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A Comparative Study of the Efficacy of Epidural 0.25% Bupivacaine Versus 0.25% Ropivacaine For Post Operative Pain Relief in Lower Abdominal Surgeries.

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ABSTRACT

Background: Aim: To compare epidural 0.25% bupivacaine with 0.25% ropivacaine for post operative pain relief in cases of abdominal surgeries. **Methods:** 60 patients belonging to ASA physical status I & II of both sexes (each group 30 patients n=30) were randomly selected for the study. The sensory and motor block, analgesia, hemodynamic status, complications and need for rescue analgesia were compared in both the groups. Group B patients received 0.25% Bupivacaine as continuous epidural. Group R patients received 0.25% Ropivacaine as continuous epidural. **Results:** The sensory block was almost similar in both groups. No significant association is observed between the ASA class, age and sex of the groups (P>0.05). The difference in mean VAS between Bupivacaine and Ropivacaine was found to be statistically significant at 24 hours (P<0.05). Motor block was significantly more (17%) in group B than group R (3%) (P< 0.05). Haemodynamic changes did not differ in patients of either group (P >0.05). The rescue analgesia requirement were minimal in group R compared to group B. Complications were less in group R. **Conclusion:** Our study compared clinical efficacy of 0.25% Ropivacaine and 0.25%Bupivacaine in respect to analgesia, motor blockade, hemodynamic stability, requirement of rescue analgesia and complications. Sensory block and hemodynamic stability was comparable in the two groups. Ropivacaine group had significantly less motor block than Bupivacaine group.

Keywords: Bupivacaine, Ropivacaine, epidural, abdominal surgeries.

INTRODUCTION

The common type of acute pain that the anaesthesiologists deal with postoperative pain with resultant neuroendocrine stress response causing protein catabolism, hyperglycemia, poor wound healing, decreased respiratory function, and increase in myocardial oxygen demand.[1,2] The latest emerging concepts are preemptive analgesia and multimodal approach. It is beneficial for the patients to remain pain free postoperatively for early ambulation and recovery and to avoid adverse effects of pain ranging from uneasiness to serious cardiovascular and respiratory complications resulting in increased morbidity and longer hospital stay.[3] The multiple physiological changes due to severe untreated pain and insufficient analgesia can have significant pathophysiological effects in the post operative period.[4]

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Among the most commonly used pain relieving techniques, epidural local anaesthetic or local anaesthetic and opioid combinations are the most effective in providing pain relief after major surgical procedures.[5] Lack of pain relief may manifest as hemodynamic changes in the form of tachycardia and hypertension. Other varied presentations include increased respiratory rate and hypoxemia, altered gastrointestinal motility, impaired urinary tract function, changes in blood viscosity, clotting time and platelet aggregation.[6]

In neuraxial analgesia, the analgesics are injected or infused in close proximity to the spinal cord, usually either intrathecally or epidurally in to the fatty tissues around the dura.[7,8] Analgesia delivered through an epidural catheter is a safe and effective method for management of acute postoperative pain. Postoperative epidural analgesia can provide analgesia superior to that with systemic opioids.

This study will focus on the postoperative pain management by epidural analgesia comparing bupivacaine and ropivacaine, analyzing the quality of postoperative analgesia and patient-reported outcomes. This study aims to compare epidural

0.25% bupivacaine with 0.25% ropivacaine for post operative pain relief in cases of abdominal surgeries.

MATERIALS AND METHODS

Study Design: Total 60 abdominal surgery patients were randomized by toss of coin method into two equal groups. The study was prospective randomized and double blinded where person giving drug as well as observer were blinded. All patients received general anaesthesia as a part of anaesthetic management for surgical procedure.

Study Centre: The study was conducted in Chalmeda Anandrao Institute of Medical Sciences Hospital, Karimnagar during from 2016 to 2019.

Group I received post operative epidural analgesia with 0.25 % bupivacaine while Group II received 0.25 % ropivacaine epidural analgesia post operatively.

Epidural catheter was inserted peri-operatively in thoracic or lumber region, corresponding to the dermatomes covered by the surgical incision, under strict aseptic precautions. Continuous epidural analgesia was maintained by multi rate (2-5 ml/h) syringe pump. The infusion rate was started at 3 mL/h postoperatively and increased to 5 ml/h if pain relief was inadequate (ie. visual analogue scale [VAS] score >4). Infusion rate was decreased when systolic arterial pressure decreased to< 90 mmHg. Rescue analgesia is given when VAS>5.

Inclusion Criteria:

- Patients scheduled for elective open abdominal surgery.
- ASA I and II physical status.
- Adult patients aged 18-50 years.

Exclusion Criteria:

- Patients less than the age of 18 years and more than 50 years, Known allergy to amide type local anaesthetics, Bleeding disorder, Infection at injection site, ASA III, IV and V physical status and mental illness.

Pre-operatively depending on the physical status, age and clinical profile of the patient, standard institutional preoperative instructions were offered as per protocol. All patients were instructed about the use of the Visual Analogue Scale (VAS 0-10). Patients were also observed for hemodynamic stability by measuring heart rate, systolic and diastolic blood pressure as well as for epidural related complications including motor blockade, nausea, vomiting, hypotension, bradycardia and shivering.

The study also compared the motor block in the post-operative period. The sensory block was determined by a pin-prick test in the mid clavicular line bilaterally. All determinations of the sensory levels were based on a dermatome chart. Motor block was assessed using the Modified Bromage Scale.

Ethics Approval

This study was approved by Institute Ethics Committee, Chalmeda AnandRao Institute of Medical Sciences, Karimnagar.

Statistical Analysis

All data were analyzed and using SPSS software and Microsoft excel sheet. Chi-square test for the analysis of qualitative variables and t- test and Mann-Whitney test for the analysis of continuous variables. Statistical significance was assumed for P<0.05.

RESULTS

Total 60 patients were included in this study. The both groups were comparable with age, gender distribution of the patients (Table 1). Pre operative heart rate, systolic and diastolic blood pressure, MAP, respiration rate, and SpO2 were also comparable in the groups. There was no statistically significant change in the hemodynamic parameters in the study period.

Table 1: Gender distribution

Gender	Ropivacaine		Bupivacaine	
	N	%	N	%
Male	21	70%	18	60%
Female	9	30%	12	40%
Total	30	100%	30	100%

[Table 1] shows the gender distribution data of patients in two groups were comparable with male and female patients which statistically not significant (P<0.05)

Table 2: Mean age according to group and overall.

Age	Mean	Std Deviation	SE of Mean	Median	Min	Max
Ropivacaine	43.07	8.61	1.57	44.5	21	57
Bupivacaine	43.37	10.50	1.92	43.5	20	60
Overall	43.22	9.52	1.23	44.0	20	60

[Table 2] shows Group I Ropivasaine mean age was (43.07), standard deviation 8.81 and Bupivacaine group mean age was 43.37 and standard deviation 10.50. The difference between Ropivacaine and Bupivacaine was not statistically significant at any of the time intervals (P>0.05).

Table 3: ASA Class.

ASA	Ropivasaine		Bupivacaine		X2	P-value
	n	%	n	%		
Class I	19	63	15	50	1.086	0.297
Class II	11	37	15	50		
Total	30	100	30	100		

[Table 4] shows, there was no significant association is observed between the ASA class and the two groups (P>0.05).
The difference in mean VAS between Ropivacaine and Bupivacaine was found to be statistically significant at 24 hours (P<0.05) but not significant at any of the other time intervals (P>0.05).

Table 4: Rescue Analgesia

Rescue Analgesia	Ropivacaine(n=30) N	%	Bupivacaine(n=30) N	%
1 hour	0	0 %	0	0%
2 hour	0	0%	0	0%
4 hour	1	0%	0	0%
6 hour	1	0%	3	1%
12 hours	1	0%	1	0%
24 hours	1	0%	0	0%
48 hours	0	0%	0	0%

[Table 4] shows the rescue analgesia was 4 patients in each groups required rescue analgesia. There was no significant difference at 24 hours. No side effects at all times in the postoperative period in both the groups.

DISCUSSION

A prospective study was conducted at Chalmeda AnandRao Institute of Medical Sciences Hospital involving 60 ASA I & II patients who underwent abdominal surgeries. This study was based on the hypothesis that 0.25% bupivacaine and 0.25% ropivacaine in epidural would be clinically comparable in terms of sensory block, motor block and hemodynamic stability.
Analgesia delivered through an indwelling epidural catheter is a safe and effective method for management of acute postoperative pain. Postoperative epidural analgesia can provide analgesia superior to that with systemic opioids. Presently bupivacaine is most commonly used for epidural analgesia for post operative pain relief. Ropivacaine is a newly introduced mepivacaine analogue and is marketed as a less toxic alternative to bupivacaine with better sensory block.
The development of long acting amide local anesthetics has traditionally focused on ever increasing duration of local anesthetic duration. Ropivacaine development diverges from this tradition because its duration of sensory anaesthesia is similar to that of currently available local anesthetics. Also it is different from other anesthetics because it is prepared as a single enantiomer (S), rather than a racemic mixture.[9]
In Curbello MM study found that to comparing 0.5% ropivacaine and 0.5% bupivacaine for epidural analgesia in patients undergoing lower extremity surgery. The authors found 0.5% ropivacaine and 0.5% bupivacaine to be clinically similar in both sensory and motor blockade except that bupivacaine produced a longer duration of motor blockade.[9] We also found the similar results but with 0.25% of both drugs.

Sensory block
All patients receiving either drug achieved adequate level of anaesthesia but with higher doses. The difference in mean VAS between Ropivacaine and Bupivacaine was found to be statistically significant at 24 hours (P<0.05) but not significant at any of the other time intervals (P>0.05).

Motor block
Group R had less motor block as compared to Group B which is comparable to the above study. The motor blockade was more in group B (17%) of the study group and less in group R (3%) of the study group.

Haemodynamic changes
In our study showed that Blood pressure and heart rate changes were similar in both the groups. The difference in mean heart rate between Ropivacaine and Bupivacaine was not statistically significant at any of the time intervals (P>0.05). The difference in mean SBP between Ropivacaine and Bupivacaine was not statistically significant at any of the time intervals (P>0.05). The difference in mean DBP between Ropivacaine and Bupivacaine was not statistically significant at any of the time intervals (P>0.05).
A study on ropivacaine concluded that it is an effective long acting local anaesthetic and the first produced as a pure enantiomer. The sensory block produced by ropivacaine is similar to that produced by an equivalent dose of bupivacaine for extradural block but the motor block is less intense, when compared to bupivacaine. This together with the lower toxicity compared with bupivacaine, enables ropivacaine to be used for surgical anesthesia in concentrations up to 1%. We found similar results with less motor blockade with ropivacaine.

In Surabathuni et al study reported that the need for rescue analgesia was more in the ropivacaine group than the bupivacaine group.[10] However, in our study four patients in each group required rescue analgesia. No other complications such as nausea, urinary retention, and convulsions were found in our study.

CONCLUSION

We concluded that the Sensory block and Haemodynamic stability was comparable with no significant difference in the both the groups. Overall higher doses of Ropivacaine were used than Bupivacaine. The Ropivacaine group had significantly less motor block compared to Bupivacaine group.

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