaine and 10ml of 0.25% bupivacaine provides excellent pain relief with almost same duration of analgesia with better hemodynamic stability and early post-operative ambulation with less complications in ropivacaine group compared to bupivacaine group.

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