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Retaining the epigastric trocar, until rest all ports closed decreases post-operative shoulder pain in laparoscopic cholecystectomy patients

Leesa Misra[1], Navya Teja[2], Swastik Sourav Mishra[3], Manash Ranjan Sahoo[4]

[1]Associate Professor, Depatment of Obstetrics and Gynecology, SCB Medical College, Cuttack, [2,3]Senior Resident, [4]Professor and Head, Department of General Surgery, AIIMS, Bhubaneswar, Odisha, India

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ABSTRACT

Background: Laparoscopic cholecystectomy has become the mainstay of treatment for gallstone disease cases due to its lower morbidity and pain compared to open techniques. Unfortunately, the use of carbon dioxide to insufflate the abdomen is the main contributor to post-operative shoulder pain. **Aims and Objectives:** The aim of the study was to evaluate the effectiveness of retaining the epigastric port trocar in position until rest all ports closed after completion of lap cholecystectomy in decreasing the post-operative shoulder pain. **Materials and Methods:** A prospective, randomized, and clinical trial was done in AIIMS hospital, Bhubaneswar, on 102 patients who have undergone laparoscopic cholecystectomy. The patients were alternatively selected, one in the study group (52) and the other in the control group (50). For those patients in the study group, after the completion of the surgery, the epigastric port trocar is retained in position until the rest of all ports were closed. In the control group, all trocars were removed and port closure was done. The patients were evaluated for the next 24 h for post-operative shoulder pain. A numerical rating scale (NRS) was used to assess shoulder pain on patient arrival to the ward, at 4, 6, 12, and 24 h postoperatively. One hundred and two patients were included in the final data analysis. **Results:** NRS pain scores were significantly lower in the study group at 6, 12, and 24 h post-laparoscopic cholecystectomy compared to the control group with no additional requirement of IV analgesics. **Conclusion:** Retaining the epigastric trocar in position is an easy way that is beneficial in reducing post-operative shoulder pain post laparoscopic cholecystectomy surgery.

Key words: Laparoscopic cholecystectomy; Epigastric trocar; Shoulder pain; Post-operative pain

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INTRODUCTION

Laparoscopic cholecystectomy has become the mainstay of treatment for gallstone disease these days. The advantages include shorter hospital stays, early ambulation, and less morbidity and pain compared to open techniques.[1] However, some patients complain of post-operative right shoulder tip pain post-laparoscopic cholecystectomy. Studies mention around 31–80% incidence of shoulder tip pain post-laparoscopic cholecystectomy.[2] Various methods are being employed to decrease this post-operative shoulder tip pain. In our study, we evaluated the effect of retaining the epigastric trocar until rest all ports closed in significantly decreasing the incidence of shoulder tip pain in post-laparoscopic cholecystectomy patients.

Aims and objectives

Aim of the study is to evaluate the effectiveness of retaining the epigastric trocar in decreasing the incidence of postoperative shoulder pain in post laparoscopic cholecystectomy patients.

MATERIALS AND METHODS

This is a prospective, randomized, and clinical trial done in the Department of General Surgery, AIIMS

Address for Correspondence:
Manash Ranjan Sahoo, Professor and Head, Department of General Surgery, AIIMS, Bhubaneswar, Odisha, India.
Mobile: +91-9937025779. **E-mail:** surg_manash@aiimsbhubaneswar.edu.in

Bhubaneswar between the period of September 2021 and November 2022. Written informed consent was taken from the participating patients and the study protocol was approved by the ethics committee. All patients who were electively planned for laparoscopic cholecystectomy were included in this study. The patient exclusion criteria include all those patients who had drain insertion due to bile spillage intraoperatively, all those patients who had been on analgesics 1 day before the date of surgery, difficult laparoscopic cholecystectomy cases, those who took a duration of more than 2 h and those cases which got converted to open (Table 1).

A standard four trocar technique was followed in all these cases of laparoscopic cholecystectomy. Pneumoperitoneum was achieved with carbon dioxide (CO_2) insufflation through periumbilical trocar and was maintained at 14 mm hg during the entire surgical procedure.

The patients were alternatively selected as one in the study group (52) and the other in the control group (50). For those patients in the study group, after the completion of the surgery, the epigastric port trocar is retained in position until the rest of all ports were closed. In the control group, all trocars were removed and port closure was done.

The patients were evaluated for the next 24 h for post-operative shoulder pain. A numerical rating scale (NRS) was used to assess shoulder pain on patient arrival to the ward, at 4, 6, 12 (primary outcome), and 24 h postoperatively. One hundred and six patients were initially included in this trial, out of which bile spillage occurred in three patients and conversion to open occurred in one patient.so, 102 patients were involved in the final data analysis.

Table 1: Baseline characteristics

Baseline characteristics	Control (n=50)	Test (n=52)	P-value
Age	44.2±3.6	46±3.4	1.2
Male/Female	21/29	18/34	0.8
Iatrogenic GB perforation	0	0	0
Post ERCP	6	8	1.3
Conversion to open	0	0	0
Bail out procedures	1	2	0.75
Abandoned	0	0	0

NRS: Numerical rating scale

Table 2: Numerical rating scale at 6 h

NRS	Control (n=50)	Test (n=52)	P-value
0–3	12	26	0.03
4–6	28	13	0.02
7–10	10	11	0.1

NRS: Numerical rating scale

Table 3: Numerical rating scale at 12 h

NRS	Control (n=50)	Test (n=52)	P-value
0–3	15	30	0.03
4–6	24	9	0.03
7–10	11	13	0.13

NRS: Numerical rating scale

Table 4: Numerical rating scale at 24 h

NRS	Control (n=50)	Test (n=52)	P-value
0–3	20	36	0.02
4–6	28	10	0.03
7–10	12	6	0.12

NRS: Numerical rating scale

RESULTS

NRS pain scores were significantly lower in the majority of the patients allocated to the study group at the end of 24 h when compared to the control group (Table 4). Further, when NRS pain scores were compared at 6th hourly (Table 2), 12 hourly (Table 3), and 24 hourly (Table 4) from time of arrival to the post-operative ward (time 0), improvement in post-operative shoulder pain was significantly seen in patients allocated to the study group compared to the control group.

DISCUSSION

Laparoscopic cholecystectomy has become the gold standard treatment for patients with symptomatic gallstone disease these days. It is not only safe but successful in interrupting the progress of calculous disease of the biliary tract.[3] The advantages are shorter hospital stay, early ambulation, and less pain. However, some patients complain of shoulder tip pain post-laparoscopic cholecystectomy. This shoulder tip pain may turn more uncomfortable for the patient than the pain at incision sites.[4]

The pain pattern post-laparoscopic cholecystectomy is multifactorial. It is a combination of visceral pain (deep intra-abdominal pain), incisional pain (somatic pain), and shoulder pain (referred somatic pain). Visceral pain is the one that causes the most discomfort initial few hours after surgery.[5] Shoulder pain mostly becomes apparent on the day after surgery.[5,6]

The most commonly used gas for insufflation during laparoscopic cholecystectomy is CO_2.[4-8] The residual CO_2 left after laparoscopic surgery is known to irritate the phrenic nerve causing referred pain to the

right shoulder.[5-7] Various methods are employed to wash out the residual CO_2. These include pulmonary recruitment maneuver and intraperitoneal normal saline infusion, administration of gas drainages, and intraperitoneal application of local anesthetic agents and opioids.[4]

In our study, we have not used any of the above methods. After gall bladder extraction, the epigastric trocar is retained in its place until rest all ports are closed. This provides ample time for the residual CO_2 in the peritoneal cavity to get escaped, therefore decreasing the diaphragmatic irritation and leading to decreased post-operative shoulder tip pain. The standard four trocar technique is followed in all cases in this trial. Hence, periumbilical port closure (sheath closure and skin closure) along with closure of the rest two 5 mm ports gives us more than 5 min for the carbon-dioxide to get escaped through the epigastric port. Although shoulder tip pain is a problem encountered in the postoperative period of all laparoscopic surgeries, our study is limited to only laparoscopic cholecystectomy.

Limitations of the study

Although shoulder tip pain is a problem encountered in post-operative period of all laparoscopic surgeries, our study is limited to only laparoscopic cholecystectomy. Difficult laparoscopic cholecystectomy cases which has taken duration more than 2 hours & those laparoscopic cholecystectomy cases in which drain insertion was done were not included in the study.

CONCLUSION

Through our study, retaining the epigastric trocar for a little long time until rest all ports are closed is a simple and cost-effective method that is statistically significant in decreasing the incidence of the right shoulder tip pain in patients post-laparoscopic cholecystectomy.

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Authors' Contributions:
LM and MRS- Concept and design of the study and first draft of the manuscript; **NT and SSM-** Reviewed the literature and helped in the preparation of the manuscript.

Work attributed to:
AIIMS Bhubaneswar, Bhubaneswar, Odisha, India.

Orcid ID:
Dr. Leesa Misra - https://orcid.org/0000-0002-7133-9250
Dr. Navya Teja - https://orcid.org/0000-0001-9211-538X
Dr. Swastik Sourav Mishra - https://orcid.org/0000-0002-0482-2533
Dr. Manash Ranjan Sahoo - https://orcid.org/0000-0001-7275-0116

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