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ORIGINAL RESEARCH

An investigation of pain following laparoscopic cholecystectomy by using non-opioid analgesics

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Abstract
Background: A pain study using non-opioid analgesics following laparoscopic cholecystectomy.
Methods: In this study, 218 individuals who underwent elective laparoscopic cholecystectomy participated. Patients from either gender, aged 20 to 55, were enrolled in this prospective observational study. Due to the conversion of a laparoscopic procedure to an open cholecystectomy, seven patients were disqualified from the trial, and two patients were lost to follow-up. The Numerical Pain Rating Scale (NPRS), which measures pain during deep breaths, while moving, and at rest, was explained to and practised on these patients. The following pain metrics were noted: pain score at rest, deep breathing and movement, dynamic pain, breakthrough episodes of pain, and time to discharge following surgery.
Results: None of the patients, we discovered, experienced acute discomfort when at rest at any point in time. Only 1 patient and 2 patients, respectively, experienced acute pain with deep breathing at 2 hours and 6 hours following surgery. After surgery, 2 patients experienced severe pain with movement at 2 hours, and 6 patients experienced severe pain with movement at 6 hours. Patients with dynamic pain at two hours had a higher overall number of breakthrough episodes.
Conclusion: The peak pain scores were discovered at six hours. A better analgesic control is necessary in this category of patients because they frequently experience breakthrough episodes and have higher dynamic pain score values at 2 hours. The first postoperative day pain scores had a positive correlation with patient time to discharge.
Keywords: Dynamic pain, Laparoscopic cholecystectomy, Postoperative pain

Introduction

A frequent procedure used to treat cholelithiasis is laparoscopic cholecystectomy. The causes of pain following laparoscopic cholecystectomy include incisional, local visceral, peritoneal, and referral pain. Remaining carbon dioxide in the peritoneal cavity after insufflations can cause shoulder tip pain in the postoperative period, suggesting phrenic nerve irritation.[2] The trocar insertion site also contributes to the postoperative pain following cholecystectomy.

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Rapid distension of the peritoneum with gas may be associated with pressure over the blood vessels, and traumatic nerve traction releases inflammatory mediators causing pain.
Pre-emptive analgesia attenuates signals entering the spinal cord, which has comparably better efficacy in regulating pain after surgical stimulus, according to prior studies. [3] In this context, various pain-relieving strategies have been described for the management of postoperative pain, such as the multimodal analgesia approach. In a laparoscopic cholecystectomy, adequate postoperative pain management enables early mobilisation and speeds up discharge. It can only be accomplished with sufficient knowledge of the laparoscopic cholecystectomy postoperative pain pattern. The postoperative use of opioids may potentially prolong the time until discharge. We investigated the patterns of postoperative pain in patients who underwent balanced anaesthesia during laparoscopic cholecystectomy. These patients' postoperative discomfort following laparoscopic cholecystectomy was treated without the use of opioids.

Methods

The Institutional Ethical Committee and Clinical Trial Registry India gave their approval to this study. This prospective observational study included 218 patients who had been scheduled for laparoscopic cholecystectomy and who were between the ages of 20 and 55 and ASA physical status II. Patients with a history of drug allergies to any of the study medications, opioid-dependent chronic pain, immunosuppression, diabetes mellitus, renal disease (serum creatinine >1.6 mg/dL), liver disease (liver enzymes more than two times of normal values), psychiatric disorder, and use of steroids within one month of surgery were excluded from the study. The patient was not included in the trial if the laparoscopic cholecystectomy was changed to an open operation.
The Numerical Pain Rating Scale (NPRS) was demonstrated to patients in order to quantify pain during deep breaths, while moving, and at rest (an 11-point ordinal scale, with 0 indicating no pain and 10 indicating worst pain imaginable). On the first day of surgery, all patients underwent a postoperative pain score interview on the NPRS during rest, deep breathing, and movement at 2, 6, and 12 hours. The NPRS difference between rest and deep breathing, which is >2 points, was used to identify dynamic pain. On the first postoperative day, the timing of the first episode of breakthrough pain, the number of episodes, and the time till discharge from the day of surgery were all noted.
The SPSS 20 programme was used to conduct the statistical analysis. Given that the data were not normally distributed, the Mann-Whitney U-test was used for the statistical analysis of quantitative data (mean ± SD) within and across groups. The Pearson correlation coefficient was used to ascertain the link between different parameters. Statistics were considered to be significant at a P value of <0.05.

Results

218 patients who underwent elective laparoscopic cholecystectomy were enrolled in this study. Due to the laparoscopic treatment being converted to an open cholecystectomy in 14, as well as 4, patients, they were not included in the study. Patients' mean age was 47.79 ± 13.05 years, and their average BMIs were 24.37 ± 3.31 kg/m^2.
The average time spent performing surgery across all patients was 91.49 ± 19.28 minutes. The average amount of time between the last analgesic and extubation was 31.95 ± 14.41 minutes. It was discovered that the maximum pain score at rest observed at 6 hours (2.21 ± 1.05) was greater than the pain scores at rest observed at 2 hours (1.01 ± 1.14). After then, pain scores at rest dropped at 12 hours (1.84 ± 0.81), and they dropped much more on the first postoperative day (1.48 ± 0.89). The maximum score with deep breathing was discovered at 6 hours following surgery (3.08 ±1.47), whereas the lowest score with deep

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breathing was discovered at 2 hours following surgery (1.72 ± 1.48). On the first postoperative day, the average pain score with deep breathing was 2.16 ± 1.21. Maximum pain scores with movement were recorded at 6h after surgery (3.61±1.59), and minimum pain scores with movement were recorded at 2h after surgery (2.25±1.72) [Table 1].

Twelve patients experienced dynamic discomfort at two hours after surgery, which gradually went away over time. Only four individuals had dynamic discomfort on the first postoperative day [Table 2]. Patients experiencing dynamic pain at all times had a significantly greater overall number of breakthrough episodes, with a P value of < 0.05. The average rescue analgesic dosage was 34.20 ± 44.72 mg. The average time to discharge after surgery was 2.22±0.50 days. With a P value of < 0.05, there was a positive correlation between the patients' time to discharge and their postoperative day 1 pain scores [Table 3].

Table 1: Pain score at rest, deep breath and movement

Time interval	Postoperative pain scores at rest	Postoperative pain scores with deep breath	Postoperative pain scores with movement
Pain with movement at 2 h	1.01±1.14	1.72±1.48	2.25±1.72
Pain with movement at 6 h	2.21±1.05	3.08±1.47	3.61±1.59
Pain with movement at 12 h	1.84±0.81	2.57±1.21	3.04±1.14
Average score with movement on POD1	1.48±0.89	2.16±1.21	1.24

Table 2: Distribution of dynamic pain at different time intervals

Postoperative pain	N = 200 (%)
Dynamic pain at 2 h	
Yes	24 (12)
No	176 (88)
Dynamic pain at 6 h	
Yes	20 (10)
No	180 (90)
Dynamic pain at 12 h	
Yes	12 (6)
No	188 (94)
Dynamic pain on day 1	
Yes	8 (4)
No	192 (96)

Table 3: Correlation between pain scores on postoperative day 1 and time to discharge

Average pain scores on day 1 vs time to discharge	r	P value
Average score at rest on day 1 vs time to discharge	0.556	<0.0001
Average score pain with deep breath on day 1 vs time to discharge	0.577	<0.0001
Average score pain with movement on day 1 vs time to discharge	0.601	<0.0001

Discussion

Among elective surgical treatments, laparoscopic cholecystectomy is one of the most popular. Pain is still the most frequent complaint and the main cause of extended hospital stays, despite the approach's obvious advantages. [4-6] Pain, fatigue, and sociocultural factors are the main influences on how long patients need to recover from noncomplicated

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laparoscopic cholecystectomy. [7,8] Pain and fatigue are at their worst on the day of surgery and the day after. [7-9] Nausea and vomiting mostly happen on the day of surgery .[7]
Patients typically report pain from the skin incision, visceral pain, and shoulder pain after a laparoscopic cholecystectomy, which is typically brought on by diaphragmatic irritation.[9] Since pain can be brought on by a variety of factors, a variety of treatment options have been developed to lessen it. [1,9]
Local anesthetic infiltration at the incision area is an established pain management method in laparoscopic cholecystectomy.[10-12] Nonsteroidal anti-inflammatory drugs (NSAIDs) are advised to be used prior to surgery or even during surgery and for 3-4 days after surgery.[11] There are also reports that CO2 remaining in the abdominal cavity is related to postoperative pain so thorough removal of the gas is advised.[1] Recently a multimodal analgesic method that combines multiple analgesics has been developed .[11]

Conclusion

Maximum pain scores were discovered at 6 hours following surgery, indicating that this is the time when effective pain control must be administered. Patients also have high dynamic pain scores and increased breakthrough episodes, which can delay early discharge. By classifying the patients based on whether or not they experienced dynamic pain, the date of the first breakthrough episode and the overall number of breakthrough episodes were compared. Significantly more breakthrough episodes overall were observed in patients with dynamic pain, according to our research.

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