

Original Research Article

Evaluation of role of peri portal infiltration of ropivacaine in post laparoscopic cholecystectomy pain management: a randomized controlled double-blind study

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ABSTRACT

Background: Laparoscopic cholecystectomy is considered as the treatment of choice for symptomatic cholelithiasis. The present study was conducted to assess the role of peri-portal infiltration of ropivacaine in post laparoscopic cholecystectomy pain management.

Methods: A total of 100 eligible cases undergoing laparoscopic cholecystectomy were randomly allocated in two groups: group A (received infiltration of total 20 ml of 0.5% ropivacaine, 5 ml in each port site after removal of trocar, and group B (received placebo i.e., 20 ml normal saline). Postoperative pain was assessed using Wong Baker facial pain scale at 6, 12 and 18 hours and use of rescue analgesics were noted.

Results: Group I comprised of 27 males and 23 females and group II had 25 males and 25 females. The mean heart rate in group I was 85.4 and in group II was 86.2. Respiratory rate was 14.2 cycles/minute in group I and 15.2 cycles/minute in group II. The mean blood pressure was 134.2/74.6 mmHg in group I and 136.4/75.2 mmHg in group II and oxygen saturation was 99.2% in group I and in group II was 99.5%. The mean VAS scores were significantly lower in group A cases as compared to group B, throughout the study follow up ($p < 0.01$). 70% in group A and 90% in group B required 1 dose and 10% in group II required 2 doses. Duration of rescue analgesia was 21.49 minutes in group A and 17.3 minutes in group B.

Conclusions: Peri-portal infiltration of ropivacaine is effective in reducing post laparoscopic cholecystectomy pain. Mean duration of analgesia was significantly more and requirement of rescue analgesics were significantly less in cases managed by peri-portal infiltration of ropivacaine as compared to control group (using NSAIDs).

Keywords: Analgesia, Laparoscopic cholecystectomy, Ropivacaine

INTRODUCTION

Laparoscopic cholecystectomy is considered as the treatment of choice for symptomatic cholelithiasis.¹ Reduction in post-operative pain is one of the biggest advantages of laparoscopy compared with open surgery. However, postoperative pain is not completely disappeared and is still considerable.² Pain can increase morbidity and is the primary reason for prolonged hospitalization after laparoscopic cholecystectomy. To date, administration of NSAIDs and opioids are the most

prevalent drugs used to reduce pain. However, use of these methods for pain relief is associated with a lot of side effects.³

Pain experienced following laparoscopic cholecystectomy derives significantly from the incisions made in the anterior abdominal wall which has segmental innervation provided by nociceptor afferents in the transversus abdominis fascial plane between the internal oblique and transversus abdominis muscles.⁴ Wound infiltration with local anesthetic is an important part of

multimodal analgesia and has been recently incorporated into enhanced recovery programs. It blocks pain transmission from nociceptive afferents directly from the wound surface and also decreases local inflammation following injury.⁵

The present study was conducted to assess the role of peri-port infiltration of ropivacaine in post laparoscopic cholecystectomy pain management.

METHODS

A hospital based randomized control study was conducted at department of surgery, Shri Guru Ram Rai Institute of Medical and Health sciences, Dehradun, India from September 2020 to December 2023. Inclusion criteria including patients with cholelithiasis with no comorbidities, patients with gall stone induced pancreatitis, acute cholecystitis, any per op findings of empyema, adhesions, bile spillage, mucocele and choledocholithiasis with cholelithiasis were excluded.

Study included a total of 100 eligible cases undergoing laparoscopic cholecystectomy. Patients were randomly allocated in two groups: group A (received infiltration of total 20 ml of 0.5% Ropivacaine, 5 ml in each port site after removal of trocar, and group B (received placebo i.e., 20 ml normal saline). Injection voveran AQ 1 ml i.v. at the end of procedure was given in all cases. Any breakthrough pain was treated using rescue analgesics (injection voveran) and was recorded. Postoperative pain was assessed using Wong Baker Facial pain scale at 6, 12 and 18 hours and use of rescue analgesics were noted. Data thus obtained were subjected to statistical analysis. P value <0.05 was considered significant.

RESULTS

Table 1 shows that group I comprised of 27 males and 23 females and group II had 25 males and 25 females.

Table 1: Distribution of patients.

Groups	Group A	Group B
Agent	20 ml of 0.5% ropivacaine	20 ml normal saline
M: F	27:23	25:25

Table 2: Hemodynamic parameters.

Parameters	Group A	Group B	P value
Heart rate (beats/minute)	85.4	86.2	0.94
Respiratory rate (cycles/minute)	14.2	15.1	0.81
Blood pressure (mmHg)	134.2/74.6	136.4/75.2	0.72
Oxygen saturation	99.2%	99.5%	0.93

Table 2 shows that mean heart rate in group I was 85.4 and in group II was 86.2. Respiratory rate was 14.2 cycles/minute in group I and 15.2 cycles/minute in group II. The mean blood pressure was 134.2/74.6 mmHg in group I and 136.4/75.2 mmHg in group II and oxygen saturation was 99.2% in group I and in group II was 99.5%. The difference was significant ($p < 0.05$).

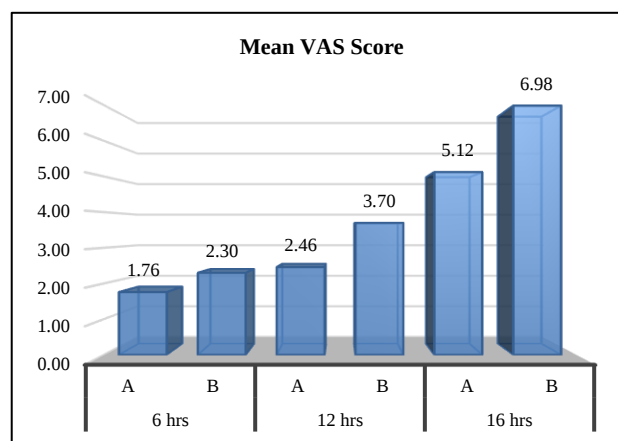


Figure 1: Comparison of VAS.

Figure 1 shows that the mean VAS scores were significantly lower in group A cases as compared to group B, throughout the study follow up ($p < 0.01$).

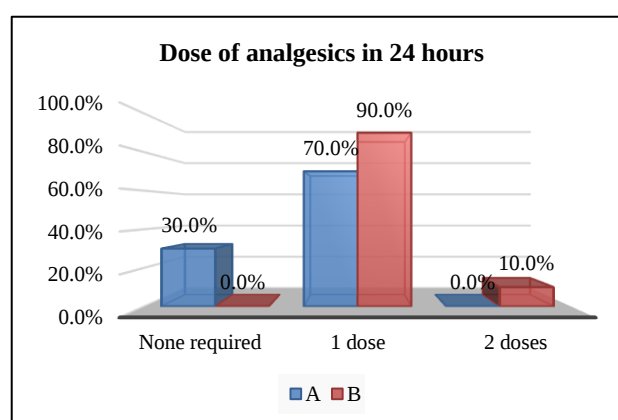


Figure 2: Dose of analgesics.

Figure 2 shows that 70% in group A and 90% in group B required 1 dose and 10% in group II required 2 doses.

Table 3: Comparison of parameters.

Parameters	Group A	Group B	P value
duration for rescue analgesia	21.49	17.3	0.02
PONV	2%	10%	0.01

Table 3 shows that duration of rescue analgesia was 21.49 minutes in group A and 17.3 minutes in group B. The difference was significant ($p < 0.05$).

DISCUSSION

It is well known that laparoscopy causes less postoperative pain than does open cholecystectomy, as do other laparoscopic procedures, e.g., inguinal hernia repair.⁶ However, it is not completely painless. This pain is thought to be multifactorial in nature and severity, and various methods of analgesia have been introduced.^{7,8} They aim at avoidance of opioids and include nonsteroidal anti-inflammatory drugs (NSAIDs), intraperitoneal local anesthesia, local anesthetic infiltration of the wound, intraperitoneal saline, adequate removal of the insufflation gas, heated gas, low pressure gas, and nitrous oxide pneumoperitoneum. The combination of techniques that have parietal, diaphragmatic, and visceral components may reduce pain after laparoscopy. The accurate assessment of pain is difficult because of its individual threshold, subjectivity, and difficulty in measurement.⁹ However, most of all, the prevention of pain should be directed peripherally at inputs along sensory axons or central neurons. Pre-incisional or pre-emptive analgesia with long-acting local anesthesia theoretically achieves peripheral blockage of pain stimuli, which is more advantageous than treating pain after it occurs.¹⁰ The present study was conducted to assess the role of peri-portal infiltration of ropivacaine in post laparoscopic cholecystectomy pain management.

We found that group I comprised of 27 males and 23 females and group II had 25 males and 25 females. Bijalwan et al aimed to evaluate the effect of periportal infiltration of ropivacaine in patients who underwent LC.¹¹ A total of 100 patients undergoing LC were randomly divided into two groups: group I (n=50) patients were infiltrated with port-site long-acting local anesthetic ropivacaine and group II (n=50) patients were infiltrated with normal saline (matching placebo). Mean time for rescue analgesia 184.40 ± 46.27 min and 61.90 ± 18.94 min ($p < 0.05$) in cases and controls. Total number of injection diclofenac/tramadol administered in first 24 hours after extubation in group I was $42 (0.84 \pm 0.40 \hat{A})/2 (0.04 \pm 0.20 \hat{A})$ and that in group II was $101 (2.02 \pm 0.42 \hat{A})/56 (0.92 \pm 0.38 \hat{A})$, respectively, and the difference was statistically significant ($p = 0.001$).

We found that mean heart rate in group I was 85.4 and in group II was 86.2. Respiratory rate was 14.2 cycles/minute in group I and 15.2 cycles/minute in group II. The mean blood pressure was 134.2/74.6 mmHg in group I and 136.4/75.2 mmHg in group II and oxygen saturation was 99.2% in group I and in group II was 99.5%. Di Pace et al evaluated the analgesic effect of periportal infiltration of ropivacaine in children undergoing laparoscopic surgery.¹² The study demonstrates that local infiltration of ropivacaine is more effective for pain relief after laparoscopic surgery than controls.

We found that the mean VAS scores were significantly lower in group A cases as compared to group B,

throughout the study follow up ($p < 0.01$). We found that 70% in group A and 90% in group B required 1 dose and 10% in group II required 2 doses. We found that duration of rescue analgesia was 21.49 minutes in group A and 17.3 minutes in group B. Pavlidis et al examined the effect of wound infiltration by ropivacaine in laparoscopic surgeries.¹³ The patients were randomly allocated into 2 groups. The control group comprised 75 cases of laparoscopic cholecystectomy (LC) and 20 cases of laparoscopic inguinal hernia repair (LIHR) without the use of a local anesthetic; only saline was used. The study group comprised 75 cases of LC and 20 cases of LIHR with pre-incisional periportal infiltration with 20 ml of ropivacaine (10 mg/ml). In the study group in 41% of LC cases and 85% of LIHR cases, no analgesia was required at all; likewise, in the control group in 20% of LC cases and 44% of LIHR cases, no analgesia was required. In the remainder, pain at 3 and 6 hours and total analgesic requirements in the study group were less than that in the control group ($p < 0.05$). The postoperative nausea and shoulder pain remained statistically unchanged ($p > 0.05$). Study concluded that wound infiltration with ropivacaine in laparoscopy provides satisfactory postoperative analgesia, diminishing or reducing the need for opioids.

The limitation the study is small sample size.

CONCLUSION

Authors found that peri-portal infiltration of ropivacaine is effective in reducing post laparoscopic cholecystectomy pain. Mean duration of analgesia was significantly more and requirement of rescue analgesics were significantly less in cases managed by peri-portal infiltration of ropivacaine as compared to control group (using NSAIDs). No difference was observed regarding hemodynamic stability and incidence of adverse reactions. The present study thus recommends use of local infiltration of analgesia to control pain after laparoscopic cholecystectomy.

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Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

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