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ORIGINAL ARTICLE

Comparative Evaluation of Levo-Bupivacaine against Ropivacaine for Post-Operative Pain Relief in Patients of Laparoscopic Appendectomy

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Abstract

Introduction: Pain in the immediate postoperative period is less after laparoscopic surgery than conventional surgical techniques. Ropivacaine is often in favored over Bupivacaine to avoid toxicity. Levo-bupivacaine a newer version of bupivacaine is said to be safer than Ropivacaine. We have evaluated the pain relief provided by Ropivacaine and Levo-bupivacaine instilled intra-abdominally during laparoscopic surgery for acute appendicitis.

Methods and material: In a randomized placebo controlled study conducted on 90 patients in private medical institute over a period of year, a patient control analgesia (PCA) total amount of morphine utilized to attain pain scores of 0-1 was measured in placebo, Ropivacaine and Levo-bupivacanie group using visual analog score (VAS). Data was analyzed using analysis of variance and tests of statistical significance were employed.

Results: Significant difference was not observed between the Ropivacaine and Levo-bupivacaine groups with similar utilization of morphine for both drugs. Whereas significant difference was noted between placebo and local anaesthetics.

Conclusions: There appear to be no difference between Ropivacaine and Levo-bupivacaine in terms of pain relief. Pre-emptive instillation of local anaesthetic for laparoscopic surgery is beneficial for post-operative pain relief.

Keywords: Comparative Evaluation , VAS, Post op pain relief , Laparoscopic Appendectomy

1 | INTRODUCTION

Abdominal surgeries come with the postoperative problems of pain, nausea, vomiting, chest infections, and risks of DVT, which lead to delay in ambulation, increased morbidity and longer hospital stays which increases the hospitalization cost. Laparoscopic surgery has been used often to avoid many of these and instillation of local anesthetic to reduce postoperative pain gives an added advantage with reduce complications. [1,2,3,4,5]

Being less invasive, most anesthetists in our hospital do not enlist these patients under the acute

pain service care. The postoperative pain is usually managed by the surgeons in the ward, often times with paracetamol and oral opioids that then tend to contribute to the increased ,incidences of nausea and vomiting.[6,7,8] Recently, Ropivacaine has been more popularly used because of its safety profile compared to Bupivacaine. However recently availability of Levobupivacaine, which is said to be safer made us evaluate them. Levobupivacaine and Ropivacaine are prepared as the single levorotatory isomer thus have less potential for systemic toxicity.[9,10,11] With conflicting results in studies comparing potency of Ropivacaine and Levobupivacaine [12,13] we planned this study to compare the analgesic effect of Ropivacaine and Levo-bupivacaine during the immediate post-operative period (1-6 hours) in patients of laparoscopic appendectomy.

2 | METHODOLOGY

This study was conducted over a period of year with the help of medical officers of Senior Residents of both the anesthetic and surgical department. The study was planned as double blinded randomized placebo-controlled study wherein all patients diagnosed as acute appendicitis, who fulfilled the inclusion criteria of being classed as American society of Anesthesiology (ASA) Class ASA I and II (only hypertensives), Aged between 18 to 65 years and weighing between 50 kg and 80 kg, were included in the study. All the patients with ASA II (excluding hypertension) and above, with known allergies to local anesthetics, Chronic consumption of analgesics, Suspected perforated appendix, with surgeries expected to last for more than two hours, Iatrogenic perforation or bleeding during surgery were excluded. The amount of morphine used postoperatively for pain relief using patient controlled analgesia (PCA) was noted during the immediate postoperative period and subsequent 18 hours.

A sample size of 90 was calculated based on a power of 80% and two-sided alpha level at 0.05 to detect a post-operative analgesic consumption of 50%. The dose was calculated based on patients' body weight and the solutions were prepared in a 50 ml syringes by the OT nurse.

Patients were assigned to 3 groups by simple randomization using sealed unlabeled envelopes that contained the name of the solution. The envelopes were opened by the anesthetist who then prepared the dilution for instillation. Both the patient and surgeon were blinded in the study. Group A (Placebo group), received 50 ml of 0.9% saline, Group B received 50 ml of 0.75% Ropivacaine plus 0.9% saline at a dose of 3 mg/kg and Group C received 50 ml of 0.5% Levo-bupivacaine plus 0.9% saline at a dose of 2 mg/kg. After anesthesia, the surgeon instilled the agent at the intended operative site and the surgery commenced after waiting period for 5 minutes

3 | ANAESTHETIC TECHNIQUE

All patients were given General Anesthesia to maintain standardization. Patients were given fentanyl and propofol for induction, muscle relaxant, suxamethonium, followed by tracurium, oxygen, nitrous oxide and sevoflurane for maintenance and reversed with atropine and neostigmine combination. Only fentanyl was given intra-operatively and again in the post-operative recovery room if there was pain.

After the procedure, the patients were observed in the recovery unit for 20 to 30 minutes, ensured were pain free (pain score 0-1) and sent back to the ward where the pain score was monitored. Patient controlled analgesia (PCA) using morphine as the drug of choice was initiated when the scores were 0-1. Patients were advised to use the PCA until they were comfortable and felt that the pain score was 0 to 1 by their perception.

Side effects of morphine like nausea and vomiting were treated with metoclopramide. The PCA was

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stopped at the end of 24 hours and the total dose of morphine used was recorded.

Data were analysed using analysis of variance and test of significance (t-test) was carried out to compare the Ropivacaine and Levo-bupivacanie.

4 | RESULT

There was a statistical difference between the placebo and local anesthetic (LA) group in terms of use of PCA morphine (PCAM). Table 1

TABLE 1: showing the utilization of morphine with Patient Controlled Anesthetic (PCA) and significance

A-solution	B- solution	Mean Difference (A-B)	Standard	Significance
Placebo	Ropivacaine	-11.140*	1.936	000
	Levo Bupivacaine	11.605*	2.006	000
Ropivacaine	Placebo	-11.140*	1.936	000
	Levo Bupivacaine	465	1.936	1.000
Levo bupivacaine	Placebo	-11.605*	2.006	000
	Ropivacaine	-0.465	1.936	1.000

There was a significantly higher usage of morphine with placebo group (23.03 mg) to attain the required comfortable state than Ropivacaine (11.89 mg) and Levo-bupivacaine group (11.42 mg). (Table 2)

TABLE 2: Showing mean dosage of morphine used in 3 different groups

Groups	Patients (n)	Mean dosages of morphine used (mg/ml)
Placebo	28	23.03 ± 7.55
Ropivacaine	34	11.89 ± 8.62
Levobupivacaine	28	11.42 ± 9.93

There appears to be no correlation between age and amount of PCAM used. With P value of 0.821 no significant difference in the use of morphine for Ropiv- acaine (M = 11.89, SD = 8.619) and Levo-bupivacaine (M = 11.42, SD = 9.923) was found.

5 | DISCUSSION

Postoperative pain control is one of the main factor which influences speedy recovery and faster discharge of a patient from the hospital after surgery and studies have shown that adequate acute pain control would also reduce the risk of developing chronic pain.[14,15] The use of local anesthetics in central and peripheral nerve blockades, which include wound infiltration, can improve pain score in the postoperative period [16]

The reason for replacing Bupivacaine with the s-enantiomers Levo-bupivacaine and Ropivacaine is to provide a wider margin of safety with the same analgesic efficacy and less postoperative motor block. However, based on the lower lipophilic property and many experimental studies, Ropivacaine appears to have the greatest margin of safety of all the local anesthetics. [11,17]

The individual dose of analgesic differs significantly from patient to patient. Pain in fact has an affective and motivational component [18,19] In this study there was better pain control in patients who received the local anesthetic instillation than those who did not which is in concordance with many other studies[1,4,7,20,21,22]. We could not gather evidence of and significant difference in the pain relief provided by Ropivacaine and Levo-bupivacaine postoperatively in maximum possible dosage of 2 mg/kg for Levobupivacaine and 3 mg/kg for Ropivacaine per Kg body weight.

When used for women in labor, Levobupivacaine was 19.3% more potent than Ropivacaine and provided similar safety results.[23] In other studies with similar designs, Ropivacaine was found to be 40% to 50% less potent than Bupivacaine. [17,24] A study on obstetric patients receiving spinal anaesthesia, Levobupivacaine was found to be 38% less potent than Bupivacaine.[25] Whereas studies demonstrate the potency arrangement for spinal and combined spinal-epidural to be Bupivacaine > Levobupivacaine> Ropivacaine. [9,11,26]

Factors that need consideration when choosing between drugs with similar clinical profile include safety profile, efficacy and cost. In terms of economic, it is not worthy to justify the use of Levobupivacaine in place of Ropivacaine when both the drugs have very similar clinical effects especially in terms of safety. The costing of a drug is will affect the choice especially in third world countries Levo-bupivacaine being more expensive than Ropivacaine and also the fact that Ropivacaine has slightly less side effects than Levo-bupivacaine.

The average age of patients in our study is 30 years and there appears to be no correlation between age and amount of PCA used in our study.

6 | CONCLUSION

Instillation of local anesthetic for laparoscopic surgery is definitely beneficial for post-operative pain relief as use of other analgesics like opioids were reduced allowing patients to ambulate earlier, low risk of post-operative nausea and vomiting and avoids side effects of analgesics. However, we found no difference the effectiveness of pain relief provided by Ropivacaine and Levo-bupivacaine in our study.

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