

Effect of Warm Saline Irrigation Versus Negative Gas Suction on Reduction of Postoperative Pain in Patients of Laparoscopic Cholecystectomy

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ABSTRACT

Objective: To compare warm saline irrigation and negative gas suction in terms of frequency of severe postoperative pain in patients of laparoscopic cholecystectomy.

Methodology: A comparative clinical trial was conducted in the Department of General Surgery, Pakistan Institute of Medical Sciences, Islamabad over a period of six months. After ethical approval from the hospital ethics committee, all patients who had laparoscopic cholecystectomy for gallstones were enrolled in the study. Patients were randomly divided into two equal groups by lottery methods. One group had warm saline irrigation of the operative field while the other group had negative gas suction at the end of the procedure. The pain score was recorded postoperatively by visual analog score. SPSS version 21 was used for descriptive analysis of the variables.

Results: A total of 102 patients were included according to the study's inclusion criteria. All the patients were observed for 24 hours for severe postoperative pain. The mean age (years) of the patients was 40.40±11.55 years. There were 28 (27.5%) male and 74 (72.5%) female patients in the study. The frequency of severe postoperative pain in patients of laparoscopic cholecystectomy among warm saline irrigation and negative gas suction was 33 (64.7%) and 14 (24.5%) respectively which was statistically significant (p-value <0.001).

Conclusion: Patients in the negative gas suction group have better modalities in reducing severe postoperative pain after laparoscopic cholecystectomy. This helps in early pain relief that reduces the agony of the patients and shortens the post-operative hospital stay.

Keywords: Cholelithiasis, Laparoscopic Cholecystectomy, Postoperative Pain

Authors' Contribution:

^{1,2}Conception; ¹Literature research; ¹manuscript design and drafting; ^{3,4}Critical analysis and manuscript review; ^{5,6}Data analysis; Manuscript Editing.

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Introduction

Laparoscopic cholecystectomy is widely accepted as the gold standard procedure for patients with symptomatic gallstone disease, as it has many advantages over open cholecystectomy, including small wounds, lower rates of wound infection and pneumonia, better cosmetic outcomes, shorter

recovery times in the hospital, lower rates of morbidity and mortality, and an earlier and more affordable return to work.¹ Laparoscopic cholecystectomy is associated with moderate-intensity postoperative pain soon after surgery that causes lot of distress to the patient.² The severity of pain ranges from mild to severe.³ After surgery, pain

is the main cause of extended hospital stays, which might raise morbidity.⁴ Patients commonly report experiencing pain in their upper abdomen, shoulders, backs and port site incisions.⁵ The incidence of shoulder and right upper abdomen pain varies from 12% to 60%.⁶ Pain is most intense in the first few hours after operation and then normally subsides in two or three days.⁷

Over the last two decades, a lot of research has been documented for pain management in the literature. Multiple medications and various modalities have been studied for acute pain relief after laparoscopic cholecystectomy for better patient care.⁸

Postoperative pain relief following laparoscopic cholecystectomy has been the subject of research into a variety of analgesic strategies.⁹ A blend of pharmacologic pain-relieving medicines diminishes postoperative pain in patients after laparoscopic cholecystectomy. Additionally, operative analgesic techniques have been used for postoperative analgesia in patients of laparoscopic cholecystectomy. Among these strategies, low-pressure pneumoperitoneum, low rate of insufflation, pulmonary recruitment maneuver and active gas suction are used to diminish postoperative pain and analgesic necessities in patients going through laparoscopic cholecystectomy.¹⁰ Combining operative pain-relieving modalities with pharmacologic medicines can be beneficial for decreasing pain in patients following laparoscopic cholecystectomy.²

The rationale of the study is to look for the better modality in lowering postoperative pain after laparoscopic cholecystectomy among the warm saline irrigation and negative gas suction. This may also assist in ways; first early relieve of pain reduces the agony of the patients and shortens the post operative hospital stay, second, it will prevent the judicious use of various painkillers post operative. The objective of the study is to compare warm saline irrigation and negative gas suction in terms of frequency of severe postoperative pain in patients of laparoscopic cholecystectomy.

Methodology

A comparative clinical trial was conducted in the Department of General Surgery, Shaheed Zulfiqar Ali Bhutto Medical University, Pakistan Institute of Medical Sciences Islamabad over a period of six months. After getting approval from the ethical review board, all patients who had laparoscopic cholecystectomy for gallstones were enrolled in the study. The sample size was calculated by using the WHO sample size calculator where $P_1=22.9\%$, $P_2=3.7\%$ with the level of Significance= 5%, and power of test= 80%.¹⁰ All patients of both genders, age ranges from 20-70 years, operated for symptomatic gallstone disease by laparoscopic cholecystectomy were included in the study by using non-probability consecutive sampling technique. Patients already diagnosed with gall bladder carcinoma, acute Cholecystitis, associated Choledocholithiasis, Peptic ulcer disease, Hepatitis, acute Pancreatitis, and Obese with a BMI of more than 29 were excluded from the study. All admitted patients with diagnosis of gall stone disease were assessed clinically. Patients were prepared for surgery after doing all necessary laboratory tests and doing anesthesia fitness by the anaesthetist. Informed written consent for the study was taken before the procedure of laparoscopic cholecystectomy. Patients were randomly divided into two equal groups by lottery methods. In Group A patients, warm saline irrigation was done while in Group B patients negative pressure gas suction was applied at the end of the procedure. All the patients were observed for 24 hours for severe postoperative pain. The pain was recorded by using the visual analogue scale at 4, 8, 12, and 24 hours of surgery on Proforma. The data was analyzed by SPSS software version 22. Mean \pm SD was calculated for age and body weight. Frequency and percentage were presented for qualitative variables like gender, ASA, and severe post-operative pain.

Post stratification chi-square test was applied to compare the frequency of severe pain between the

two groups. P value < 0.05 was considered significant.

Results

A total of 102 patients were included in the study. The mean age (years) of the patients was 40.40 ± 11.55 years.

	Saline Group (n=51)	Suction Group (n=51)	P value
Age (years)	40.92±10.58	39.88±12.54	0.653
Gender			
Male	15 (29.4%)	13 (25.5%)	0.816
Female	36 (70.6%)	38 (74.5%)	0.7
Weight (kg)	72.86±7.96	70.71±7.54	0.165
BMI (kg/m²)	26.67±4.56	25.09±4.47	0.180
ASA grade			
I	34 (66.7%)	37 (72.5%)	0.108
II	17 (33.3%)	14 (27.5%)	0.294

VAS pain score	Saline Group (n=51)	Suction Group (n=51)	P value
After 04 hours	6.5±21	5.9±21	0.101
After 08 hours	5.1±18	3.8±15	0.001
After 12 hours	3.9±16	2.7±11	0.003
After 24 hours	2.3±17	1.5±09	0.033

There were 28 (27.5%) male and 74 (72.5%) female patients enrolled in the study according to the inclusion criteria. Mean weight of the patients was 71.78 ± 7.48 kg. There were 71 (69.6%) patients with ASA grade-I, whereas 31 (30.3%) with grade-II.

Patients' characteristics in both groups are shown in Table I. Frequency of severe postoperative pain among both the groups was 33 (64.7%) and 14 (24.5%) respectively which was statistically significant (p-value <0.001). Postoperative pain scores in both groups are shown in Table II.

Discussion

For symptomatic cholelithiasis, laparoscopic cholecystectomy is regarded as the preferred course of treatment. When opposed to open surgery, the primary benefit of laparoscopic surgery is less pain following operation. Nonetheless, there is still a significant amount of postoperative pain that has not entirely subsided. After a laparoscopic cholecystectomy, pain is the main cause of extended hospital stays, which might raise morbidity.¹

On the day of the surgery, patients often experience severe pain and often require opioid analgesia post-surgery. There are several types of post-surgery pain that can arise after laparoscopic cholecystectomy. Parietal pain is caused by trocars entering the abdominal wall and is superficial. Patients can easily locate this type of pain. Visceral pain is the type of post-operative pain caused by intraperitoneum dissection and CO₂ insufflation. The abdominal wall distension leads to dull, diffuse, and difficult-to-detect pain. Referred shoulder tip pain after laparoscopic surgery is caused by the long-term elevation of diaphragms and residual gas in pneumoperitoneum.¹¹

Despite many advances in pain management, post-operative pain remains a serious problem for many patients, and in the majority of cases, patients request analgesics (up to 80%) after laparoscopic cholecystectomy. Pain intensity is high over the initial postoperative hours and gradually decreased over the following 48 to 72 hours.⁵

The demographic data was similar in both groups in this study. The mean age was 40.40 ± 11.55 years similar to a study conducted by Rashdan et al, where the mean age was 42.78 ± 13.53 years.¹ There were

13 (26%) males and 37 (74%) females' patients in the study. This finding was also similar to the results reported by Kim HC,² Salman JM,¹⁰ and Vijayarhavalu S.¹¹ However Saadati found that frequency and percentage of male and female patients were 4 (8%) and 46 (92%) respectively which is in difference with our findings. The reason may be the geographically difference in culture and dietary habits of the populations.⁵ In this study, the comparison of warm saline irrigation and negative gas suction was done in terms of frequency of severe postoperative pain in patients of laparoscopic cholecystectomy. The frequency of severe postoperative pain among both the groups was 33 (64.7%) and 14 (24.5%) respectively. These findings are in consistent with the results reported in Rajneesh K,³ Salman JM,¹⁰ and Vijayarhavalu S.¹¹ Warm saline irrigation and negative gas suction are two techniques used in laparoscopic cholecystectomy to reduce postoperative pain. Warm saline irrigation can help reduce postoperative pain by decreasing inflammation, while negative gas suction may aid in pain relief by removing residual gas. Both methods have shown benefits in pain management.¹² Studies suggest that warm saline irrigation can help in pain relief,¹³ while negative gas suction may not significantly affect pain levels.¹⁴ Additionally, dry mopping with gauze after laparoscopic cholecystectomy has shown benefits in terms of reduced postoperative pain and early discharge.¹⁵ Although warm saline irrigation offer pain relief but negative gas suction and dry mopping could be more advantageous in terms of reducing postoperative pain and promoting early recovery in patients undergoing laparoscopic cholecystectomy. Another point is that warm saline irrigation reduces intraperitoneal CO₂ concentrations, lowering postoperative pain after laparoscopic cholecystectomy, while negative gas suction may not directly address CO₂ levels.¹⁶ One of the disadvantages of this study was the limited sample size used as the study population. Further this is a single centered study; So, these

restrictions make it difficult to validate these results. The investigator proposes extending the duration of the monitoring period and the study population as guidelines for future studies.

Conclusion

There is a significant difference between warm saline irrigation versus negative gas suction in terms of frequency of pain relief. Negative gas suction showed better modality in reducing severe postoperative pain in patients of laparoscopic cholecystectomy. Hence, it helps in early pain relief which reduces the agony of the patients and shortens the post-operative hospital stay.

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