e-ISSN: 0975-1556, p-ISSN:2820-2643

Available online on www.ijpcr.com

International Journal of Pharmaceutical and Clinical Research 2022; 14(9); 842-847

Original Research Article

Laparoscopic Cholecystectomy Study of Intraperitoneal Ropivacaine's Post-Operative Analgesic Effects with or without Tramadol

Neha Soni[1], Sudipto Banerjee[2], Mahendra Kumar[3], Chandra Prakash[4], Leena Jain[5], Manish Jain[6]

[1]Senior resident, Department of Anaesthesia, Bundelkhand Medical College, Sagar (MP)

[2]Assistant Professor, Department of Critical Care Medicine, NTC, RIMS, Ranchi

[3]Assistant Professor, Department of Anaesthesia, RVRS Medical College, Bhilwara, Rajasthan

[4]Assistant Professor, Department of Anaesthesia, Sri Ganganagar Medical College, Ganganagar, Rajasthan

[5]Professor & Head, Department of ENT, SMBT Institute of Medical College & Research Centre, Igatpuri, Nashik

[6]Professor & Head, Department of Public Health, SMBT Institute of Dental Sciences & Research, Igatpuri, Nashik

Received: 24-07-2022 / Revised: 25-08-2022 / Accepted: 20-09-2022

Corresponding author: Dr Chandra Prakash

Conflict of interest: Nil

Abstract

Background: The laparoscopic cholecystectomy surgery is frequently carried out. The intra-abdominal cavity is stretched, peritoneal inflammation occurs, and residual carbon dioxide in the peritoneal cavity irritates the diaphragm. Contrary to intravenous opioids, the use of intraperitoneal local anaesthetics for laparoscopic surgery postoperative pain treatment offers appropriate analgesia without any negative side effects. In the current study, our tertiary hospital's laparoscopic cholecystectomy patients' post-operative analgesic response to intraperitoneal ropivacaine with or without tramadol was studied.

Materials and Methodology: The current study was a prospective, comparative study conducted on patients aged 19 to 65, of either sex, scheduled for an elective laparoscopic cholecystectomy and in physical status I or II according to the ASA (American Society of Anaesthesiologists) at tertiary care Centre, Nashik. Participants had to be willing to take part in the study. Prior to surgery, patients in the operating room were randomly divided into two groups (group R and group RT) using the chit technique. 20 ml of an intraperitoneal solution (18 ml of 0.5% ropivacaine and 2 ml of normal saline) were administered to Group R. The intraperitoneal 20 ml solution for group RT contained 2 mL (100 mg) tramadol and 18 mL of 0.5% ropivacaine IP. The Mann Whitney U test and the Chi-square test were applied. A p value of 0.05 or less was regarded as statistically significant.

Results: A total of 60 patients were examined for this investigation. There were 30 patients apiece in each group (group R and group RT). Age, gender, height, weight, and ASA status were all general characteristics that were comparable across the two groups, and the difference was not statistically significant. It took the group R longer (in minutes) and required more paracetamol (grammes) than the group RT, with the difference being statistically significant.

Conclusion: When combined with tramadol, intraperitoneal ropivacaine provides superior postoperative analgesia and requires less rescue analgesic dosage overall.

Keywords: Laparoscopic cholecystectomy, ropivacaine, tramadol, VAS Analgesia.

Introduction

The most widely used method for treating symptomatic gallstones is laparoscopic cholecystectomy. Modern surgery has been transformed by laparoscopic methods, which have nearly entirely supplanted open operations. There will be a shorter hospital stay because to its numerous benefits over open operations, including smaller and more aesthetic incisions, decreased blood loss, decreased discomfort, early mobility, and early enteral feeding [1]. The intra-abdominal cavity is stretched, peritoneal inflammation occurs, and leftover carbon dioxide in the peritoneal cavity irritates the diaphragm [2]. Ineffective pain management can hinder rehabilitation, put a strain on patients and their families, and raise the price of healthcare for everyone. Parenteral analgesia (NSAIDS and opioids), epidural analgesia, peripheral nerve blocks, incisional infiltration, and intraperitoneal instillation with local anaesthetics are only a few of the options for postoperative pain treatment [3,4]. Contrary to intravenous opioids, the use of intraperitoneal local anaesthetics for laparoscopic surgery postoperative pain treatment offers appropriate analgesia without any negative side effects. Following laparoscopic procedures, post-operative pain has been shown to be reduced by intraperitoneal instillation of local anaesthetic drugs alone or in combination with opioids, tramadol, -2 agonists (clonidine), and dexmedetomidine [5,6]. Chemically similar to bupivacaine, ropivacaine is a long-acting amide local anaesthetic, although studies have shown that it is less harmful to the heart and central nervous system. In the current study, our tertiary hospital's laparoscopic cholecystectomy patients' post-operative analgesic response to intraperitoneal ropivacaine with or without tramadol was studied.

Methodology

The current study was a prospective, comparative investigation carried out in the anesthesiology and surgery departments at tertiary care Centre, Nashik. The study lasted a year (September 2021 to August 2022). Ethical clearance was obtained from institutional ethics committee. Informed consent was taken from each patient prior to commencement of the study.

Patients between the ages of 19 and 65, of either sex, who have been scheduled for an elective laparoscopic cholecystectomy and who are willing to participate in the research meet the inclusion criteria. Patients who require bile duct exploration, the placement of a T-drain, or those who have acute cholecystitis are among the exclusion criteria. women who are pregnant, cancer patients, those who misuse alcohol or drugs, patients who have previously had ropivacaine/tramadol hypersensitivity Not interested in taking part.

Patients were told about the study at their pre-anesthesia exam, and their signed informed permission was obtained to participate. Additionally explained was the visual analogue scale. Clinical information and laboratory and radiographic results were recorded. Pre-operative blood pressure (NIBP), peripheral oxygen saturation (SpO2), end-tidal carbon dioxide (EtCO2), ECG, and heart rate were all routinely monitored. Under isoflurane and oxygen general

anaesthesia, all patients underwent surgery. Whenever necessary, top-up doses of vecuronium (0.01 mg/kg) were administered intravenously to maintain neuromuscular blockade. One gramme of intravenous paracetamol was administered during surgery. Dexamethasone 8 mg intravenously was given at the beginning of anaesthesia induction and ondansetron 4 mg intravenously was given throughout skin closure. Before the trocar was removed at the conclusion of the procedure, 20 ml of local anaesthetic solution was injected through the ports. The operating surgeon, who was blind to the study medication, administered it across the hepatodiaphragmatic space, hepatoduodenal ligament, and gall bladder bed in accordance with the group allocation. For two minutes after instillation, the Trendelenburg posture was maintained to ensure complete LA dispersion.

Prior to surgery, patients in the operating room were randomly divided into two groups (group R and group RT) using the chit technique.

1. Group R was administered a 20-ml intraperitoneal solution (18 mL of 0.5% ropivacaine and 2 mL of normal saline).
2. The intraperitoneal 20 ml solution for Group RT contained 2 mL (100 mg) tramadol and 18 mL of 0.5% ropivacaine IP.

With neostigmine 0.05 mg/kg IV and glycopyrrolate 0.01 mg/kg IV, neuromuscular blockade was reversed. The time period between the end of the operation and the patient's first request for analgesic medicine was used to define the duration of analgesia. All patients received 1 gramme of intravenous paracetamol every 12 hours for the first 24 hours. Postoperatively, VAS scores were taken at 1, 4, 8, 12, 16, and 24 hour intervals. Over the course of 24 hours, the total intake dose of rescue analgesia was noted. There were also reported side symptoms such nausea, vomiting, and shoulder discomfort. Data was gathered, put into a Microsoft Excel spreadsheet, and then analysed using SPSS version 21.0 of the statistical software for the social sciences. The Mann Whitney U test and the Chi-square test were applied. A p value of 0.05 or less was regarded as statistically significant.

Results

60 patients in all were investigated for the current study. There were 30 patients each in each group (group R and group RT). Age, gender, height, weight, and ASA status were all general characteristics that were comparable across the two groups, and the difference was not statistically significant. It took the group R longer (in minutes) and required more paracetamol (grammes) than the group RT, with the difference being statistically significant.

Table 1: General characteristics and postoperative analgesia.

Parameter	Group R (n=30) (mean ± SD/ no. of patients)	Group RT (n=30) (mean ± SD/ no. of patients)	P value
Age (in years)	45.2 ± 10.2	46.4 ±9.2	0.76
Gender			
Male	15	17	0.45
Female	15	13	
Weight (kg)	55.4 ± 9.0	53.2 ± 8.3	0.33
Height (cm)	154.3 ± 6.4	134.2± 4.6	0.55
ASA status			
I	18	23	0.46
II	12	7	

Duration of surgery (minutes)	63.2 ± 8.3	64.5 ±12.3	0.3
Postoperative analgesia			
Time for 1st analgesia request (in min.)	165.3 ± 35.4	288.3 ± 19.3	0.01
Amount of Paracetamol needed (gm)	2.5 ± 1.6	1.1 ± 0.4	0.02

In order to compare pain intensity, we used the VAS at 1, 4, 8, 12, 16, and 24 hours after surgery. Throughout the postoperative period, group R experienced less postoperative discomfort than group RT; this difference was statistically significant. No group reported any postoperative problems including nausea, pruritis, or shoulder discomfort.

Table 2: VAS (Visual analogue score).

Time (hours)	Group R	Group RT	P value
1 hrs	6.0 ± 1.1	3.9 ± 1	0.01(S)
4 hrs	4.7 ± 0.5	2.8 ± 1.2	0.01(S)
8 hrs	4.6 ± 1.1	3.1 ± 0.3	0.02(S)
12 hrs	4.2 ± 0.8	2.4 ± 0.5	0.02(S)
16 hrs	5.0 ± 1.1	3.2 ± 0.5	0.01(S)
24 hrs	3.3 ± 0.4	2.2 ± 1.1	0.01(S)

Discussion

The anterior abdominal wall, which has segmental innervation given by nociceptor afferents in the transversus abdominis fascial plane between the internal oblique and transversus abdominis muscles, is where most of the pain felt after laparoscopic cholecystectomy is caused [8]. The use of intraperitoneal and port site instillation of local anaesthesia to decrease postoperative pain was made possible by the increased understanding of the causes of abdominal and shoulder discomfort following laparoscopic surgeries.

The risk of deep vein thrombosis, atelectasis, and pulmonary embolism is considerably decreased by early ambulation and the capacity to breathe deeply. The surgical approach affects postoperative referral pain because lower abdominal pressures and a shorter operation time are linked to a reduced incidence and intensity of shoulder pain following LC.

Opioids are added to local anaesthetics to treat postoperative pain since their mode of action is genuinely peripheral rather than central. Inflammatory hyperalgesia has been suggested to be particularly susceptible to peripheral antinociception [9,10]. Prashant S. observed that ropivacaine concentrations of 0.5% were effective for rescue analgesics when used in equal amounts of varied ropivacaine concentrations as preclosure periportal instillations during laparoscopic cholecystectomy. Lower Ropivacaine concentrations (0.25% and 0.125%) were no more efficacious than regular saline in providing satisfactory postoperative analgesia [11]. As a result, 0.5% ropivacaine was employed as an intraperitoneal instillation in the current investigation. In a related research, Kumari A *et al.* [12] reported that the mean NRS score in both groups reached its peak 2 hours after surgery.

Between the two groups, there was a significant difference in the mean NRS score at 2.5, 3, 3.5, 4, 6, and 12 hours (P 0.05). The need for rescue analgesia (fentanyl) was statistically significantly higher in Group R (75%) than in Group RT (42.5%). The difference between Groups R and RT's minimum times to get their initial rescue analgesia was not statistically significant at 5 minutes and 10 minutes, respectively. The difference between the median total analgesic consumption (TAC) in Group R and

Group RT—40 g vs. 0 g—was statistically significant. Group R consumed a total of 1800 grammes of analgesics, whereas Group RT consumed 785 grammes. Similar results were seen in the current investigation. According to Gupta *et al.* [13], ropivacaine 70 ml (0.25%) infused into cholecystectomy wounds considerably reduces wound pain and lengthens the time until the patient requests post-operative analgesia for the first time, all without any ropivacaine-related adverse effects. Memis *et al.*'s [14] investigation of the effects of tramadol or clonidine combined with intraperitoneal bupivacaine on postoperative pain following complete abdominal hysterectomy discovered that the combination was more effective than bupivacaine alone.

While lipophilic opioids, such as tramadol and buprenorphine, can diffuse across the intact perineural barrier and provide better analgesia when administered intraperitoneally, hydrophilic opioid molecules, such as morphine, are prevented from entering peripheral intact perineurium as a result of their interaction with opioid receptors. It has also been demonstrated that local anaesthetic administered intraperitoneally can lessen nausea and vomiting. A second method of analgesia is provided by intraperitoneal injection, which exposes the peritoneum to inhibit the visceral nociceptive conduction from the location of tissue injury and the peritoneum [15].

In the initial postoperative period following laparoscopic cholecystectomy, a simple, inexpensive, and noninvasive approach that offers adequate analgesia is intraperitoneal instillation of local anaesthetic. The present study has a limited sample size as a drawback.

Conclusion

Compared to ropivacaine used alone, tramadol produces a more potent analgesia. Better postoperative analgesia is produced by intraperitoneal ropivacaine combined with tramadol, which also results in a lower overall dosage of rescue analgesic use.

References

1. Lahmann B, Adrales GL, Mastrangelo MJ Jr, Schwartz RW. Laparoscopic cholecystectomy-technical considerations. Curr Surg 2002;59(1):55-8.
2. Gupta R, Bogra J, Kothari N, Kohli M. Postoperative analgesia with intraperitoneal fentanyl and bupivacaine: A randomized control trial. Can J Med 2010;11-11.
3. Shabir SA, Saleem B, Hakim A, Hashia AM. Postoperative analgesia in laparoscopic cholecystectomy: a comparative study using bupivacaine instillation and infiltration versus parenteral analgesia (tramadol). The Internet Journal of Anaesthesiology. 2011; 29 Number 2.
4. Bisgaard T. Analgesic treatment after laparoscopic cholecystectomy: A critical assessment of the evidence. Anaesthesiology. 2006; 104:835–46.
5. Labaille T, Mazoit JX, Paqueron X, Franco D, Benhamou D. The clinical efficacy and pharmacokinetics of intraperitoneal ropivacaine for laparoscopic cholecystectomy. Anesth Analg 2002;94(1):100-5.
6. Kucuk C, Kadiogullari N, Canoler O, Savli S. A placebo- controlled comparison of bupivacaine and ropivacaine instillation for preventing postoperative pain after laparoscopic cholecystectomy. Surg Today 2007;37(5):396-400.
7. Goldstein A, Grimault P, Henique A, Keller M, Fortin A, Darai E. Preventing postoperative pain by local anaesthetic instillation after laparoscopic gynecologic surgery: A placebo controlled comparision of bupivacaine and ropivacaine. Anesth Analg 2000;91(2):403-7
8. Tolchard S, Davies R, Martindale S. Efficacy of the subcostal transversus abdominis plane block in laparoscopic cholecystectomy:

Comparison with conventional port-site infiltration. J Anaesthesiol Clin Pharmacol. 2012; 28:33943.
9. Singh A, Mathur SK, Shukla VK. Postoperative analgesia with intraperitoneal ropivacaine with and without fentanyl after laparoscopic cholecystectomy: a randomized double- blind controlled trial. OA Anaesthetics 2013 May 01;1(1):9.
10. Kim TH, Kang HK, Park JS, Chang IT, Intraperitoneal ropivacaine instillation for postoperative pain relief after laparoscopic cholecystectomy. J Korean Surg Soc. 2010; 79:130-6.
11. Prashant Sharma, Amit Gupta. Comparative study of preclosure periportal instillation of three different concentrations of ropivacaine (0.125%, 0.25%, 0.5%) for postoperative analgesia in laparoscopic cholecystectomy. International Journal of Contemporary Medical Research 2020;7(2): B16-B21.
12. Kumari A, Acharya B, Ghimire B, Shrestha A. Post-operative analgesic effect of intraperitoneal ropivacaine with or without tramadol in laparoscopic cholecystectomy. Indian J Anaesth 2020; 64:43-8.
13. Gupta A. Local anaesthesia for pain relief after laparoscopic cholecystectomy – A systematic review. Best Pract Res Clin Anaesthesiol 2005;19(2):275-92.
14. Memis D, Turan A, Karamanlioglu B, *et al.* The effect of tramadol or clonidine added to intraperitoneal bupivacaine on post operative pain in total abdominal hysterectomy. Opioid Manag 2005;1(2):77-82.
15. Trikoupi A, Papavramidis T, Kyurdzhieva E, Kesisoglou I, Vasilakos D. Intraperitoneal administration of ropivacaine during laparoscopic cholecystectomy 14AP125. Eur J Anaesth. 2010; 27(47): 222.