

# Effects of Intraperitoneal Instillation of Ropivacaine on Postoperative Bowel Movements

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## ABSTRACT

**Background:** Gallstone disease represents a significant burden for healthcare systems making laparoscopic cholecystectomy one of the most common surgical procedures performed in the world.

**Aims and objectives:** Numerous studies have shown intraperitoneal ropivacaine instillation to have good analgesic effect thus enhancing postoperative recovery. In this study, we aim to evaluate the effect of intraperitoneal instillation of ropivacaine on postoperative bowel movements.

**Methods:** A prospective study was conducted on 28 patients undergoing laparoscopic cholecystectomy in the Victoria Hospital, affiliated to Bengaluru Medical College and Research Institute, Bengaluru, from October 2019 to December 2019. Laparoscopic cholecystectomy was performed electively on patients diagnosed with symptomatic cholelithiasis. Group A were instilled with ropivacaine intraperitoneally (40 mg of ropivacaine in 100 mL of normal saline) during laparoscopic cholecystectomy, after the removal of the gallbladder but prior to the removal of the ports into the gallbladder bed and over the liver surface. Group B were not instilled with any drug. Patients were then monitored postoperatively, treated with intravenous analgesics, and other supportive care was given. Postoperative bowel movements were then recorded in terms of mean time for appearance of bowel sounds, passage of flatus, and passage of stools. Patients were then discharged after being deemed fit for discharge.

**Results:** There was no significant improvement in the return of bowel sounds or in the time to passage of flatus/stools as a result of intraperitoneal ropivacaine instillation. Further, it did not seem to have a positive effect on the early discharge of patients.

**Conclusion:** Early recovery from surgery has been a major concern. In this regard, the effect of intraperitoneal instillation of ropivacaine on postoperative analgesia has been well documented. However, its effect on postoperative bowel movements does not seem to be significant.

**Keywords:** Cholecystectomy, Enhanced recovery after surgery, Laparoscopic cholecystectomy, Postoperative care.

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## INTRODUCTION

Gallstone disease represents a significant burden for healthcare systems worldwide and is one of the most common disorders among patients presenting to the general surgery outpatient department and emergency with abdominal discomfort. In India, the prevalence of gallstones ranges from 6 to 9% in the adult population.<sup>1</sup> Autopsy reports have shown a prevalence of gallstones from 11 to 36%.<sup>2</sup>

Globally, laparoscopic cholecystectomy is one of the most common surgical procedures performed. Elective laparoscopic cholecystectomy is performed as a day-care procedure in a few hospitals but in most, the hospital stay spans a few days. Several factors play a role in this, the primary causes being pain and delayed return of bowel movements. Several measures including enhanced recovery after surgery (ERAS<sup>®</sup>) protocols have been implemented for this purpose to hasten the recovery and promote early discharge of the patient. One of the components of the ERAS protocols includes the intraperitoneal instillation of ropivacaine in laparoscopic surgeries.<sup>3</sup>

Clinical trials indicate that ropivacaine is an effective regional anesthetic when administered intraperitoneally, providing good analgesia and thus early postoperative recovery. Ropivacaine is a long-acting amide local anesthetic agent. It is known to produce effects via reversible inhibition of sodium ion influx in nerve fibers.<sup>4</sup>

Boddy et al., in their meta-analysis involving 24 randomized controlled trials showed there was a significant postoperative pain relief after instillation of ropivacaine intraperitoneally in patients who had undergone laparoscopic cholecystectomy.<sup>5</sup>

Chundriger et al. conducted a randomized controlled trial including 60 patients, who underwent laparoscopic cholecystectomy,

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divided into two groups. One group received bupivacaine intraperitoneally whereas the other received normal saline. Lesser pain was observed in the postoperative period in the group that received bupivacaine.<sup>6</sup>

Duffield et al. concluded that intraperitoneal instillation of ropivacaine in patients undergoing laparoscopic colectomy decreases postoperative pain and improves functional recovery thus promoting early discharge.<sup>7</sup>

Numerous studies have shown that intraperitoneal ropivacaine instillation has good analgesic effect thus enhancing postoperative recovery. In this study, we aim to evaluate the effect of intraperitoneal instillation of ropivacaine on postoperative bowel movements.

**METHODOLOGY**

A prospective study was conducted on 28 patients undergoing laparoscopic cholecystectomy in Victoria Hospital, affiliated to Bengaluru Medical College and Research Institute, Bengaluru, from October 2019 to December 2019.

After taking informed written consent, patients were randomly divided into Group A and Group B based on a randomization sequence obtained from www.randomisation.org.

**Group A** were instilled with ropivacaine intraperitoneally (40 mg of ropivacaine in 100 mL of normal saline) during laparoscopic cholecystectomy, after the removal of gallbladder but prior to the removal of the ports into the gallbladder bed and over the liver surface.

**Group B** were not instilled with any drug.

Laparoscopic cholecystectomy was performed electively on patients diagnosed with symptomatic cholelithiasis. Diagnosis of symptomatic cholelithiasis was made in patients with dyspepsia, right hypochondrium/epigastric pain, and ultrasonographic evidence of cholelithiasis. Acid peptic disease was ruled out by esophagogastroduodenoscopy.

Laparoscopic cholecystectomy was performed in both groups by a team that included a surgeon, two assistants, and a scrub nurse with anesthesiologists and operation theater technicians. One dose of second-generation cephalosporins was given preoperatively, half an hour prior to surgery. The four-port technique was used (10 mm umbilical, 10 mm subxiphoid, 5 mm right subcostal in midclavicular line, and 5 mm in the right anterior axillary line). Critical view of safety was always identified, and Calot’s triangle dissected. Cystic artery and cystic duct were delineated, clipped, and then cut. Gallbladder specimens were removed through the subxiphoid port and sent for histopathological examination. Ropivacaine 40 mg diluted in 100 mL of normal saline was instilled intraperitoneally in Group A patients, whereas no drug was instilled in Group B patients. Patients were given postoperative intravenous second-generation cephalosporins. Patients were then monitored postoperatively, treated with intravenous analgesics, and other supportive care was given. Patients were then discharged after being deemed fit for discharge.

Data about the demographics, clinical findings, ultrasonogram reports, biochemical reports, intraoperative findings, operative time, postoperative bowel movements (time to appearance of bowel sounds, time to passage of flatus, and time to passage of stools), time to oral intake, and time to be deemed fit for discharge were collected and analyzed.

**Statistical Analysis**

Data were analyzed by descriptive statistics, such as mean and standard deviation. Independent *t*-test was used to determine significant difference between the two groups. The software SPSS version 20.0 was used for data analysis.

**RESULTS**

The study included 28 patients who underwent laparoscopic cholecystectomy during the study period. Group A consisted of 11 patients, and Group B comprised 17 patients (Fig. 1). Among the study population, females constituted 60.7% and males constituted 39.3%. The mean age of the study group was 45.6 years. The mean body mass index of the study group was 23.9.

The mean time taken for surgery was 76 minutes. There were no conversions to open surgery.

There were no ICU admission or readmission in either of the groups. There was no mortality.

As shown in Table 1, the time to appearance of bowel sounds and time to passage of stools were marginally lower in the group that received ropivacaine; however, the *p*-value being >0.05 makes the result statistically insignificant.

Oral intake was also started slightly earlier in the group that received ropivacaine as shown in Figure 2.

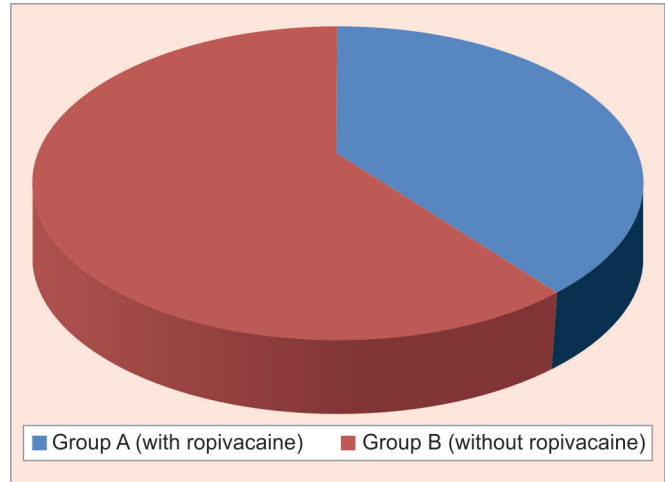


Fig. 1: Composition of the study group

Table 1: Time parameters for Group A and Group B

Parameter	Group A	Group B	<i>p</i> value
Mean time to appearance of bowel sounds	13.7 hours	14.5 hours	0.7
Mean time to first passage of flatus	24.1 hours	21.2 hours	0.18
Mean time to passage of stools	49.6 hours	50.7 hours	0.79
Mean time to oral intake	21.3 hours	22.7 hours	0.57
Mean time to discharge	57.5 hours	58.7 hours	0.85

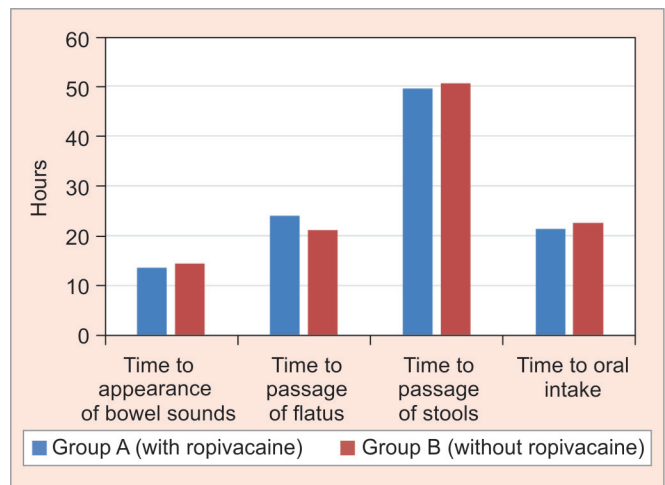


Fig. 2: Comparison of postoperative bowel movements in Group A and Group B

It is also clear from Figure 2 that passage of flatus was early in the group that did not receive ropivacaine. The  $p$ -value, however, was again  $>0.05$  and hence requiring more studies to show a statistically significant result.

## DISCUSSION

Laparoscopic cholecystectomy is one of the most common surgeries performed worldwide. In this era, when people wish to resume work as early as possible following a surgery, new steps are being taken to enhance postoperative recovery.<sup>3</sup>

Enhanced recovery after surgery (ERAS) protocols are being implemented in this regard. One of the components of the ERAS protocol for laparoscopic surgeries includes intraperitoneal instillation of ropivacaine for its regional anesthetic effect, thus reducing postoperative pain and promoting early discharge of the patient.<sup>3</sup>

Several studies have shown the positive effects of intraperitoneal instillation of ropivacaine on postoperative pain with barely any side effects.

A prospective randomized control study conducted by Shivhare et al. concluded that 0.5% of 30 mL (150 mg) of ropivacaine instilled intraperitoneally in patients undergoing laparoscopic cholecystectomy significantly reduced the shoulder tip pain during the first postoperative day compared with 30 mL of normal saline instilled in the gallbladder fossa.<sup>8</sup>

Wu et al. conducted a study in 2005 in which they concluded that perioperative cotreatment with dextromethorphan and intravenous lidocaine had better analgesic effect and promotes early recovery of bowel function after laparoscopic cholecystectomy.<sup>9</sup>

Elhakim et al. concluded in their study that a combination of intraperitoneal instillation of lidocaine and tenoxicam provided better analgesia and faster return of bowel function.<sup>10</sup>

However in our study, it was noted that intraperitoneal instillation of ropivacaine had no significant effect on bowel movements.

Though there are studies observing the analgesic effect there is a lack of literature studying the effects of intraperitoneal instillation of ropivacaine on bowel movements.

In our study, this hypothesis was studied to know the possible effects of intraperitoneal instillation of ropivacaine on bowel movements. It was noted that there was no significant improvement in the return of bowel sounds or in the time to passage of flatus/stools. It also did not seem to have a positive effect on the early discharge of patients.

## LIMITATIONS OF THE STUDY

As the study was conducted on a smaller population, generalizing these results to a bigger population might not be appropriate and further studies would be needed to have a definite picture of the effect of ropivacaine on postoperative bowel movements.

## CONCLUSION

Early recovery from surgery has been a major concern. In this regard, the effect of intraperitoneal instillation of ropivacaine on postoperative analgesia has been well documented. However, the effect of the same on postoperative bowel movements does not seem to be significant. Hence, further studies are needed to validate our results.

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## REFERENCES

1. Unisa S, Jagannath P, Dhir V, et al. Population-based study to estimate prevalence and determine risk factors of gallbladder diseases in the rural Gangetic Basin of North India. *HPB (Oxford)* 2011;13:117–125. Available from: <https://dx.doi.org/10.1111%2Fj.1477-2574.2010.00255.x>.
2. Pham TH, Hunter JG. Gallbladder and the extrahepatic biliary system. In: Brunicaardi FC, Andersen DK, Billiar TR, Dunn DL, Hunter JG, Matthews JB, et al. Eds. *Schwartz's principles of surgery*. 10th edition. New York: McGraw-Hill; 2015:1309–1340. NLMID: 101614128.
3. Kehlet H. Multimodal approach to control postoperative pathophysiology and rehabilitation. *Br J Anaesth* 1997;78:606–617. DOI: 10.1093/bja/78.5.606.
4. Kuthiala G, Chaudhary G. Ropivacaine: a review of its pharmacology and clinical use. *Indian J Anaesth* 2011;55(2):104–110. DOI: 10.4103/0019-5049.79875.
5. Boddy AP, Mehta S, Rhodes M. The effect of intra-peritoneal local anaesthetic in laparoscopic cholecystectomy : a systemic review and meta-analysis. *Anesth Analg* 2006;103(30):682–688. DOI: 10.1213/01.ane.0000226268.06279.5a.
6. Chundrigar T, Hedges AR, Morris R, et al. Intraperitoneal bupivacaine for effective pain relief after laparoscopic cholecystectomy. *Ann R Coll Surg Engl* 1993;75(6):437–439. PMID: 8285548.
7. Duffield JA, Thomas ML, Moore JW, et al. Intraperitoneal local anesthetic instillation and postoperative infusion improves functional recovery following colectomy: a randomized controlled trial. *Dis Colon Rectum* 2018;61(10):1205–1216. DOI: 10.1097/DCR.0000000000001177.
8. Shivhare P, Dugg P, Singh H, et al. A prospective randomized trial to study the effect of intraperitoneal instillation of ropivacaine in postoperative pain reduction in laparoscopic cholecystectomy. *J Minim Invasive Surg Sci* 2014;3(4):e189. PMID: 29962601.
9. Wu CT, Borel C, Lee MS, et al. The Interaction effect of Perioperative cotreatment with dextromethorphan and intravenous lidocaine on pain relief and recovery of bowel function after laparoscopic cholecystectomy. *Anesth Analg* 2005;100(2):448–453. DOI: 10.1213/01.ANE.0000142551.92340.CC.
10. Elhakim M, Amine H. Effects of intraperitoneal lidocaine combined with intravenous or intraperitoneal tenoxicam on pain relief and bowel recovery after laparoscopic cholecystectomy. *Acta Anaesthesiol Scand* 2000;44(8):929–933. DOI: 10.1034/j.1399-6576.2000.440806.x.