

Original Research Article

EVALUATION OF EFFECTIVENESS OF INTRAPERITONEAL INSTILLATION OF ROPIVACAINE AS A POSTOPERATIVE ANALGESIC IN PATIENTS UNDERGOING LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

Background: Cholecystectomy represents one of the most frequently conducted intraabdominal surgical intervention. Ropivacaine is a long-acting amide local anaesthetic agent and first produced as a pure enantiomer. Hence; the present study was conducted to evaluate effectiveness of ropivacaine as a postoperative analgesic in patients undergoing laparoscopic cholecystectomy.

Materials & Methods: A total of 40 patients scheduled for laparoscopic cholecystectomy participated in this study. The laparoscopic cholecystectomy procedures were performed by an experienced surgeon, utilizing 20ml of 0.375% Ropivacaine for intraperitoneal instillation at the end of procedure. Postoperative pain was measured using the Visual Analog Scale (VAS), and rescue analgesia was administered to those with a VAS score exceeding 3. The VAS ranged from 0 to 10, where 0 represented no pain and 10 indicated the most severe, intolerable pain. All data were compiled in a Microsoft Excel spreadsheet and analysed using SPSS software.

Results: Mean age of the patients was 45.3 years with 62 percent of the patients being males while the remaining were females. Mean duration of procedure was 112.3 minutes. Mean VAS at 0 hours, 2 hours, and 4 hours was 1.56, 2.23 and 2.11 respectively. Number of patients requiring of rescue analgesia at 0 hours, 2 hours and 4 hours was 0 percent, 4 percent and 10 percent of the patients respectively.

Conclusion: Laparoscopy-assisted administration of ropivacaine effectively reduces pain levels in patients undergoing laparoscopic cholecystectomy.

Key words: Laparoscopic cholecystectomy, Pain, Ropivacaine.

INTRODUCTION

Cholecystectomy represents one of the most frequently conducted intraabdominal surgical intervention. Currently, laparoscopic techniques have become the preferred method for performing this procedure when indicated.^[1,2]

Recovery after laparoscopic cholecystectomy depends upon several factors such as abdominal pain, shoulder tip pain, nausea, vomiting and fatigue. These side-effects are due to peritoneal stretching and diaphragmatic irritation caused by high intra-abdominal pressure and by CO₂.^[3,4]

Intraperitoneal instillation of local anaesthetics is an effective mode of postoperative analgesia in laparoscopic surgeries amongst the various multimodal analgesia approaches. Visceral nociceptive receptors on the exposed peritoneum are blocked, thereby aiding analgesia. Systemic absorption also plays a role in reduced nociception. Adjuvants added to local anaesthetics have proved to be of additional advantage in minimizing pain due to their antinociceptive mechanism of action.^[3,4] Ropivacaine is a long-acting amide local anaesthetic agent and first produced as a pure enantiomer. It produces effects similar to other local anaesthetics

via reversible inhibition of sodium ion influx in nerve fibres. Ropivacaine is less lipophilic than bupivacaine and is less likely to penetrate large myelinated motor fibres, resulting in a relatively reduced motor blockade. Thus, ropivacaine has a greater degree of motor sensory differentiation, which could be useful when motor blockade is undesirable.^[5] Hence; the present study was conducted to evaluate effectiveness of ropivacaine as a postoperative analgesic in patients undergoing laparoscopic cholecystectomy.

MATERIALS AND METHODS

A total of 40 patients scheduled for laparoscopic cholecystectomy participated in this study. Comprehensive demographic information for each patient was collected. The laparoscopic cholecystectomy procedures were performed by an experienced surgeon, utilizing 20ml of 0.375% Ropivacaine for intraperitoneal instillation at the end of procedure. Patients with a history of systemic illnesses or known drug allergies were excluded

from the study. Postoperative pain was measured using the Visual Analog Scale (VAS), and rescue analgesia was administered to those with a VAS score exceeding 3. The VAS ranged from 0 to 10, where 0 represented no pain and 10 indicated the most severe, intolerable pain. All data were compiled in a Microsoft Excel spreadsheet and analyzed using SPSS software, with univariate analysis conducted to assess the significance of the findings.

RESULTS

The mean age of the patients was 45.3 years with 62 percent of the patients being males while the remaining were females. Mean duration of procedure was 112.3 minutes. The mean VAS at 0 hours, 2 hours, and 4 hours was 1.56, 2.23 and 2.11 respectively. Number of patients requiring of rescue analgesia at 0 hours, 2 hours and 4 hours was 0 percent, 4 percent and 10 percent of the patients respectively.

Table 1: Demographic data

Variable	Number	Percentage
Mean age	45.3 years	
Males	31	62
Females	19	38
Mean BMI (Kg/m ²)	23.8	

Table 2: Duration of procedure (mins)

Duration of procedure	Value
Mean	112.3
SD	32.8

Table 3: Mean VAS

Time interval	Mean VAS	p-value
0 hours	1.56	0.252
2 hours	2.23	
4 hours	2.11	

Table 4: Requirement of rescue analgesia

Time interval	Number	Percentage
0 hours	0	0
2 hours	2	4
4 hours	5	10

DISCUSSION

The advent of minimally invasive cholecystectomy techniques by French and American surgeons in the late 1980s significantly reduced the associated morbidity of the procedure, thereby expanding its indications. The Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) recognizes several conditions warranting laparoscopic cholecystectomy, including symptomatic cholelithiasis, biliary dyskinesia, acute cholecystitis, and complications arising from choledocholithiasis, particularly in patients deemed fit for surgery. Laparoscopic cholecystectomy (LC) has emerged as one of the most frequently

performed surgical interventions, with approximately 1.3 million procedures conducted in the United States in 2021.^[6-8]

Ropivacaine (Naropin, AstraZeneca) a new long-acting amide local anaesthetic agent, is a pure S-enantiomer, with a high pKa and relatively low-lipid solubility. Since its clinical introduction in 1996, it has been the focus of intense interest because of its increased CNS and cardiovascular safety compared with bupivacaine. Compared with bupivacaine (the drug of choice for many years), ropivacaine is equally effective for subcutaneous infiltration, epidural, intrathecal and peripheral nerve block surgery, and obstetrics and postoperative analgesia. Ropivacaine is virtually identical to bupivacaine in

terms of onset, quality and duration of sensory block.^[9] Hence; the present study was conducted to evaluate effectiveness of ropivacaine as a postoperative analgesic in patients undergoing laparoscopic cholecystectomy.

Mean age of the patients was 45.3 years with 62 percent of the patients being males while the remaining were females. Mean duration of procedure was 112.3 minutes. Mean VAS at 0 hours, 2 hours, and 4 hours was 1.56, 2.23 and 2.11 respectively. Number of patients requiring of rescue analgesia at 0 hours, 2 hours and 4 hours was 0 percent, 4 percent and 10 percent of the patients respectively. Liang et al, in a previous study investigated the analgesic effects and pharmacokinetic profile of varying concentrations of ropivacaine at port sites under laparoscopy assistance. 132 patients were assigned to 4 groups: Group H: in which patients were infiltrated with 0.75% ropivacaine; Group M: 0.5% ropivacaine; Group L: 0.2% ropivacaine; and Group C: 0.9% normal saline only. The NRS in Group C was significantly higher at rest, and when coughing upon leaving PACU and at 4hours, 6hours, 8hours, and 24hours after infiltration ($P < .05$) and rescue analgesic consumption was significantly higher. Notably, these parameters were not significantly different between Groups H, Group M and Group L ($P > .05$). Intra-operative consumption of sevoflurane and remifentanyl, HR at skin incision and MAP at skin incision, as well as 5 minutes after skin incision were significantly higher in Group C than in the other 3 groups ($P < .01$). In contrast, these parameters were not significantly different between Groups H, Group M and Group L ($P > .05$). The concentration of ropivacaine at 30minutes after infiltration in Group H was significantly higher than that of Group L and Group M ($P < .05$). No significant differences were observed in the occurrence of side effects among the 4 groups ($P > .05$).^[10]

Singh et al, in a previous study, compared the effect of intraperitoneal ropivacaine with placebo for post-operative pain management in patients undergoing laparoscopic cholecystectomy. All patients were pre-medicated with glycopyrrolate 0.2 mg, ondansetron 4 mg and ranitidine 150 mg intravenously half an hour prior to induction of anesthesia. All patients were given standard general anaesthesia with propofol (2-2.5 mg/kg), fentanyl 2 µg/kg, and succinylcholine (2 mg/kg) to facilitate tracheal intubation. Anesthesia was maintained with 60% N₂O in oxygen with 0.5% to 1% Halothane. Group A: Patients received 20 ml of 0.9% normal saline as placebo (n = 25). Group B: Patients received 20 ml of 0.5% ropivacaine (n = 25). The mean VAS varied considerably within (between time) and between the groups (treatment) and was especially comparatively higher in Group A at initial hours 15 min to 30 min and at end hours 12-24 hrs as compared with Group B. On an average, the frequent dosing of rescue analgesia and mean No. of

rescue analgesia doses were higher in Group A followed by Group B. In both groups, the treatment related adverse events were mostly emetic symptoms and shoulder pain with the highest being in Group A.^[11] Sozbilen, M et al assessed the effects of incisional and intraperitoneal administration of ropivacaine on postoperative pain and stress response in patients undergoing laparoscopic cholecystectomy. 45 patients with ASA (American Society of Anesthesiologists) scores I and II who were about to undergo laparoscopic cholecystectomy were divided into 3 groups. After cholecystectomy, a total of 40 mL of 3.75% ropivacaine was administered preincisionally and intraperitoneally to patients in group 1 (n=14); preincisionally and intraperitoneally to patients in group 2 (n=17); and intraperitoneally and locally at incision sites to patients in group 3 (n=14). Blood levels of epinephrine and norepinephrine were examined preoperatively, 15 min after insufflation, and at the end of the operation. Visual analog pain scale scores and analgesic requirements were used for 24-h postoperative follow-up of pain levels reported by patients. No statistically significant difference was found among the 3 groups with respect to visual analog pain scale scores, total analgesic requirements, and accompanying pain, nausea, and vomiting. The earliest analgesic requirements were seen in group 2 ($P < .005$), and less shoulder pain was noted in group 3 ($P < .005$). Norepinephrine and epinephrine levels showed no statistically significant differences between the 3 groups.^[12]

CONCLUSION

Laparoscopic cholecystectomy is regarded as the preferred intervention for symptomatic cholelithiasis. While the post-operative discomfort associated with this technique is significantly less intense compared to that experienced after open cholecystectomy, it is important to note that the procedure is not devoid of pain. Laparoscopy-assisted administration of ropivacaine effectively reduces pain levels in patients undergoing laparoscopic cholecystectomy.

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