Original Research Article

A study to compare the effect of postoperative analgesia between intraperitoneal instillation of ropivacaine and bupivacaine in laparoscopic surgeries

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Abstract

Background: Laparoscopic techniques have revolutionized the field of surgery with benefits that include decreased postoperative pain, earlier return to normal activities following surgery, and fewer postoperative complications. Management of postoperative pain relievers suffering and leads to earlier mobilization, shortened hospital stay, reduced hospital costs, and increased patient satisfaction. Objectives: To measure Postoperative Analgesia of Intraperitoneal Instillation of Ropivacaine and Bupivacaine in Laparoscopic Surgeries by using time to first request of analgesia. **Methodology:** The present study was conducted at Sri Manakula Vinayagar Medical College and Hospital, Pondicherry in the Department of Anaesthesia. The double blinded randomized experimental study was conducted from October 2017 to May 2019.The sample size of 50 study subjects was selected using the mean pain score at 3.6 with 80% power and 95% confidence interval. In each of the group 25 study subjects were allotted based on randomization. All patients were instilled with 30 ml of solution in a standardized manner by the operating surgeon under vision before removal of trocar at the end of the surgical procedure. Group R received 30 ml (0.2%) ropivacaine and group B received 30 ml (0.25%) bupivacaine. The drugs were prepared and given to the investigator who was blind to the identity of drugs. **Results:** Both the study groups were comparable in terms of age, no significant difference was observed between the groups No significant association was observed between pain score and the study groups at 60 and 120 mins . Significant association was seen at 8,12 and 24 hrs .**Conclusion :** Pain scores were not significantly different between the study groups till 4 hours, however, higher pain scores were noted in Bupivacaine group thereafter. Also, this difference in pain scores between the study groups after 8 hours was found to be statistically significant.

KEYWORDS: Pain, Vas Score ,Bupivacaine, Laprotomy ,Intraperitonieal

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INTRODUCTION

Laparoscopic techniques have revolutionized the field of surgery with benefits that include decreased postoperative pain, earlier return to normal activities following surgery, and fewer postoperative complications (eg, wound infection, hernia). However, unique complications are associated with gaining access to the abdomen for laparoscopic surgery. Inadvertent bowel injury or major vascular injury is uncommon, but both are potentially life-threatening complications that are most likely to occur during initial access.[1,2,3]

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In abdominal surgeries, the cause of pain is

1. Somatic
2. Visceral.

Somatic pain is due to skin incision and the visceral pain is due to handling of the intestine and peritoneal inflammation. During open surgeries, both somatic and visceral pain will be present which may not be tolerable to a patient without adequate analgesia. In Laparoscopic surgeries somatic pain is very less due to a small skin incision. But visceral pain is more prominent due to visceral nociceptor stimulation. Visceral Pain may occur due to rapid distension of peritoneum, intraperitoneal inflammation, traction of nerves and vessels, diaphragmatic irritation (shoulder tip pain). Post laparoscopic pain can be minimized by following ways: - creating the pneumoperitoneum slowly, aspiration of gas under the diaphragm which lets out the residual CO2, keeping gas drain, using low pressure and heated gas, using nitrous oxide pneumoperitoneum, instillation of local anesthetics under the diaphragm, rectus sheath block, surgery under subarachnoid block, peri- operative NSAID'S and opioids. Intra peritoneal local anaesthesia is a simple, cheap and safe method of providing post-operative analgesia.[4,5] Management of postoperative pain relievers suffering and leads to earlier mobilization, shortened hospital stay, reduced hospital costs, and increased patient satisfaction.[9-11] Pain control regimens should not be standardized; rather, they are tailored to the needs of the individual patient, taking into account medical, psychological, and physical condition; age; level of fear or anxiety; surgical procedure; personal preference; and response to agents given. Inflammation from tissue trauma (i.e., surgical incision, dissection, burns) or direct nerve injury (i.e., nerve transaction, stretching, or compression) is the main factor behind post-operative pain. The patient feels pain through the afferent pain pathway = which can be altered by numerous pharmacologic mediators.[6] Intraperitoneal local anesthetics acts by blocking the visceral nociceptors, thereby, decreasing the visceral pain in laparoscopic surgeries. It also has anti-inflammatory action and prevents peritonitis and bowel adhesion. Visceral nociceptors will be stimulated by handling of the viscera and the peritoneum causing inflammation and pain.

Objectives:

To measure Postoperative Analgesia of Intraperitoneal Instillation of Ropivacaine and Bupivacaine in Laparoscopic Surgeries by using time to first request of analgesia.

MATERIALS AND METHODS

The present study was conducted at Sri Manakula Vinayagar Medical College and Hospital, Pondicherry in the Department of Anaesthesia. The double blinded randomized experimental study was conducted from October 2017 to May 2019.

The sample size of 50 study subjects was selected using the mean pain score at 3.6 with 80% power and 95% confidence interval. In each of the group 25 study subjects were allotted based on randomization.

Inclusion Criteria: The subjects within the Age group of 18-60 years and belonging to ASA I and II Category undergoing Laparoscopic surgery

Exclusion Criteria: Subjects suffering from Renal or any systemic Illness and those who are allergic to the drugs being examined and who didn't give consent.

All patients were instilled with 30 ml of solution in a standardized manner by the operating surgeon under vision before removal of trocar at the end of the surgical procedure. Group R received 30 ml (0.2%) ropivacaine and group B received 30 ml (0.25%) bupivacaine. The drugs were prepared and given to the investigator who was blind to the identity of drugs.

The quality of analgesia was assessed by visual analogue scale (VAS). Time to first request of analgesia, total dose of analgesic in first 24 hours and adverse effects were also noted. All patients were explained about the anaesthesia technique andwritten informed consent taken. Patients were kept NPO for 8hours prior to surgery. Patients were shifted to the post-operative recovery room when they were breathing spontaneously and following verbal command with stable vital parameters. Postoperative pain was assessed using numeric VAS 0 - 10. When the VAS pain score was equal or more than 4, the patients were given inj. diclofenac sodium as a rescue analgesic in the dose of 2 mg/kg intravenously slowly. The severity of PONV was graded on a four-point ordinal scale (0- no nausea or vomiting; 1-mild nausea; 2- moderate nausea; and 3- severe nausea with vomiting). Rescue antiemetic ondansetron 4 mg intravenously was given to all patients with PONV of grade ≥2. Means and proportions were calculated for continuous and categorical data respectively. Difference in proportions were tested using chi square test. Tests of normality were carried out for continuous variables and Mann Whitney U test was carried out to test statistical difference in means between the study groups. A p value <0.05 was considered statistically significant. Data entry was done using MS Excel 2013 and data analysis was carried out using SPSS version 23.0

RESULTS

A total of 25 study subjects were selected and enrolled in each of the group.

Table 1: Distribution of study groups based on age (n = 50)

Age (in years)	Study group		Total n (%)	p value* (Chi Square)
	Ropivacaine n (%)	Bupivacaine n (%)		
18-30	13(52.0)	9(36.0)	22(44.0)	0.476
31-45	7(28.0)	8(32.0)	15(30.0)	
46-65	5(20.0)	8(32.0)	13(26.0)	
Total	**25(100.0)**	**25(100.0)**	**50(100.0)**	

Both the study groups were comparable in terms of age, no significant difference was observed between the groups (p value -0.476)

Table 2: Distribution of study groups based on pain score at 60 mines (n = 50)

Pain score at 60 mines	Study group		Total n (%)	p value* (Chi Square)
	Ropivacaine n (%)	Bupivacaine n (%)		
0	21(84.0)	18(72.0)	39(78.0)	0.505
1	4(16.0)	5(20.0)	9(18.0)	
2	0(0.0)	1(4.0)	1(2.0)	
3	0(0.0)	1(4.0)	1(2.0)	
Total	**25(100.0)**	**25(100.0)**	**50(100.0)**	

No significant association was observed between pain score and the study groups at 60 mines (p value -0.505)

Table 3: Distribution of study groups based on pain score at 120 mins (n = 50)

Pain score at 2 hours	Study group		Total n (%)	p value* (Chi Square)
	Ropivacaine n (%)	Bupivacaine n (%)		
0	18(72.0)	17(68.0)	35(70.0)	0.401
1	5(20.0)	4(16.0(	9(18.0)	
2	1(4.0)	4(16.0)	5(10.0)	
3	1(4.0)	0(0.0)	1(2.0)	
Total	**25(100.0)**	**25(100.0)**	**50(100.0)**	

No significant association was observed between pain score at 2 hours and the study groups (p value -0.401).

Table 4: Distribution of study groups based on pain score at 8 Hrs. (n = 50)

DISTRIBUTION OF STUDY GROUPS BASED ON PAIN SCORE AT 8 HOURS (N = 50)				
Pain score at 8 hours	Study group		Total n (%)	p value* (Chi Square)
	Ropivacaine n (%)	Bupivacaine n (%)		
0	3(12.0)	0(0.0)	3(6.0)	
1	4(16.0)	1(4.0)	5(10.0)	
2	4(16.0)	2(8.0)	6(12.0)	0.027
3	6(24.0)	3(12.0)	9(18.0)	
4	8(32.0)	19(76.0)	27(54.0)	
Total	**25(100.0)**	**25(100.0)**	**50(100.0)**	

Significantly higher pain scores are observed in Bupivacaine group as compared to Ropivacaine group at 8 hours (p value -0.027).

Table 5: Distribution of study groups based on pain score at 12 Hrs. (n = 50)

Pain score at 12 hours	Study group		Total n (%)	p value* (Chi Square)
	Ropivacaine n (%)	Bupivacaine n (%)		
1	1(4.0)	0(0.0)	1(2.0)	0.006
2	9(36.0)	1(4.0)	10(20.0)	
3	7(28.0)	18(72.0)	25(50.0)	
4	8(32.00	6(24.0)	14(28.0)	
Total	**25(100.0)**	**25(100.0)**	**50(100.0)**	

Significantly higher pain scores are observed in Bupivacaine group as compared to Ropivacaine group at 12 hours (p value -0.006)

Table 6: Distribution of study groups based on pain score at 24 Hrs. (n = 50)

Pain score at 24 hours	Study group		Total n (%)	p value* (Chi Square)
	Ropivacaine n (%)	Bupivacaine n (%)		
1	1(4.0)	0(0.0)	1(2.0)	0.044
2	8(32.0)	1(4.0)	9(18.0)	
3	8(32.0)	11(44.0)	19(38.0)	
4	8(32.0)	13(52.0)	21(42.0)	
Total	**25(100.0)**	**25(100.0)**	**50(100.0)**	

Significantly higher pain scores are observed in Bupivacaine group as compared to Ropivacaine group at 24 hours (p value -0.044).

Table 7: Distribution of study groups based on PONV (n = 50)

PONV	Study group		Total n (%)	p value* (Chi Square)
	Ropivacaine n (%)	Bupivacaine n (%)		
Yes	1(4.0)	0(0.0)	1(2.0)	1.0
No	24(96.0)	25(100.0)	49(98.0)	
Total	**25(100.0)**	**25(100.0)**	**50(100.0)**	

Presence of PONV was noted only in one patient in Ropivacaine group (p value – 1.0).

DISCUSSION

Sharan R *et al.* [7] study results stated that Pulse rate, systolic blood pressure, and diastolic blood pressure were comparatively lower in Group B (Ropivacaine) than in Group A (Bupivacaine). The visual analog scale (VAS) score was significantly lower in Group B. Rescue analgesia was given when VAS was >6. Verbal rating scale score was significantly lower in Group B, showing longer duration of analgesia in this group. Rescue analgesic requirement was also less in Group B. These results with respect to verbal ration scores were similar to that of the observations noted in the present study. Meena R K *Et al.* [8] noted that VAS score was significantly lower in Group-R from postoperative 5th hr to 12th hr. Rescue analgesia was given when VAS was > 40. VRS score was significantly lower in Group-R from postoperative 7th hr, showing longer duration of analgesia in this group. The rescue analgesia requirement was also less in Group-R. A comparable result was noted in the present study also, where lower VAS scores were noted from 8 hours and after, in patients who received Ropivacaine. Babu R *et al.* [9] study reported revealed that the age and sex distribution of both the groups was similar. There is a significant reduction in VAS over the 12-hour period in both the treatment groups. No statistically significant adverse effects were noted. Duration of hospital stay was also similar in both the study groups. These findings were contradicting to the present study results as well as other studies, since higher blood pressure levels and higher pain scores were noted in Bupivacaine group of patients. Porika S *et al.*[10] study findings reported that There was no significant difference in age and weight between the two groups. Dynamic VAS scores were statistically significant at extubation and in first 6 hours and not significant at 24 hours between both the groups. Static VAS scores were not statistically significant at all times compared between both the groups. Mean Time for first rescue analgesic requirement was 8.23+0.511 hours in group R vs.7.59+0.52 in group B and was statistically significant (p=0.0001). Mean total rescue analgesic required was 95+33.3 mg Diclofenac in group R vs. 112.6+38.4 in group B with 26% of group R requiring 2nd dose of rescue analgesic and 50% of patients in group B required 2nd dose and was not statistically significant. The quality of analgesia measures by dose of rescue analgesia required is equivalent to the VAS scores noted in the present study between the study groups. Das NT *et al.* [11] study observations noted that the mean NRS was <5 till only four hours in Group S, till eight hours in Group B and till 16 hours in Group R. The duration of analgesia was 13.47±1.38 hours in Group R, 7.93±1.44 hours in Group B and 4.47±0.86 hours in Group S.

CONCLUSION

The present study was carried out as an attempt to compare the postoperative analgesic effects of intraperitoneal instillation of Ropivacaine and Bupivacaine in laparoscopic surgeries. Pain scores were not significantly different between the study groups till 4 hours, however, higher pain scores were noted in Bupivacaine group thereafter. Also, this difference in pain scores between the study groups after 8 hours was found to be statistically significant.

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