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EFFICACY OF INTRAPERITONEAL INSTILLATION OF 0.2% ROPIVACAINE FOR POSTOPERATIVE PAIN RELIEF AFTER LAPAROSCOPIC CHOLECYSTECTOMY

Anaesthesiology

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ABSTRACT

INTRODUCTION: Postoperative pain management is one of most important components of adequate postoperative patient care. Poorly treated pain contributes to patient suffering and may prevent rapid recovery and rehabilitation. Laparoscopic operative procedures have revolutionized surgery with many advantages : a smaller and more cosmetic incision, reduced blood loss, reduced postoperative hospital stay and pain, which cut down hospital costs [1].

AIMS AND OBJECTIVES: Aim of the study is to evaluate the efficacy of intraperitoneal instillation of ropivacaine for postoperative pain relief after laparoscopic cholecystectomy surgeries in terms of : Duration of analgesia, 24 hour postoperative analgesic requirement, Postoperative pain assessment, Postoperative hemodynamic changes like pulse rate, blood pressure and Complications (if any).

MATERIALS AND METHODS: Study area - Command Hospital (Eastern Command), Alipore, Kolkata (operation theatre and ward).

Study population - Patients posted for Elective Laparoscopic Cholecystectomy.

Study period - Jan 2017 to June 2018

Study Time– From first intraoperative intraperitoneal instillation of study drug to next 24 postoperative hours.

Sample Size - 80 (40 in each group)

RESULTS AND ANALYSIS: In our study, intraperitoneal instillation of Ropivacaine at the end of surgery provided analgesia for 5.54 ± 4.61 hrs. When compared with the saline group, it was about 2.22 ± 2.93 hrs, which was found to be statistically significant (-0.004). In this study, Injection Tramadol was used for rescue analgesia for postoperative pain relief.

SUMMARY AND CONCLUSION: This study has a few limitations. First, eighty study population may be underpowered for the study. Second, the surgeon performing the surgeries is not the same in every case which may alter the postoperative consequences. From this study it may be concluded that intraperitoneal instillation of Ropivacaine is effective for postoperative pain relief after laparoscopic cholecystectomy. From this study we also conclude that, intraperitoneal instillation of Ropivacaine is useful for postoperative pain relief for patients undergoing laparoscopic cholecystectomy in terms of duration of analgesia, rescue analgesic requirement and pain perception.

KEYWORDS

Intraperitoneal Instillation, Ropivacaine, Postoperative Pain Relief And Laparoscopic Cholecystectomy

INTRODUCTION

Postoperative pain management is one of most important components of adequate postoperative patient care. Poorly treated pain contributes to patient suffering and may prevent rapid recovery and rehabilitation. Laparoscopic operative procedures have revolutionized surgery with many advantages : a smaller and more cosmetic incision, reduced blood loss, reduced postoperative hospital stay and pain, which cut down hospital costs [1]. However, patients undergoing laparoscopic procedures do experience postoperative pain, especially in upper and lower abdomen and back and shoulder regions. Pain intensity usually peaks during the first few postoperative hours and usually declines over the following 2 to 3 days. Pain after laparoscopy, results from the stretching of intra-abdominal cavity, peritoneal inflammation and phrenic nerve irritation caused by residual CO2 in peritoneal cavity [2].

Local anaesthetic techniques are part of the multi-modal approach to postoperative pain management. This involves the use of opioids [3], non-steroidal anti-inflammatory drugs (NSAIDs), paracetamol [4] and local anaesthetics. For ambulatory surgery and anaesthesia, the main advantage of using local anaesthetics is that they do not have the adverse effects of opioids, which may delay recovery and discharge from hospital. Although NSAIDs provide morphine sparing effects, they do not appear on their own to provide sufficiently reliable postoperative analgesia for minimally invasive laparoscopic surgery [5].

Intraperitoneal instillation of local anaesthetics provide pre-emptive analgesia by preventing the establishment of central sensitization following noxious stimulus, by blocking the visceral nociceptors thereby decreasing the visceral pain in laparoscopic surgeries. It also has anti-inflammatory action and prevents peritonitis and bowel adhesion. Visceral nociceptors are stimulated by handling of the viscera and peritoneum, causing inflammation and pain. In high risk cases, this technique can provide excellent intraoperative and postoperative pain relief without the adverse effects associated with NSAIDs.

Ropivacaine is a newer, long acting local anaesthetic whose neuronal blocking potential used in peripheral nerve blockade seems to be equal or superior to Bupivacaine. Studies have shown that it has a significantly greater margin of safety compared to Bupivacaine because of lower CNS and cardiac toxicity and hence can be used in higher concentrations. One of the drawbacks of Ropivacaine is its less intense motor blockade compared to Bupivacaine. Till date, there have been few studies on the intraperitoneal use of ropivacaine to reduce postoperative pain. Therefore, this study was undertaken to assess the efficacy of ropivacaine in reducing postoperative pain after laparoscopic cholecystectomy (LC) and also complications (if any).

AIMS AND OBJECTIVES

Aim of the study is to evaluate the efficacy of intraperitoneal instillation of ropivacaine for postoperative pain relief after laparoscopic cholecystectomy surgeries in terms of :

1. Duration of analgesia
2. 24-hour postoperative analgesic requirement
3. Postoperative pain assessment
4. Postoperative hemodynamic changes like pulse rate (PR), blood pressure (BP) and oxygen saturation (SpO2)
5. Complications

MATERIALS AND METHODS

Study area - Command Hospital (Eastern Command), Alipore, Kolkata (operation theatre and ward)

Study population- Patients posted for Elective Laparoscopic Cholecystectomy

INCLUSION CRITERIA:

- Patients of either sex
- ASA grade 1 and 2
- Age between 18 to 65 years
- Body weight between 45 to 85 kg

EXCLUSION CRITERIA:

- Patients who have not given consent
- Patients other than ASA 1 & 2

- Known local anaesthetic allergy

Study period - Jan 2017 to June 2018
Study Time – From first intraoperative intraperitoneal instillation of study drug to next 24 postoperative hours.
Sample Size – 80 (40 in each group)
Sample and Study Design - A Prospective Randomised Clinical Study.

The patients are divided into 2 groups of 40 each :
Group A received intraperitoneal instillation of 30ml 0.2% Ropivacaine while Group B received 0.9% isotonic saline.

Parameters to be Studied - The subjects were randomly allocated into 2 groups of 40 each.

RESULTS AND ANALYSIS

In our study, intraperitoneal instillation of Ropivacaine at the end of surgery provided analgesia for 5.54 ± 4.61 hrs. When compared with the isotonic saline group, it was about 2.22 ± 2.93 hrs, which was found to be statistically significant (p-0.004). In this study InjectionTramadol was used as rescue analgesic for postoperative pain relief. But in some cases, Injection Diclofenac had to be added along with Tramadol for analgesia. In Group A, 10% patients received single dose of Tramadol in first 24 hrs, second and third doses of Tramadol were needed for 30% and 22.5% patients respectively (with or without Diclofenac). But in Group B, no patient was relieved from single dose of Tramadol in first 24 hrs, while second and third dose of Tramadol was needed for 5% and 95% patients respectively, which is statistically significant (p<0.001).

We found that if the additional rescue analgesia requirement with Diclofenac is factored in, then the total rescue analgesic requirement in first 24hrs is significantly less in Group A. In the control group, 57% patients had received total 5 doses of rescue analgesic whereas the value is only 17.5% in ropivacaine group. In ropivacaine group, 37.5% patient did not need any rescue analgesic for first 24 hrs. In our study, the median VAS score for Ropivacaine group was 2.00 at 0 hr, which was found to be statistically significant (p<0.05); VAS score was 4 at 6th hr and 12th hr; and again 2 at 24th hr. In our study, there were no significant hemodynamic changes noted. PR, BP and SpO2 were maintained within 20% of the normal limit throughout the study.

Table: Distribution As Per Asa Physical Status In Two Groups

		GROUP		Total		
		Group A	Group B		p Value	Significance
ASA	I	22(55)	28(70)	50(62.5)	0.166	Not Significant
	II	18(45)	12(30)	30(37.5)		
Total		40(100)	40(100)	80(100)		

Table : Distribution As Per First Analgesic Requirement (pain Free Hours) In Two Groups

PAIN FREE HOURS			
GROUP	Mean	Median	Standard Deviation
Group A	5.54	6.00	4.61
Group B	2.22	0.00	2.93
p Value	0.004		
Significance	Significant		

DISCUSSION

Laparoscopic technique has gained popularity in recent years, mainly because of the fact that it involves a small incision, shorter hospital stay and early ambulation. Though it has got various advantages on its own, the peritoneal stretching due to the insufflation of gases results in excessive postoperative pain. For this purpose, various modes of providing analgesia have been tried in laparoscopic surgeries like surgery under subarachnoid block, parenteral opioids and NSAIDs, instillation of local anaesthetic intraperitoneally, etc.

Surgery under subarachnoid block provides adequate analgesia both intraoperatively and postoperatively, but the level of sensory block required intraoperatively is very high (Thoracic level 4), which results in higher hemodynamic instability and time for postoperative ambulation also extends.

Instillation of local anaesthetic solution intraperitoneally, as a mode of providing postoperative analgesia, has been studied extensively. It has the added advantage of early ambulation, reduces the use of parenteral opioids and NSAIDs, and reduced incidence of postoperative nausea and vomiting.

This study was done to see the analgesic efficacy of intraperitoneally instilled ropivacaine, with a control group using isotonic saline.

All the groups were comparable with respect to the demographic data including Age, Sex, Height, Weight, BMI, etc. They were also comparable in terms of the duration of surgery.

FIRST ANALGESIC REQUIREMENT

In our study, intraperitoneal instillation of Ropivacaine at the end of surgery provided analgesia for 5.54 ± 4.61 hrs. When compared with the saline group, it was about 2.22 ± 2.93 hrs, which was found to be statistically significant (p-0.004).

Chou and co-workers [6] used 0.5% Bupivacaine (50 mg) after the dissection, compared with the group which received both before the pneumoperitoneum and after the dissection (100mg) in the group. The patients who received Bupivacaine both before and after dissection had less pain when compared with the other group. But the duration of analgesia was up to 8 hrs, which also supports our study.

Gvozdenović et al [7] used 0.25% Bupivacaine vs. 0.25% Bupivacaine + 2mg Morphine. They concluded that postoperative pain relief in intraperitoneal bupivacaine with morphine was about 6 hrs which was similar to the duration of postoperative analgesia in our study.

Szem et al [8] also showed the same duration of pain relief like our study. They used 0.1% Bupivacaine intraperitoneally. Pain relief was modest which lasted for 6 hrs.

TOTAL RESCUE ANALGESICS

In this study, Injection Tramadol was used as rescue analgesic for postoperative pain relief. But in some cases Injection Diclofenac had to be added along with Tramadol for analgesia. In group A, 10% patients received single dose of Tramadol in first 24 hrs, second and third doses of Tramadol were needed for 30% and 22.5% patients respectively (with or without Diclofenac). But in group B, no patient was relieved from single dose of Tramadol in first 24 hrs while second and third dose of Tramadol was needed for 5% and 95% patients respectively, which is statistically significant (p<0.001).

If the additional rescue analgesia requirement with Diclofenac is factored in, then it has been found that total rescue analgesic requirement in first 24hrs is significantly less in Group A. In the control group, 57% patients had received total 5 doses of rescue analgesic whereas the value is only 17.5% in ropivacaine group. In ropivacaine group, 37.5% patients did not need any rescue analgesic for first 24 hrs. Shabir et al [9] compared intraperitoneal Bupivacaine with intravenous Tramadol for postoperative pain relief in which the mean VAS in Bupivacaine group was at 1st, 2nd, 3rd, 4th and 5th hrs were 3.50, 2.80, 2, 1.30 and 0.06 respectively, but in Tramadol group VAS was 2.20, 1.83, 1.40, 1.07 and 0.7. Pain relief was better with iv Tramadol group than intraperitoneal group.

The difference in the Fentanyl requirement closely correlates with the study done by Tae Han Kim et al [10], where the total dose of Fentanyl consumed in Ropivacaine group was 367 ± 85.88 µg over 48 hrs via PCA when compared to 535 ± 100.29 µg in control group. This was statistically significant (p<0.001).

Rajini Gupta et al [11] also demonstrated the same in which saline vs. Bupivacaine vs. Bupivacaine and Fentanyl were compared. Total Diclofenac consumption was about 65 ± 15mg in Bupivacaine with Fentanyl compared with 128 ± 25mg in the saline group.

SUMMARY AND CONCLUSION

- This prospective randomized clinical study was carried out at Command Hospital (EC) Kolkata. 80 ASA 1 and ASA 2 patients undergoing elective laparoscopic cholecystectomy were included in the study.
- Patients were randomized into 2 groups of 40 each (Group A and Group B). In patients included in study group A, 30 ml of local anaesthetic solution was instilled on the upper surface of liver and right subdiaphragmatic space, using subcostal trocar under direct laparoscopic control at the end of surgery. In patients in study group B, instillation of 30 ml of 0.9% isotonic saline was done.

Postoperative pain was assessed at 0, 6, 12 and 24 hrs using Visual Analog Scale (VAS) along with vital parameters like heart rate, respiratory rate, non invasive blood pressure and oxygen saturation.

- The study population did not show significant difference in demographical characteristics or duration of surgery. There was no significant difference in vital parameters between the study groups postoperatively.
- Intraperitoneal instillation of Ropivacaine significantly increases the duration of postoperative analgesia (5.54 ± 4.61 hrs in Group A vs. 2.22 ± 2.93 hrs in Group B). In Group A, 37.5% patients did not need any rescue analgesic in first 24 hrs postoperatively whereas in Group B, three doses of tramadol analgesic were required by 95% patients. In this study, the median pain score (VAS) for Ropivacaine group was 2.00 at 0 hr, which was found to be significantly less in comparison to Group B (2.00 in Group A vs. 8.00 in Group B). In first 24 hrs, the total rescue analgesic requirement is also much lesser in Group A.
- This study has a few limitations. First, eighty study population may be underpowered for the study. Second, the surgeon performing the surgeries is not the same in every case which may alter the postoperative consequences.
- From this study, it may be concluded that intraperitoneal instillation of Ropivacaine is effective for postoperative pain relief after laparoscopic cholecystectomy in terms of duration of analgesia, rescue analgesic requirement and pain perception.

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