

Evaluation of Post-Operative Epidural Analgesia with 0.2% Ropivacaine HCL and 0.2% Bupivacaine HCL in Patients Undergoing Abdominal Hysterectomy Under Spinal Anaesthesia

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Abstract:

Background: Many people view epidural analgesia as the "gold standard" in analgesic method, and it is frequently used for post-operative analgesia following abdominal and lower limb procedures. While some researchers claimed that the newer local anaesthetic agent Ropivacaine provided superior block over conventional agent Bupivacaine, others did not find similar results. Hence our study is designed to compare whether there is any difference of analgesic efficacy between these two drugs in patients undergoing abdominal Hysterectomy under Spinal anaesthesia

Methodology: A Comparative observational study was conducted on total 60 (sixty) no of ASA PS I & II patients undergoing abdominal hysterectomy under spinal anaesthesia. Patients were divided in 2 groups with equal numbers in each group (n=30). Group R (Ropivacaine) received 10 ml of 0.2% Ropivacaine & Group B (Bupivacaine) received 10 ml of 0.2% Bupivacaine at VAS Score 5 in the postoperative period. Onset and duration analgesia, Haemodynamic parameters, and adverse effects- if any, were studied.

Results: Bupivacaine group had a faster onset time with 11 min approx., while in Ropivacaine group it was around 15 min. The duration of analgesia was longer with Bupivacaine- approx 130 min than in Ropivacaine group- approx. 113 min. Overall side effects were more in Bupivacaine group as compared to Ropivacaine group. Pain relief was more with Bupivacaine in comparison to Ropivacaine.

Conclusion: It is concluded that Bupivacaine produced better and longer-lasting analgesia than Ropivacaine. Moreover, bupivacaine had a faster onset time over Ropivacaine.

Keywords: Epidural analgesia, Bupivacaine, Ropivacaine

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Introduction

Pain is a sensation in a certain area of the body and is always subjective. Furthermore, it includes an emotional component because it is uncomfortable at the same time. Post operative pain is the most severe form of pain felt by patient. So, it is the unequivocal duty of anaesthesiologist to ensure adequate post operative analgesia for patients undergoing surgeries. Many people view epidural analgesia as the "gold standard" in analgesic approach, particularly when it comes to post-operative analgesia following abdominal and lower limb procedures. Because it offers dynamic analgesia, the patient can continue activities of daily living that are impeded by pain. When an epidural catheter containing an analgesic medication is inserted, epidural analgesia can continue to provide continuous pain relief, which makes it appropriate for early ambulation and ongoing post-operative

pain reduction [1-3]. Even though bupivacaine is the best local anaesthetic and is frequently injected intravenously for analgesia, we looked at alternative medications out of concern that it could accidentally be injected intravascularly and cause cardiac arrest, which is difficult to revive. Because it is an S-enantiomer of bupivacaine, ropivacaine, a recently developed long-acting amide local anaesthetic, is thought to have fewer adverse effects on the cardiovascular system. Compared to similar concentrations of bupivacaine, the differential blocking action of ropivacaine gives analgesia with less motor block. Varying degree of results was observed by different investigators in regard to post operative analgesia achieved by Bupivacaine and Ropivacaine. Some investigators found no differences between Ropivacaine and Bupivacaine [4] while others labeled Ropivacaine as less potent

than Bupivacaine regarding their analgesic efficacy [5]. Hence, the present study” post-operative epidural analgesia-a comparative study between 0.2% Ropivacaine HCl and 0.2% Bupivacaine HCl in patients undergoing abdominal Hysterectomy under Spinal anaesthesia” is designed to compare whether there is any difference of analgesic efficacy between these two drugs.

Methodology

The Study was conducted in AGMC & GBP Hospital, among 60 patients of 35-65 years, ASA PS I and II who undergone abdominal hysterectomy under spinal anaesthesia in 2 groups (30 patients in each Group R i.e., Ropivacaine and Group B i.e., Bupivacaine respectively). Patients refused to undergo the study, failed sub-arachnoid/epidural block, known patients of- bleeding diathesis, uncontrolled hypertension, hypotension, dehydration, increased intracranial tension –were excluded from the study.

The study drug was administered 10 ml of 0.2% Ropivacaine/ Bupivacaine to each study subject at VAS Score 5 in the post operative period. The following outcome variables were studied.

- Onset of analgesia: Time to reach visual analogue scale < 5 after the first dose of study drug in the post operative period.
- Duration of analgesia: Calculated by time interval from the time to achieve VAS<5 to time to reach VAS ≥5 after the first dose of study drug in the post operative period.

Heart rate, mean arterial pressure, Systolic & diastolic BP, Oxygen saturation percentage were monitored in regular intervals. Patients were monitored for any sign of adverse effects. Pain intensity was measured as per VAS Score.

Results

Data were analyzed by using computer statistical software system SPSS® version 15 (Statistical Packages for the Social Sciences). Most of collected data were of normal distribution and students’ test was applied on them for statistical analysis. A ‘p’ value less than 0.05 were taken as significant.

There was no statistically significant difference in respect of age, sex, and ASA- PS between the 2 groups.

Table 1: Onset of analgesia with either ropivacaine or bupivacaine through epidural route

Time to Achieve VAS SCORE <5 (minutes)		
Group-R (n = 30)	Group-B (n = 30)	p-value
(Mean ± S.D)	(Mean ± S.D)	(Students’ ‘t’ test)
15.467 ± 2.047	11.767 ± 1.382	<0.001

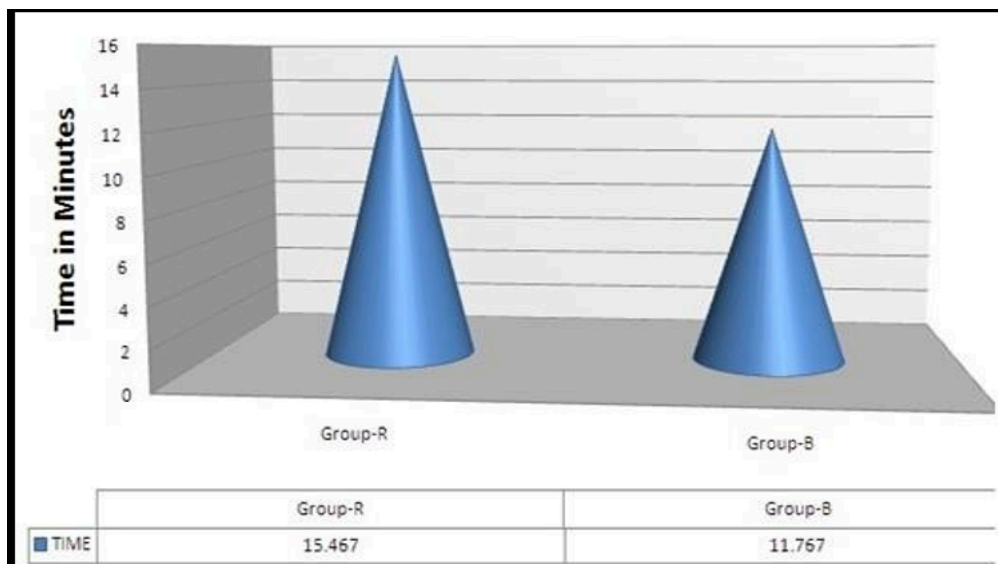


Figure 1: Onset of Analgesia

Table 1 & Figure 1 show that Group-R patients who received Ropivacaine took 15.467 ± 2.047 minutes to regain VAS score <5 whereas group-B patients who received Bupivacaine took 11.767 ± 1.382 minutes. Unpaired students’ test was done, and p value was <0.001 which is considered to be highly significant statistically.

Table 2: Duration of post operative epidural analgesia achieved with either ropivacaine or bupivacaine.

Duration of Post Operative Analgesia (min)		
Group-R (N = 30)	Group-B (N = 30)	p-value
(Mean ± S.D)	(Mean ± S.D)	(Unpaired Student ‘t’ test)
113.767 ± 8.966	130.800 ± 18.429	<0.001

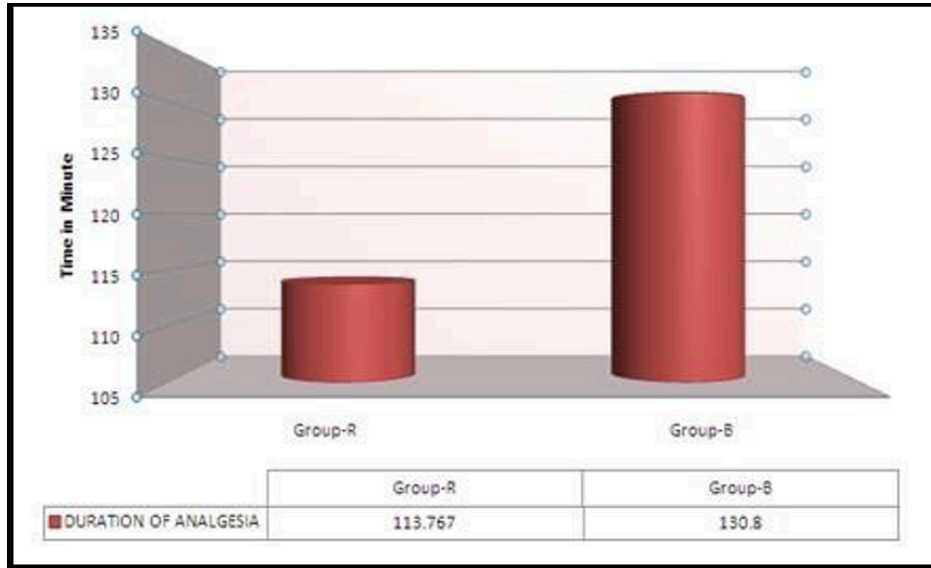


Figure 2: Duration of post operative analgesia

Table 2 & Figure 2 show that the duration of post operative epidural analgesia with Ropivacaine or Bupivacaine. Duration of analgesia in Group-R patients was 113.767 ± 8.966 min but in group- B patients the duration was 130.800 ± 18.429 min. As

per unpaired student’s test p value was <0.001 which is which is highly significant statistically. This indicates that duration of analgesia of Bupivacaine group is more than the ropivacaine group.

Table 3: Incidence of side effects in case of epidural analgesia with either ropivacaine or bupivacaine

Incidence of Side Effects		
Side Effects	Group-R	Group-B
Nausea	2	3
Vomiting	1	3
Pruritus	0	1
Hypotension	1	2
Bradycardia	0	2
Respiratory depression	0	0

Table 3 show that the incidence of side effects in patients received post-operative epidural with either Ropivacaine or Bupivacaine. It is evident that the overall side effects with epidural Bupivacaine is higher in compared to the epidural Ropivacaine. Among the side effects nausea and vomiting is quite common with Bupivacaine though it was seen in patients who receiving Ropivacaine too. Cardiac adverse effect like hypotension and bradycardia is much higher with Bupivacaine than with Ropivacaine.

Thus, it indicates that Ropivacaine is much safer drug than Bupivacaine though the overall benefit in regard to the onset and duration of analgesia with Bupivacaine is better than Ropivacaine. The changes in Mean heart rate and Mean arterial Pressure in two groups at each period of time was comparable. The overall cardiac stability was well preserved by either drug.

Discussion

Bupivacaine remains the optimal medication for epidural analgesia. In our study we observed that the

mean duration of analgesia of Bupivacaine was 130 min approx., whereas in Ropivacaine group mean duration was 113 min approx. In a similar study, Miller et al [4] found that there were no significant differences in analgesia between continuous epidural infusion of 0.2% Ropivacaine and 0.2% Bupivacaine while Breschan et al [6] found that duration of analgesia was longer with bupivacaine than ropivacaine But According to Pouzeratte et al. [7], Bupivacaine was more efficacious than Ropivacaine when combined with an opioid analgesic.

While we compared the time of onset of analgesia and duration of analgesia with 0.2% Ropivacaine HCl and 0.2% Ropivacaine HCl, we found that analgesia began to take effect in the Bupivacaine group after 12 minutes and in the Ropivacaine group after approximately 15 minutes. Thus, the onset was quicker in the Bupivacaine group, but it was almost similar in the other group. However, the duration of analgesia was longer in the Bupivacaine group

which is similar to the finding of the study conducted by Ingelmo et al [8] and Tuttle et al [9].

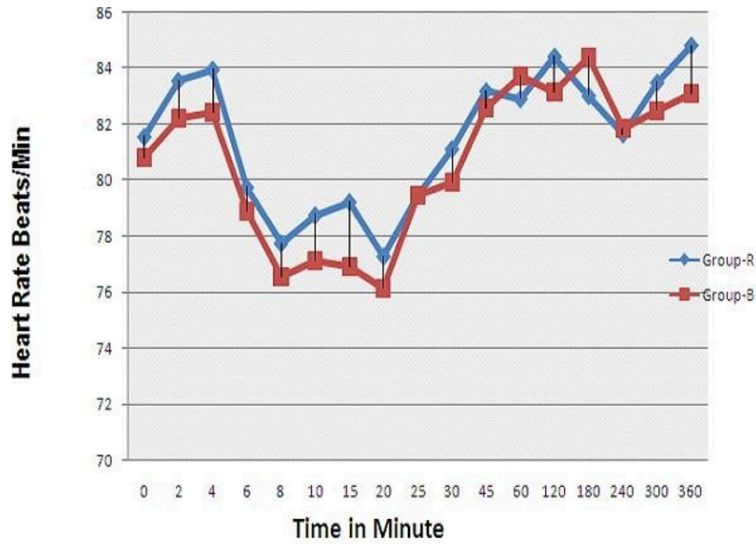


Figure 3: Mean Heart Rate over time

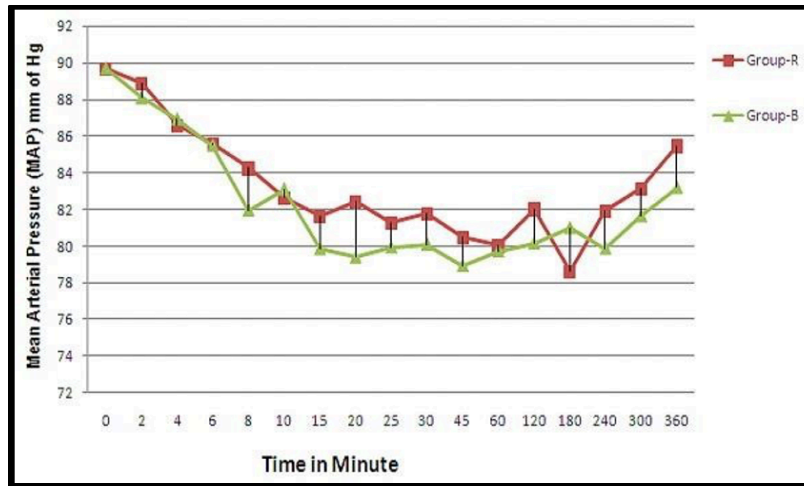


Figure 4: Mean arterial pressure over time

Because of its composition, bupivacaine is thought to be more cardiotoxic. With Bupivacaine, Knudsen et al. [3] noted a slight drop in both the diastolic and systolic blood pressure. However, when hemodynamic stability was examined in our study, we discovered that some bupivacaine group patients experienced a drop in blood pressure over a 15–30-minute period, but that this drop did not occur significantly in the first 6 hours following surgery until the first dose of epidural rescue analgesics.

The duration of action in the epidural region is influenced by the vasoconstrictive feature of ropivacaine, as mentioned in a previous study by Dahl et al. [10]. However, we observed that the analgesic duration in the bupivacaine group was longer than that of the ropivacaine group.

In the Ropivacaine group, hemodynamic stability was higher. Using the same dosage of ropivacaine and bupivacaine, Ingelmo et al. [8] observed that ropivacaine induced a motor block that was less

severe, had a delayed start, and lasted less time. We also reached the same conclusion: in order to sustain post-operative epidural analgesia, 0.2% bupivacaine was preferable to 0.2% ropivacaine.

In a study conducted by Scott et al. [11], the effects of a continuous lumbar epidural infusion of 0.1%, 0.2%, and 0.3%) Ropivacaine and 0.25% Bupivacaine were examined. It was found that the 0.1% Ropivacaine induced minor motor block and limited analgesia. In our study also we observed that there is no motor block with 0.2% ropivacaine whereas fewer patient develops minimal motor blocked with 0.2% bupivacaine.

We concluded that, in comparison to Group R, where patients received Ropivacaine, Group B, which received Bupivacaine 0.2%, was considerably more at ease and satisfied with the level of analgesia.

Summary

60 patients undergoing Abdominal Hysterectomy were selected for this study in which 10 ml of 0.2% Bupivacaine was compared with 10ml of 0.2% Ropivacaine for post-operative analgesia. The patients were allocated randomly to either receive 0.2% Bupivacaine or 0.2% Ropivacaine. The haemodynamic parameters, onset and duration of analgesia were recorded at regular time intervals. Subjective pain relief score also recorded. Once the data collected from all the patients, it was compared using chi-square test, student t-test. The p value was calculated and $P < 0.05$ was considered statistically significant.

Duration of analgesia in Bupivacaine group was approx. 130 min and in Ropivacaine group was 113 min. Thus, the duration of analgesia was longer with Bupivacaine. Bupivacaine group had a faster onset time with 11 min approx. while in Ropivacaine group it was around 15 min. Overall side effects were more in Bupivacaine group as compared to Ropivacaine group. Pain relief was more with Bupivacaine in comparison to Ropivacaine in achieving post operative analgesia.

Conclusion

It is concluded that the duration of analgesia was longer and better with Bupivacaine than Ropivacaine. Bupivacaine also had a faster onset time over Ropivacaine.

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