

# Comparative Study Of Intraperitoneal Instillation Of Levobupivacaine (0.25%) Plus Dexmedetomidine Versus Ropivacaine (0.25%) Plus Dexmedetomidine For Postoperative Analgesia In Patients Undergoing Laparoscopic Cholecystectomy

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**Abstract; Background:** *Instillation of intraperitoneal lignocaine, bupivacaine, levobupivacaine and ropivacaine has been used following laparoscopic gynaecological and general surgical procedures to reduce postoperative pain through randomized trials for many years. Hence; the present study was undertaken for assessing and comparing the efficacy of Intraperitoneal Instillation of Levobupivacaine (0.25%) plus Dexmedetomidine and Ropivacaine (0.25%) plus Dexmedetomidine for postoperative analgesia in patients undergoing laparoscopic cholecystectomy.*

**Materials & methods:** *90 patients were enrolled and were randomly divided into three groups of 30 each using sealed envelopes. Group L: Patients who were given 20 ml of 0.5% levobupivacaine plus dexmedetomidine @ dose of 1 µgm per kg body weight and the remaining volume by adding normal saline to make total volume 40ml, intraperitoneally after gall bladder removal. Group R: Patients who were given 20 ml of 0.5% ropivacaine plus dexmedetomidine @ dose of 1 µgm per kg body weight and the remaining volume by adding normal saline to make total volume 40ml, intraperitoneally after gall bladder removal. Group C: Patient who were given 40 ml of normal saline. Postoperatively the patients were assessed for pain utilizing visual analogue scale (VAS). The result were analyzed and compared to previous studies.*

**Results:** *The mean VAS scores readings were recorded postoperatively in all the three groups at 0, 0.5, 1, 2, 4, 6, 8, 12 and 24 hours. 0 time was the time of end of surgery. The mean VAS score reading was lower in Group L and Group R in comparison to group C at all the time intervals. The number of patients requiring rescue analgesia was significantly higher in the control group in comparison to other study groups. Among the L group and R group, the number of patients requiring rescue analgesia was lower in group L in comparison to group R.*

**Conclusion:** *Intraperitoneal instillation of local anaesthetic solution in laparoscopic cholecystectomy provides effective postoperative analgesia, and analgesia provided by Levobupivacaine plus Dexmedetomidine is significantly better than Ropivacaine plus Dexmedetomidine.*

## 1. INTRODUCTION

Gallstones are hardened deposits of the digestive fluid bile that can form within the gallbladder. Laparoscopic removal is now the procedure of choice when cholecystectomy is indicated. Pain after laparoscopic surgery has a visceral component, as a result of surgical handling and diaphragmatic irritation by dissolved carbon dioxide and a somatic component due to the holes made in the abdominal wall for the trocars.<sup>1-3</sup>

Instillation of intraperitoneal lignocaine, bupivacaine, levo-bupivacaine and ropivacaine has been used following laparoscopic gynaecological and general surgical procedures to reduce postoperative pain through randomized trials for many years. Use of adjuvant drugs in combination with intraperitoneal instillation of local anaesthetic have been found to reduce post-operative pain following laparoscopic cholecystectomy more effectively. A noteworthy prolongation of time length of analgesia had been stated when dexmedetomidine was supplemented in epidural blockades LA, caudal blocks, subarachnoid blocks, PVB, brachial plexus blocks, ulnar nerve blocks, and greater palatine nerve blocks.<sup>4-7</sup> Hence; under the light of above mentioned data, the present study was undertaken for assessing and comparing the efficacy of Intraperitoneal Instillation of Levobupivacaine (0.25%) plus Dexmedetomidine and Ropivacaine (0.25%) plus Dexmedetomidine for postoperative analgesia in patients undergoing laparoscopic cholecystectomy.

## 2. MATERIALS & METHODS

It was prospective, randomized, double blind study comprising of 90 patients of American Society of Anesthesiologists (ASA) grade I and II of age group 18 - 65 years of either sex, admitted in the Surgery department and scheduled to undergo laparoscopic cholecystectomy surgery under general anesthesia. All patients were randomly divided into three groups of 30 each using sealed envelopes. A sealed envelope were randomly selected and opened by an assistant, with instruction to instill the relevant drug. The syringe was labelled with the patient's name and was given to the investigator. An independent observer observed the onset of analgesia.

Group L: Patients who were given 20 ml of 0.5% levobupivacaine plus dexmedetomidine @ dose of 1 µgm per kg body weight and the remaining volume by adding normal saline to make total volume 40ml, intraperitoneally after gall bladder removal.

Group R: Patients who were given 20 ml of 0.5% ropivacaine plus dexmedetomidine @ dose of 1 µgm per kg body weight and the remaining volume by adding normal saline to make total volume 40ml, intraperitoneally after gall bladder removal.

Group C: Patient who were given 40 ml of normal saline.

Pre-anesthetic check-up of the patient selected for study was carried out a day before surgery and was recorded as per proforma. In each case detailed history and physical examination was carried out. Any significant illness present or past was recorded and enquiry was made about allergy to any drug specifically amide local anaesthetic. General physical examination along with examination of cardiovascular and respiratory system will be done. Respiratory rate, pulse rate and blood pressure were recorded preoperatively. Local examination of study drug injection site was done to exclude any sign of sepsis, previous injury or previous deformity.

Patients were asked to restrict fluids and solids by mouth at least six hours before operation. The patients were assured, the procedure was explained and a written informed consent was obtained from them. Postoperatively the patients were assessed for pain utilizing visual analogue scale (VAS). The patient was also be enquired about nausea - vomiting, confusion, dizziness, number of times and dose of rescue analgesia using a predesigned proforma, which was assessed at 0, 0.5,1,2,4,6,8,12, and 24 hour.

Postoperatively the patients were assessed for pain utilizing visual analogue scale (VAS). The patient was also be enquired about nausea -vomiting, confusion, dizziness, number of times and dose of rescue analgesia using a predesigned proforma, which was assessed at 0, 0.5,1,2,4,6,8,12, and 24 hours.

Rescue analgesics were Inj. Diclofenac 75mg slow intravenously (in 100 ml normal saline). It was given when VAS is more than 3, and injection Dexmedetomidine 1 µgm per kg body weight intravenously (in 100 ml normal saline) for any patient who still demanded more analgesia. The data from the present study were systematically collected, compiled and statistically analyzed to draw relevant conclusions. The above mentioned parameters and patient's characteristics were compared using appropriate statistical tests with latest software. The result were analyzed and compared to previous studies.

### 3. RESULTS

The age of the patients in both the groups varied from 18 to 65 years. The mean age in group L was  $41.7 \pm 10.33$  years, in group R was  $43.8 \pm 13.8$  years and in Group C was  $42.8 + 14.1$  years. The mean duration of surgery in group L was  $60.44 \pm 5.61$  minutes, in group R was  $61.05 \pm 4.55$  minutes and in Group C was  $61.67 \pm 5.28$  minutes. The difference in the duration of surgery in the three groups was statistically non-significant ( $p$  value $>0.05$ ), hence the three groups were comparable with respect to duration of surgery.

The mean VAS scores readings were recorded postoperatively in all the three groups at 0, 0.5, 1, 2, 4, 6, 8, 12 and 24 hours. 0 time was the time of end of surgery. The mean VAS score reading was lower in Group L and Group R in comparison to group C at all the time intervals. The mean VAS score readings at 4 and 6 hours in group L were  $2.47 \pm 0.78$  and  $3.74 \pm 0.93$  respectively; and in group R were  $4.37 \pm 0.78$  and  $2.85 \pm 1.25$  respectively. At 4 hours postoperatively, the mean VAS readings for the group L were statistically significantly lower in comparison to the mean VAS readings for the group R ( $p$ - value  $< 0.05$ ). At 6 hours postoperatively, the mean VAS readings for the group R were statistically significantly lower in comparison to the mean VAS readings for the group L ( $p$ - value  $< 0.05$ ).

The number of patients requiring rescue analgesia was significantly higher in the control group in comparison to other study groups. Among the L group and R group, the number of patients requiring rescue analgesia was lower in group L in comparison to group R. While comparing between group L and group R, it was found that mean time to first analgesic requirement among Group L was significantly higher in comparison to Group R. However; mean time of first analgesic requirement among the Group C patients was significantly lower in comparison to Group L and Group R. Complications were noted in less than 10% of the patients in both the groups. Nausea and vomiting were seen in 2 patients in Group L, 3 patients of Group R and 2 patients in Group B. All the readings were comparable and the difference was found to be non – significant in the two groups ( $p$  value  $> 0.05$ ).

Table 1: Age-wise distribution of patients

Age group (years)	GROUP L		GROUP R		GROUP C		p-value
	Number	Percentage	Number	Percentage	Number	Percentage	
18-30	10	33.33	12	40	9	30	0.93
31-40	6	20	6	20	5	16.67	
41-50	11	36.67	5	16.67	12	40	
51-65	3	10	7	23.33	4	13.33	
MEAN ± SD	41.7 ± 10.3		43.8 ± 13.8		42.8 ± 14.1		

Table 2: Mean duration of surgery (minutes)

Mean duration of surgery (minutes)	GROUP L	GROUP R	GROUP C	p-value
MEAN ± SD	60.44 ± 5.61	61.05 ± 4.55	61.67 ± 5.28	0.89

Table 3: Mean VAS Score

TIME (HOURS)	GROUP L		GROUP R		GROUP C		Group L Vs Group R	Group R Vs Group C	Group L vs Group C
	Mean	SD	Mean	SD	Mean	SD			
0	1.53	0.51	1.73	0.45	2.19	0.65	0.18	0.02(S)	0.01(S)
0.5	1.87	0.57	2.07	0.69	2.32	0.79	0.19	0.03(S)	0.00(S)
1.0	2.23	0.68	2.13	0.78	4.46	1.01	0.75	0.01(S)	0.02(S)
2.0	2.60	0.77	2.83	0.65	2.91	1.02	0.19	0.00(S)	0.01(S)
4.0	2.47	0.78	4.37	0.78	2.75	1.12	0.02(S)	0.03(S)	0.01(S)
6.0	3.74	0.93	2.85	1.25	2.18	1.28	0.02(S)	0.02(S)	0.01(S)
8.0	2.57	0.93	2.68	0.87	3.92	1.50	0.92	0.01(S)	0.00(S)
12.0	1.94	0.76	2.87	0.87	2.03	0.91	0.42	0.02(S)	0.01(S)
24.0	1.10	0.71	1.23	0.77	1.26	0.68	0.77	0.81	0.44

Table 4: Number of Patients Requiring Rescue Analgesia

TIME (HOURS)	GROUP L		GROUP R		GROUP C	
	No.	%	No.	%	No.	%
0	0	0	0	0	0	0
0.5	0	0	2	6.67	10	33.33
1.0	1	3.33	2	6.67	18	60
2.0	2	6.67	3	10	5	16.67
4.0	2	6.67	13	43.33	6	23.33
6.0	12	40	9	30	5	36.67
8.0	5	16.67	6	20	10	33.33
12.0	0	0	1	3.33	4	13.33
24.0	0	0	0	0	0	0

Table 5: Time to First Analgesic Requirement

TIME (MINUTE)	GROUP L	GROUP R	Group C	Group L Vs Group R	Group R Vs Group C	Group L vs Group C
Mean	340.90 ± 119.12	294.55 ± 123.11	63.8 ± 135.4	0.00 (S)	0.000 (S)	0.001 (S)

Table 6: Postoperative complications

Side effect and complications	GROUP L		GROUP R		GROUP C		p-value
	No.	%	No.	%	No.	%	
Nausea and Vomiting	2	6.67	3	10	2	6.67	0.74

#### 4. DISCUSSION

The mean duration of surgery in group L was  $60.44 \pm 5.61$  minutes, in group R was  $61.05 \pm 4.55$  minutes and in Group C was  $61.67 \pm 5.28$  minutes. The difference in the duration of surgery in the three groups was statistically non-significant ( $p$  value  $> 0.05$ ), hence the three groups were comparable with respect to duration of surgery.

The mean preoperative systolic blood pressure in group L was  $112.72 \pm 10.52$  mm Hg. In group R, the mean preoperative systolic blood pressure was  $114.23 \pm 7.22$  mm Hg. In group C, the mean preoperative systolic blood pressure was  $118.51 \pm 9.56$  mm Hg. The preoperative and intraoperative readings were comparable among the three study groups and the difference was statistically non-significant. The postoperative readings of systolic blood pressure were comparable among the three study groups and the difference was statistically non-significant. The preoperative and intraoperative readings of diastolic blood pressure were comparable among the three groups and the difference were statistically non-significant ( $p$  value  $> 0.05$ ). The mean heart rate at various intervals intra-operatively was found to be comparable in all the three groups and clinically non-significant ( $p$  value  $> 0.05$ ). There was no statistical difference in change in SpO<sub>2</sub> at different time intervals in the three groups ( $p$  value  $> 0.05$ ) in intraoperative periods.

The mean VAS score reading was lower in Group L and Group R in comparison to group C at all the time intervals. The mean VAS score readings at 4 and 6 hours in group L were  $2.47 \pm 0.78$  and  $3.74 \pm 0.93$  respectively; and in group R were  $4.37 \pm 0.78$  and  $2.85 \pm 1.25$  respectively. At 4 hours postoperatively, the mean VAS readings for the group L were statistically significantly lower in comparison to the mean VAS readings for the group R ( $p$ -value  $< 0.05$ ). At 6 hours postoperatively, the mean VAS readings for the group R were statistically significantly lower in comparison to the mean VAS readings for the group L ( $p$ -value  $< 0.05$ ). In a study conducted by Beder El et al, authors compared adding dexmedetomidine to intraperitoneal levobupivacaine in patients undergoing laparoscopic cholecystectomy. A total of 105 patients were included in this prospective, double-blinded, randomized study. Patients were randomly divided into three equal sized ( $n = 35$ ) study groups. Group C patients received intraperitoneal 40 ml normal saline as controlled group. Group L was given 40 ml 0.25% levobupivacaine. Group LD received 40 ml 0.25% levobupivacaine + dexmedetomidine  $1 \mu\text{g}/\text{kg}$ . The degree of postoperative pain was measured by visual analog scale (VAS) score. The time of first analgesic demand was recorded and also total dose of painkiller in the first 24 h and postoperative complications were collected. Postoperative VAS at different time intervals was significantly lower, time to

the first demand of painkiller (min) was longer ( $30.2 \pm 14.4$ ,  $45.9 \pm 20.1$ , and  $56.5 \pm 13.2$ ), and total painkiller consumption (mg) was lower ( $203.5 \pm 42.9$ ,  $117.8 \pm 63.7$ , and  $46.3 \pm 41.3$ ) in Group LD than Group L than Group C.<sup>8</sup>

In a study conducted by Bindra TK et al, authors assessed efficacy of preemptive analgesia with intraperitoneal instillation of ropivacaine in laparoscopic cholecystectomy (LC). Hundred patients were randomly divided into two groups of fifty each. In Group A, patients received 3 mg/kg of ropivacaine intraperitoneal instillation in 100 ml normal saline (NS) before creation of pneumoperitoneum and in Group B patients received 3 mg/kg of ropivacaine intraperitoneal instillation in 100 ml NS after completion of surgery. Postoperative visual analog scale score for abdominal and shoulder tip pain alongwith requirement of rescue analgesic were recorded for 24 h. Significantly lower visual analog scores for pain were observed in Group A versus Group B. Group A reported significantly lower pain at 0 h ( $P < 0.001$ ), 1 h ( $P = 0.003$ ), 3 h ( $P = 0.006$ ), 6 h ( $P = 0.003$ ), and 12 h ( $P = 0.001$ ) postoperatively, but the difference was not statistically significant after 12 h. The mean time of first rescue analgesic was  $472.8 \pm 26.32$  min in Group A, as compared with  $189 \pm 11.87$  min in Group B. A significantly lower analgesic requirement was observed in Group A versus Group B throughout the entire study period ( $P < 0.05$ ).<sup>9</sup>

The number of patients requiring rescue analgesia was significantly higher in the control group in comparison to other study groups. Among the L group and R group, the number of patients requiring rescue analgesia was lower in group L in comparison to group R. In a study conducted by Sharan R et al, authors compared intraperitoneal instillation of bupivacaine and ropivacaine for postoperative analgesia in patients undergoing LC. Sixty patients, aged 18–65 years, of either gender, and American Society of Anesthesiologists physical status I to III scheduled for LC were included and categorized into two groups ( $n = 30$ ). Group A patients received 20 mL of 0.5% bupivacaine intraperitoneally after cholecystectomy and Group B patients received 20 mL of 0.5% ropivacaine intraperitoneally after cholecystectomy. Pulse rate, systolic blood pressure, and diastolic blood pressure were comparatively lower in Group B than in Group A. 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. The instillation of bupivacaine and ropivacaine intraperitoneally was an effective method of postoperative pain relief in LC.<sup>10</sup>

In a study conducted by Karaman Y et al, authors assessed the effects of Preincisional Infiltration and Intraperitoneal Levobupivacaine 0.25% on Pain Control in patients undergoing LC. They reported that there was no intraoperative and postoperative complications related to levobupivacaine use.<sup>11</sup> Our results were comparable to results obtained by above mentioned studies.

## 5. CONCLUSION

Intraperitoneal instillation of local anaesthetic solution in laparoscopic cholecystectomy provides effective postoperative analgesia, and analgesia provided by Levobupivacaine plus Dexmedetomidine is significantly better than Ropivacaine plus Dexmedetomidine.

## 6. REFERENCES

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