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Original Research Paper

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A COMPARATIVE STUDY OF POSTOPERATIVE ANALGESIA FROM INTRA-PERITONEAL INSTILLATION OF ROPIVACAINE V/S ROPIVACAINE + FENTANYL IN LAPAROSCOPIC CHOLECYSTECTOMY SURGERIES

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ABSTRACT

Background and Aim: This study is designed and conducted to compare the efficacy of intra-peritoneal instillation of ropivacaine to that of a combination of ropivacaine and fentanyl in reducing post-operative pain and the side effects of the same.

Aim: To compare the effects of intra-peritoneal instillation of ropivacaine to a combination of ropivacaine and fentanyl on post-operative morbidity in terms of:

1. Post-operative pain
2. Post-operative adverse effects

Methods and Material: After approval of the Institutional Ethics Committee (IEC) [IEC/HMPCMCE/105/Faculty/12/107/19] and the Clinical Trials Registry of India [CTRI/2020/04/024616], consenting patients were randomized into two groups of 26 participants each. One group was given intraperitoneal instillation with 15ml of ropivacaine 0.75% diluted in normal saline to make a solution of 45ml and other group was given 15ml of 0.75% ropivacaine with fentanyl 50mcg(1ml) diluted in normal saline to make a solution of 45ml, intra-operatively, and post-operative pain perception and occurrence of adverse effects was recorded.

Statistical Analysis: Two sample t-test with equal variances, chi-square test and Fisher's exact test. P value<0.05 was considered significant

Results: Group receiving intraperitoneal instillation of plain ropivacaine was found to have significantly higher VAS scores and VRS scores ($p<0.001$) and lesser mean time to requirement of first-dose of analgesic post-operatively ($p<0.001$), and lesser incidence of bradycardia ($p=0.01$)

Conclusion: Intraperitoneal instillation of combination of ropivacaine and fentanyl is superior to ropivacaine alone for reducing post-operative pain in patients undergoing laparoscopic cholecystectomy surgery.

KEYWORDS : Cholecystectomy, Laparoscopic Fentanyl Ropivacaine Pain, Postoperative Analgesics

INTRODUCTION

Laparoscopic cholecystectomy is the most common general surgical procedure done these days on day-care basis. Patients undergoing laparoscopic procedures do experience postoperative pain, especially in upper and lower abdomen and back and shoulder regions with the intensity of pain usually peaking in the first postoperative hours and declining over the following 2 to 3 days. The plausible reasons for pain after laparoscopy could be the stretching of intra-abdominal cavity, peritoneal inflammation and phrenic nerve irritation caused by residual CO2 in peritoneal cavity.

If treated inadequately, post-operative pain following upper abdominal incisions, can cause shallow breathing, atelectasis, retention of secretions, and lack of co-operation in physiotherapy. This leads to an increased incidence of post-operative morbidity and delayed recovery which apart from the detrimental physiological effects, also has psychological, economic and social adverse effects. [1]

Pain control is pertinent for optimal care in surgical patients and in terms of decreasing postoperative morbidity. However, adequate pain control still remains a challenge in a majority of patients. Intraperitoneal instillation of local anaesthetic has been proposed to minimize postoperative pain after laparoscopic surgery. Several initial studies have reported a favourable outcome with a low risk of adverse events. But a consensus on the best drug, concentration, volume, timing, and area to be applied has not been achieved.

Ropivacaine is a long-acting amide local anaesthetic agent. [2] Ropivacaine (70 ml of 0.25 %) infiltrated into cholecystectomy wounds significantly decreases wound pain and increases the time to the first request for postoperative analgesia compared with saline. [3]

Fentanyl is a phenylpiperidine-derivative synthetic opioid agonist with 75 to 125 times more analgesic potency than morphine [4] and rapid onset and short duration of action. [5]

Thus, as the search for improving post-operative outcomes continues, this study was designed and conducted with an aim to compare the efficacy of intra-peritoneal instillation of ropivacaine v/s a combination of ropivacaine and fentanyl to reduce post-operative pain and the side-effects resulting from the same.

MATERIALS AND METHODS

The study was designed as a randomized prospective triple (patient, interviewer, analyst) blinded, interventional study with an aim of including all the patients, who fulfilled the selection criteria for the study population and visited the hospital during the study period.

Due approval of the Institutional Ethics Committee (IEC) [IEC/HMPCMCE/105/Faculty/12/107/19] and the Clinical Trials Registry of India [CTRI/2020/04/024616] was obtained before commencing the study.

Patients undergoing laparoscopic cholecystectomy surgery who were of 18-60 years of age and ASA physical status I, II, III were included in the study after taking written and informed consent for the same. Patients with allergy to any medication, renal or hepatic insufficiency neurological or psychiatric diseases and confirmed local anaesthetic toxicity were excluded. Confidentiality of the participants was maintained at all levels.

This was a randomized control study done using computer generated numbers. Based on this randomization, serial numbers 1-52 of the participants were assigned into Group A or Group B. The serial number of the participant with the group written against the number was placed in an opaque envelope which was opened only by a third-party anaesthesiologist present in the surgery who had received prior explanation as to what drug was to be instilled intraperitoneally in each group.

All patients enrolled in the study received a loading dose of intravenous Inj. Ringer lactate 45 minutes prior to induction. Inj. Dexmedetomidine (0.5mcg/kg) I.V., in loading dose, through infusion was started in all the patients 10 minutes before induction followed by a maintenance dose of 0.2-0.7 mcg/kg intraoperatively according to hemodynamic parameters.

After shifting the patient to the theatre room, monitors were attached including ECG, pulse oximeter, manual blood pressure and NIBP. All patients were pre-medicated with I.V. Inj. Glycopyrollate (0.004 mg/kg), I.V. Inj. Midazolam (0.2mg/kg) , I.V. Inj. Fentanyl (2 mcg/kg), and Inj. Dexmedetomidine was continued I.V. in maintenance dose of 0.2-0.7 mcg/kg via infusion according to hemodynamic parameters (to maintain pulse rate and blood pressure within +/- 20% of baseline). After preoxygenation with 100% oxygen through closed circuit for 5 minutes, patients were induced with I.V. Inj. Propofol (2 mg/kg). After check ventilation, adequate muscle relaxation was achieved with I.V. Inj. Scholine (2mg/kg)/ Inj. Vecuronium (0.1 mg/kg). Patients were intubated with appropriate size endotracheal tube, cuff was inflated with 6-8 cc air, bilateral air entry was checked and confirmed and tube was fixed at the angle of the mouth. Patients were maintained on inhalational agent Sevoflurane, oxygen and air through closed circuit using controlled ventilation. EtCO2, haemodynamic parameters and muscular relaxation were continuously monitored intraoperatively. Inj. Dexmedetomidine was titrated at +/- 2ml/hour according to the fluctuations in the heart rate and blood pressure and in cases where b.p. was not controlled even upon doing the same, top-up dose of Inj. Propofol was given I.V. Muscle relaxation (Inj. Vecuronium 0.02mg/kg) was given after recovery of two twitches. Participants had been pre-divided into two groups according to randomisation. One group was given intraperitoneal instillation of 15 ml of 0.75% Inj. ropivacaine diluted in normal saline to make a solution of 45ml (Group A) and the other group was given 15ml of 0.75% Inj. ropivacaine with Inj. fentanyl 50mcg (1ml) diluted in normal saline to make a solution of 45ml (Group B) after dissection of gall bladder, in the subhepatic area/ gall bladder fossa through the 5mm lateral subxiphoid port and patient was given Trendelenburg position until reversal. I.V. Inj. Ondansetron (0.02mcg/kg) was administered. Inhalational agent (Sevoflurane) and infusion of Inj. Dexmedetomidine were stopped after completion of surgery. Oral suction was done. Patients were reversed with Inj. Neostigmine (0.05mg/kg) and Inj. Glycopyrollate (0.01mg/kg) intravenously not less than 20 minutes before the last dose of muscle relaxant or recovery of four twitches on peripheral nerve stimulator. Patients were extubated after checking for adequate respiration, reflexes and tidal volume and response to verbal commands. After checking for haemodynamic stability, patients were put on oxygen through simple face-mask at the rate of 6 litres/min. Patients were shifted to recovery room. All enrolled patients were observed for pain intensity in postoperative recovery room using visual analogue scale (VAS) and verbal rating scale (VRS) immediately postoperatively, 1 hour postoperatively, 2 hours postoperatively, 4 hours postoperatively, 8 hours postoperatively and 12 hours postoperatively.

The patients with VAS score > 4 after surgery, were administered a bolus of Inj. Diclofenac aqueous 75mg I.V. as rescue analgesia. A second dose of Inj. Diclofenac was repeated only if the complain of pain persisted and only after 1 hour of administration of the first dose. Inj. Ondansetron (0.1mg/kg IV) was administered if patient complained of nausea. Time to first analgesic requirement, total analgesic consumption in the first 12 hours post-operatively and occurrence of adverse events were also recorded. Patients were regularly asked about pruritus and shoulder pain, blood pressure was regularly monitored for episodes of hypotension (MAP<60mmHg), heart rate was regularly monitored for episodes of bradycardia (heart rate<60). Total duration of surgery was recorded for all cases. All perioperative complications such as biliary spillage, haemmorhage, intraoperative bradycardia, hypotension and hypertension were recorded.

STATISTICAL ANALYSIS

The two groups were compared in terms of patient details of age, weight and duration of surgery using the two sample t test with equal variances to obtain mean values, standard deviation, and, thereafter, p value to determine significant difference in frequency. The two groups were compared in terms of sex using the chi-square test to obtain frequency and percentage distribution of each sex in both groups. The two sample t test with equal variances was also applied to post-operative VAS scores and VRS scores at the required time intervals and to compare the time until the requirement of first dose of analgesic. Total post-operative analgesic consumption was compared using the chi-square test and adverse effects were compared using Fisher's exact test. The STATA 14.2 software was used for statistical analysis.

RESULTS

TABLE 1 : BASELINE PATIENT CHARACTERISTICS

	Group A – Ropivacaine	Group B – Ropivacaine+Fentanyl	p value
Mean Age in years (sd)	51.50(10.95)	49.88(15.28)	0.66
Sex (M) n (%)	14(53.85)	12(46.15)	0.58
Mean Weight in kg(sd)	65.46(6.93)	65.23(8.38)	0.91
Mean Duration of Surgery in mins(sd)	86.54(21.34)	78.85(21.78)	0.20

Upon applying the two sample t test with equal variances, both groups were found to comparable in terms of age (p=0.66), weight (p=0.91), and duration of surgery (p=0.20).

Upon applying the chi-square test, both groups were found to be comparable in terms of sex of the participants with 53.85% of the participants being male in group A (n=14) and 46.15% in group B (n=12).

TABLE 2 : MEAN(SD) VISUAL ANALOGUE SCALE (VAS) SCORES IN BOTH GROUPS AT DIFFERENT TIME INTERVALS

Time Interval	Group A – Ropivacaine	Group B – Ropivacaine+Fentanyl	p value
Immediate, postoperatively	2.07(0.79)	1(0.80)	<0.001
1st postoperative hour	3.07(0.56)	2.03(0.66)	<0.001
2nd postoperative hour	3.73(0.45)	2.85(0.46)	<0.001
4th postoperative hour	3.27(0.53)	2.04(0.19)	<0.001
8th postoperative hour	3.58(0.57)	2.54(0.58)	<0.001
12th postoperative hour	2.54(0.58)	1.5(0.51)	<0.001

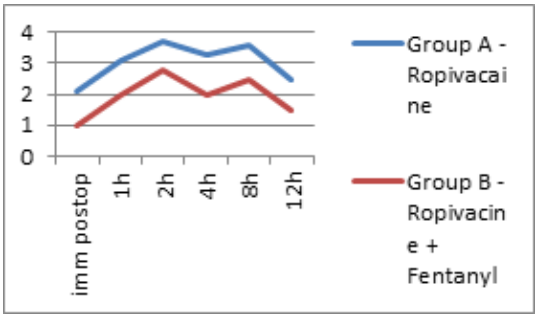

Fig 1: Comparison of mean visual analogue scale (VAS) scores in both groups at different time intervals [x-axis = time in hours, y-axis = mean VAS score]

TABLE 3 : MEAN(SD) VERBAL RATING SCALE (VRS) SCORES IN BOTH GROUPS AT DIFFERENT TIME INTERVALS

Time Interval	Group A – Ropivacaine	Group B – Ropivacaine +Fentanyl	p value
Immediate, postoperatively	1.85(0.37)	1.12(0.33)	<0.001
1st postoperative hour	1.96(0.19)	1.31(0.47)	<0.001
2nd postoperative hour	2.38(0.49)	2.19(0.49)	0.17
4th postoperative hour	1.38(0.49)	1.23(0.43)	0.24
8th postoperative hour	2.42(0.58)	1.19(0.40)	<0.001
12th postoperative hour	1.42(0.50)	1.21(1.00)	<0.001

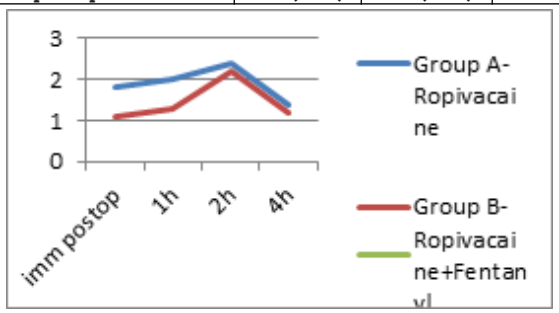

Fig 2: Comparison of mean verbal rating scale (VRS) scores in both groups at different time intervals [x-axis = time in hours, y-axis = mean VRS score]

Upon applying the two sample t test with equal variances, group receiving intraperitoneal instillation of ropivacaine was found to have significantly higher VAS score in the immediate postoperative period, and at 1 hour, 2 hours, 4 hours, 8 hours and 12 hours postoperatively, than the group receiving intraperitoneal instillation of the combination of ropivacaine and fentanyl (p<0.001). Similarly, VRS score was significantly higher in group receiving intraperitoneal instillation of ropivacaine than the group receiving intraperitoneal instillation of the combination of ropivacaine and fentanyl immediately postoperatively and at 1 hour, 8 hours and 12 hours postoperatively (p<0.001). However, no significant difference was present in the VRS score 2 hours (p=0.17) and 4 hours (p=0.23) postoperatively between both groups.

TABLE 4 : MEAN TIME(SD) TO FIRST ANALGESIC REQUIREMENT AND NUMBER OF PATIENTS REQUIRING SECOND DOSE OF RESCUE ANALGESIC

Time Interval	Group A – Ropivacaine	Group B – Ropivacaine +Fentanyl	p value
Mean time to first analgesic requirement in mins (sd)	113.4(15.92)	141.5(17.04)	<0.001
Total number of patients requiring second dose of rescue analgesic, n (%)	8(30.77)	3(11.54)	0.09

Upon applying the two sample t test with equal variances, group receiving intraperitoneal instillation of ropivacaine was found to have significantly lesser mean time to requirement of first-dose of analgesic post-operatively, than the group receiving combination of ropivacaine and fentanyl (p<0.001).

The chi-square test when applied to the findings of total post-operative analgesic consumption did not yield a significant difference between the two groups (p=0.09). While 30.77% (n=8) of participants in the group receiving ropivacaine required a second dose of I.V. analgesic, 11.54% (n=3) of participants in the group receiving ropivacaine and fentanyl required the same. The analysis of the observations not yielding the expected difference could be because of the limited sample size of the study.

Table 5: Incidence of shoulder pain, n (%)

Shoulder pain	Group A – Ropivacaine	Group B – Ropivacaine+Fentanyl	p value
	0(0)	0(0)	-

No patient in either group complained of post-operative shoulder pain.

Table 6: Incidence of Adverse effects, n (%)

Adverse effects	Group A	Group B	p value
Pruritus	24(92.31)	18(69.23)	0.07
Emetic symptoms	22(84.62)	22(84.62)	1.00
Hypotension	26(100)	23(88.46)	0.24
Bradycardia	16(61.54)	25(96.15)	<0.01

Upon applying the Fisher's exact test to compare the incidence of adverse effects between the two groups, there was no significant difference found in the post-operative incidence of pruritus (p=0.08), emetic symptoms (p=1.00), and hypotension (p=0.24) between the two groups. However, incidence of bradycardia was significantly more (p=0.01) in the group receiving a combination of ropivacaine and fentanyl than the group receiving ropivacaine alone.

Laparoscopic cholecystectomy is a frequently performed elective general surgical operation and since it is ideally performed as a day-care or short-stay procedure, provision of adequate post-operative pain relief is vital in the management of the patients undergoing the same. Most patients complain of pain after laparoscopic cholecystectomy

surgeries in upper and lower abdomen, back and shoulder regions with the intensity of pain being maximum in the first 12 to 24 postoperative hours with a peak during the first postoperative hour followed by a gradual decline over the next 2 to 3 days. Although parietal pain is significantly less following laparoscopy than that following laparotomy, visceral pain following laparoscopic cholecystectomy surgeries peaks during the first hour and is exacerbated by coughing, respiratory movements and mobilization. As post-operative pain is unpredictable, there is a need for systematic prevention of pain while the patient is still under the effects of anaesthesia. This need has led research in the method of intraperitoneal instillation of local anaesthetics through randomized trials for more than 10 years. Although parietal pain is significantly less following laparoscopy than that following laparotomy, visceral pain following laparoscopic cholecystectomy surgeries peaks during the first hour and is exacerbated by coughing, respiratory movements and mobilization.

In 2008, Ahmed BH et al conducted a randomized double blinded trial to study the effects of intraperitoneal irrigation of bupivacaine and lignocaine in patients undergoing laparoscopic cholecystectomy. From this study, they concluded that intraperitoneal irrigation with local anaesthetics significantly reduces visceral abdominal pain after laparoscopic cholecystectomy surgery with lignocaine being the most efficacious local anaesthetic in this trial. [6]

In 2007, a study conducted by Canan Kucuck et al to compare intraperitoneal instillation of bupivacaine and ropivacaine for post-operative pain after laparoscopic cholecystectomy showed ropivacaine to be significantly more effective in preventing post-operative pain than bupivacaine. [7]

A 2001 study by S. Palm et al, compared MLAC of plain ropivacaine v/s ropivacaine combined with sufentanil during epidural analgesia for labour in 46 women, 21 of whom received 20ml of plain ropivacaine and 21 receiving a 20ml combination of ropivacaine and sufentanil (0.75mcg/ml). It was found that sufentanil reduced the MLAC of ropivacaine by 31%. [8] This, and a number of other studies, have concluded that the addition of opioid to local anaesthetics when given via epidural route or intraperitoneally via instillation or nebulisation reduces the dose requirement of the local anaesthetic as well as postoperative pain.

Hence, the current study was planned to compare the efficacy of intraperitoneal instillation of ropivacaine with that of a combination of ropivacaine and fentanyl in alleviating post-operative pain. Simultaneous attempt was made to compare the incidence of adverse effects like pruritus, emetic symptoms, hypotension and bradycardia in the two groups. The volume of ropivacaine to be given was decided based on the usual dose of 0.75% ropivacaine required for lumbar epidural surgical anaesthesia during caesarean section, and other surgeries, and as a single thoracic block for post-operative pain relief, which is 15-20ml. Also, the maximum dose of ropivacaine which can be safely administered is 3mg/kg. [3]

To decide the dose of ropivacaine to be administered, similar studies conducted in the past were also referred to. In a 2007 study conducted by Canan Kucuck et al, comparing ropivacaine with bupivacaine for intraperitoneal instillation in laparoscopic cholecystectomy surgeries, the dose of ropivacaine used was 100mg. [7] In a 2010 study conducted by Ceyhun Memedov et al to compare analgesic effects of ropivacaine with and without lornoxicam for intraperitoneal and port-site infiltration in laparoscopic cholecystectomy surgeries, 150mg of ropivacaine was used. [9]

Considering moderate effect size of 0.7, an initial sample size of 70 (35 participants in each group) was decided to achieve 80% power allowing for 5% type 1 error. However, the final sample size is of 52 participants after taking into account the feasibility and availability of participants, as well as, the ongoing COVID-19 pandemic.

Randomization, blinding, control and case selection as well as operative and data collection/analysis protocols were defined prior to commencement of the study.

The study was conducted in Department of Anaesthesiology, Shree Krishna hospital, Gokal nagar, Karamsad, Gujarat.

Sample size of the current study was 52 after applying the inclusion and exclusion criteria, while the sample size of some of the other studies was larger (e.g. A Singh et al [2013] sample size was 150[10], Sanjay Singh et al [2017] sample size was 90[43]). Study was a randomized trial like most of the studies we have compared with. Intraperitoneal instillation was done in subhepatic area/GB fossa space in our study while some studies also used IPLA instillation in subdiaphragmatic space. In the current study drug used as IPLA was ropivacaine or a combination of ropivacaine and fentanyl while most of the studies we have compared with used ropivacaine, bupivacaine, lignocaine, etc. as local anaesthetics and fentanyl or nalbuphine as opioids. The mean age, weight, sex distribution and duration of surgery was comparable to other similar studies carried out in the past.

Post-operative VAS score was significantly higher in the group receiving instillation of ropivacaine than the group receiving a combination of ropivacaine and fentanyl in the immediate post-operative period, and at 1, 2, 4, 8 and 12 hours after surgery. Similar findings were confirmed in other studies like the study by A Singh et al in which VAS score was higher in the group receiving ropivacaine instillation as compared to the group receiving a combination of ropivacaine and fentanyl in the immediate postoperative period as well as every hour post-operatively for a duration of 12 hours. [39] In the study by Sanjay Singh et al, as well, it was found that post-operative VAS score was significantly higher in the group receiving ropivacaine instillation when compared to the group receiving a combination of ropivacaine and nalbuphine in the immediate post-operative period and 1h, 4h, 8h, 12h, 16h and 24h post-operatively.[11]

Post-operative VRS score was found to be significantly higher in the group receiving instillation of ropivacaine than the group receiving a combination of ropivacaine and fentanyl , in the immediate post-operative period and at 1 hour, 8 hours and 12 hours post-operatively. There was no significant difference in VRS score 2 and 4 hours postoperatively. In the immediate postoperative period, no participants had pain at rest or on deep breathing. However, while 21 participants had pain on coughing in the group receiving plain ropivacaine, only 4 participants in the group receiving combination of ropivacaine and fentanyl had the same. At 1 hour postoperatively, 25 participants in group receiving plain ropivacaine had pain on coughing as opposed to 8 patients in group receiving ropivacaine and fentanyl. At 8 hours postoperatively, no participant in group receiving plain ropivacine had pain on coughing but 5 patients had pain on deep breathing. In the group receiving combination of ropivacaine and fentanyl, 12 patients had pain on coughing and 13 patients had pain on deep breathing. At 12 hours postoperatively, 11 patients in group receiving ropivacaine and fentanyl complained of pain on coughing. The decrease in pain in group receiving ropivacaine could be because of rescue analgesic, mean time to requirement of which was less in group receiving plain ropivacaine. In the study by A Singh et al VRS score was significantly higher in the group receiving instillation of ropivacaine than the group receiving a combination of ropivacaine and fentanyl in the immediate post-operative period as well as every hour for a period of 12 hours postoperatively.[10]

In this study, no participant in either group complained of shoulder pain. Even in the study by A Singh, et al, while participants in the control group did complain of shoulder pain in the postoperative period, no participant in the group receiving ropivacaine or ropivacaine and fentanyl complained of the same. [10] In the study by Sanjay Singh et al, the incidence of shoulder pain was significantly higher in the group receiving ropivacaine than the group receiving a combination of ropivacaine and nalbuphine. [11]

Participants were given a bolus of Inj. Diclofenac aqueous 75mg I.V. as rescue analgesia when they reported a VAS score of >4. It is important to remember that a complex pain experience requires a multidimensional assessment. Hence, although only the VAS score was used to decide when to give I.V. rescue analgesia, pain intensity was also evaluated on the VRS scale. Moreover, while VAS score is a subjective rating of pain, VRS is an ordinal scale. In the study, with a VAS score of >4, VRS did not exceed a score of 3 in any patient. Average time until requirement of first dose of analgesic was significantly less in the group receiving instillation of ropivacaine than the group receiving a combination of ropivacaine and fentanyl with the mean time to requirement being 113.38 minutes in the group receiving ropivacaine and 141.53 minutes in the group receiving ropivacaine and fentanyl. This is consistent with the findings of the study by A Singh et al in which the mean time until requirement of first dose of analgesic was 138.97 minutes in the group receiving ropivacaine instillation and 117.55 minutes in the group receiving a combination of ropivacaine and fentanyl. [10]

While in the group receiving the combination of ropivacaine and fentanyl, 18 participants (69.23%) required first dose of rescue analgesia (Inj. Diclofenac 75mg I.V.), 8 participants (30.77%) required a second dose and in the group receiving ropivacaine instillation, 23 participants (88.46%) required first dose of rescue analgesia, 3 participants (11.54%) required a second dose. Upon applying the chi-square test to compare the number of patients requiring second dose of analgesia in both groups the expected significant difference between the two groups was not found, which could be because of the limited sample size of the study as in other comparable studies group receiving combination of ropivacaine and fentanyl had a significantly lesser number of participants requiring second dose of rescue analgesic than the group receiving plain ropivacaine.

In this study, the incidence of pruritus, emetic symptoms, shoulder pain, bradycardia and hypotension was recorded for both the groups. The difference in the incidence of pruritus and emetic symptoms between both the groups was found to be insignificant. The study by A Singh et al yielded similar findings. The incidence of post-operative bradycardia was significantly higher in the group receiving a combination of ropivacaine and fentanyl than the group receiving ropivacaine alone. [39] This could be explained as a result of some amount of fentanyl undergoing systemic absorption. However, no patient had a heart rate less than 52 beats/min. In the study by Sanjay Singh et al, the incidence of post-operative bradycardia was significantly higher in the group receiving a combination of ropivacaine and nalbuphine than the group receiving ropivacaine alone. [11]

The limitations of this study were that due to the unanticipated COVID-19 pandemic and, hence, a decrease in the number of laparoscopic cholecystectomy surgeries scheduled, the sample size is limited. There was no evaluation of the quality of pain, with the focus being on intensity, hence, there was no distinguishing between visceral and somatic pain. Duration of analgesia provided could have been ascertained more precisely with a longer period of study. Moreover, the 12-hour duration of observation might have led to overestimation of rescue analgesic dose as after 12 hours of surgery, pain typically decreases and, hence, fewer doses of analgesia are required.

The study will contribute to the knowledge and practice of pain management in the perioperative period in patients undergoing laparoscopic surgeries along with reduction in the duration of post-operative hospital stay and increase in the patient turnover rate. However, the use of the intraperitoneal instillation method for analgesia requires further multicentric trials with a larger sample size using different dosages and concentrations of drugs.

CONCLUSION

The combination of ropivacaine and fentanyl is superior to ropivacaine alone, when instilled intra-peritoneally, for reducing post-operative pain in patients undergoing laparoscopic cholecystectomy surgery, with better and longer pain relief and without any significant increase in adverse events. Time to requirement of rescue analgesia is increased and total post-operative analgesic consumption is decreased with the addition of fentanyl to ropivacaine for intra-peritoneal instillation.

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