

# A Prospective Comparative Study of Intraoperative Ropivacaine with Standard Analgesia for Post Operative Pain Management in Laproscopic Cholecystectomy

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**Abstract:** Background: Laparoscopic surgeries for treating intra - abdominal pathologies offer significant benefits compared to conventional approaches. This is to decrease the postoperative pain, resulting in shorter hospitalization and early return to normal activity. However, many patients still require strong analgesia. This study is a comparative study of intra operative Ropivacaine with standard analgesia for postoperative pain management in laparoscopic cholecystectomy. Ropivacaine; Intraperitoneal instillation; cholecystectomy; local analgesia Aims and objectives: To compare intra operative Ropivacaine with standard analgesia for post operative pain management in laparoscopic cholecystectomy and assess the effectiveness of the same when administered intra peritoneally. Materials and methods: A prospective randomized case - control study was conducted over a period of 5 months at Rajarajeshwari Medical College and Hospital. 60 patients undergoing laparoscopic cholecystectomy were selected and were divided into the study and control groups. The study group had 30 patients undergoing laparoscopic cholecystectomy were infiltrated with intra operative Ropivacaine 0.25% at the GB fossa and the port site. In the control group the patients were given just the standard post operative analgesia. Demographic variables were identified and compared between the control and the study groups. Peri - operative and operative data like the operative time and self - report or assignment of the intensity of the pain on the Visual Analogue Scale were identified. Mean hospital stay and postoperative complications were assessed. Results: 60 patients were studied, of which 31 (53.3%) were male and 29 (48.3%) were females. It was found that there was significant reduction in the pain (at 6 hr., 12 hr. and 7 days postoperatively) and also associated nausea in the early postoperative period. It was also identified that there was decrease in the duration of the stay in patients with intraperitoneal instillation of the Ropivacaine. Conclusion: Local infiltration of Ropivacaine at port sites during laparoscopic cholecystectomy can be implemented in clinical practice as it reduces post operative pain, has less adverse effects, minimizes the use of opioid analgesics, reduces the hospital stay and is also economically feasible.

**Keywords:** Ropivacaine; Intraperitoneal instillation; cholecystectomy; local analgesia

## 1. Introduction

Cholecystectomy is the most common operation of the biliary tract and the second most common operative procedure performed today.<sup>1</sup> Laparoscopic cholecystectomy (LC) has now replaced open cholecystectomy as the first choice of treatment for gallstones.<sup>2</sup> It results in short hospital stay and early return to regular activity.<sup>3</sup>

Although laparoscopic cholecystectomy is associated with less postoperative pain compared to open cholecystectomy, the severity of postoperative abdominal and shoulder pain is still significant, and peaks within 4–8 h after surgery resulting in tachycardia, hypertension, nausea, vomiting, paralytic ileus.

Pain after laparoscopic cholecystectomy is different when compared to that of laparotomy which is divided into 3 types of pain according to the location. Abdominal pain consists of 2 components i. e., visceral pain associated with tissue injury

due to gallbladder dissection and the stretching of nerve endings in the peritoneal cavity, the parietal pain related to incisional trauma at the port sites and the shoulder pain is referred by diaphragmatic stretching.<sup>4-6</sup> Postoperative pain, requiring injectable analgesics, remains an issue and is one of the hurdles in performing laparoscopic cholecystectomy as a day - case surgery.

Intraperitoneal instillation of local anesthetic around the operative site has been used as an analgesic technique on the premise that conduction from visceral sites is blocked and may reduce the extent of referred pain to the shoulder, which results of nerves C3, C4, C5 diaphragm innervation, gas distension and diaphragmatic shifting, in the postoperative period.<sup>7</sup>

Ropivacaine is a member of the amino amide class of LA agents and is less likely than bupivacaine to produce adverse effects. The duration of a neural blockade by ropivacaine is 100–300 min.<sup>8</sup>

### Aims and Objectives

To compare intra operative Ropivacaine with standard analgesia for post operative pain management in laparoscopic cholecystectomy and assess the effectiveness of the same when administered intra peritoneally.

## 2. Materials and Methods

A prospective randomized case - control study was conducted over a period of 5 months at Rajarajeshwari Medical College and Hospital. 60 patients undergoing laparoscopic cholecystectomy were selected and were divided into the study and control groups. All the patients (male and non - pregnant female >18 years) were included in the study. Patients undergoing emergency cholecystectomy; Operated on for indications other than symptomatic cholelithiasis; Having conversion from LC to open cholecystectomy and who withdrew from the study before 7 days postoperative period were excluded from the study.

Study participants were scheduled for laparoscopic cholecystectomy, which included symptomatic ultrasound - confirmed cholelithiasis. Demographic details, medical history, laboratory findings, peri - operative and surgical outcome data [7 days following surgery] were collected prospectively.

In the study group A 50: 50 mixture of normal saline (8 ml) and 0.5 % Ropivacaine was prepared with a 20 - ml syringe (total volume = **16 ml**; final concentration of Ropivacaine = 0.25 %). In the study group, following delivery of the GB specimen from the peritoneal cavity, **8 ml** of 0.25 % Ropivacaine solution was sprayed onto GB fossa with a spinal needle advanced under direct laparoscopic vision via a 5 - mm right subcostal laparoscopic port. The remaining **8 ml** of 0.25 % Ropivacaine was infiltrated subcutaneously at each of the four laparoscopic port sites (2 ml per port site) prior to standard sutured closure of each incision.

In the control group following laparoscopic cholecystectomy, patients received non - narcotic analgesia (diclofenac 75 mg.) upon request as needed. If the pain was not relieved, narcotic (tramadol 50mg) was added.

Demographic variables including Age, gender, height, weight, body mass index (BMI), history of smoking, are compared between study and control groups. Peri - operative and operative data included were, operative time (minutes), and self - report or assign intensity of pain on the Visual Analog Scale (VAS) ranging from 0 ('no pain') to 10 ('worst possible pain'). Patient self - reported intensity of pain at 1, 4, 6, 12, 24 h and 7 days following LC was documented using VAS and compared between the groups.

Mean hospital stay duration, post operative nausea and vomiting were also compared between the groups.

### Statistical analysis

Fisher's exact or Chi - square tests were used to compare categorical variables between groups. Normally distributed continuous data were compared using the two - sample t test and the Wilcoxon rank - sum test. All tests were two - sided, and  $p < 0.05$  was considered statistically significant.

## 3. Results

In this study conducted over a period of 5 months, a total of 60 patients were studied which were divided into study and the control groups. Based on the gender, 31 (51.6%) males and 29 (48.3%) females were included of which both male and female were 50% each in the control group and in the study group, 53.3% were males and 46.66% were females (Table 1).

**Table 1:** Comparison based on gender

Control group	Study group
Male 50% (15)	Male 53.3% (16)
Female 50% (15)	Female 46.66% (14)

It was identified that there was no significant difference among the 2 groups with respect to age, body weight and height, body mass index (BMI) and ASA class (Table 2).

**Table 2:** Demographic profile of both the groups

Characteristic patients	Study group (n=30)	Group b (control group) (n=30)
Age (Years)	47.5	46.8
Smoking (yes)	10	11
Weight (kg)	67.5	68.2
Height (cm)	167.5	168
BMI (kg/m <sup>2</sup> )	24.05	24.16
ASA 1	12	14
ASA2	16	15
ASA3	2	1

Based on the visual analogue scale, it was found that Patients who received intra - operative 0.25 % Ropivacaine reported significantly reduced pain [at 6hr, 12hr and 7days] with p value ( $< 0.05$ ) (Table 3) and nausea in the early post - operative period. It was also identified that there was decrease in the duration of the stay in patients with intraperitoneal instillation of the Ropivacaine.

**Table 3:** Mean VAS comparison between two groups at different intervals of time

VAS	Study mean	Group SD	Control mean	Group SD	P value
1hr	2.3	0.47	2.3	0.47	1.000
6hr	2.7	0.7	4.37	0.96	<0.001
12hr	2.57	0.63	5.23	0.94	<0.001
24hr	2.5	0.51	2.5	0.51	1.000
7 days	0.4	0.6	0.7	0.8	<0.001

## 4. Discussion

Despite all the benefits with the introduction of minimally invasive surgery, postoperative pain, particularly shoulder pain, stays an issue. Currently, post laparoscopic pain management includes the use of non - steroidal anti - inflammatory drugs, the use of intramuscular morphine injections, patient - controlled analgesia, and injection of local anesthetic into the port site.

Laparoscopic cholecystectomy is a part of day case surgery hence adequate analgesia and early recovery is of utmost importance. Postoperative pain and nausea are the most common complications of laparoscopic surgery. The pain reaches a maximum level within 6 hour of the procedure and then gradually decreases over a couple of days, but varies considerably between patients.<sup>9, 10</sup> It is recognized that after

laparoscopy shoulder - tip (visceral) pain is a common complaint and may delay discharge from hospital.<sup>11</sup>

The main benefit of using LA is that, they do not have the adverse effects of opioids. Time of return of bowel function in the postoperative period may be reduced when the use of opioids is replaced by administering LA which may benefit as early recovery and discharge from the hospital.<sup>12</sup> Ropivacaine is less lipophilic than bupivacaine and is less likely to penetrate large, myelinated motor fibers. The reduced lipophilicity is also associated with decreased potential for CNS toxicity and cardiotoxicity.<sup>13</sup>

Topno et al conducted a similar study with bupivacaine and came to the conclusion that it provides adequate postoperative pain relief and decrease the need for analgesia and opioids and it also leads to early ambulation.<sup>14</sup> Dinesh Singh et al in 2013 conducted a similar study and concluded that intraperitoneal instillation of local anaesthesia is an easy, cheap, and non - invasive method which provides good analgesia in the immediate postoperative period after laparoscopic surgery.<sup>15</sup> Gupta et al compared Ropivacaine 0.5% with saline injected intra peritoneally near the gall bladder fossa, after comparing the results, patients who had Ropivacaine in the post - operative period, had good VAS and better pain relief upto 4th post operative hour.<sup>16</sup>

In our study it was found that the demographic data was similar to both the groups with no much variation. The study group was found to have better postoperative analgesia when compared to that of the control group. It was also associated with less postoperative complications like nausea. There was decrease in the number of days that the patient was in the hospital and also associated with early ambulation of the patient.

#### Limitations of the study

- Pain varies from person to person and depends on the pain threshold of the patient
- Tool to measure pain is subjective

## 5. Conclusion

The intraperitoneal instillation of ropivacaine in laparoscopic cholecystectomy is an easy and safe method to provide postoperative pain relief, decreasing the need for post operative analgesia and opioids which leads to early ambulation leading to faster recovery and also shorter hospital stay.

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