



# Assessing the Effectiveness of Two-Port vs. Three-Port Laparoscopic Cholecystectomy

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## KEYWORDS

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**Abstract: Background:** Traditionally, laparoscopic cholecystectomy (LC) involves the use of three or four ports of different sizes. Given the significance of cosmetic outcomes in LC, the current trend leans toward reducing the number of ports, ultimately leading to improved cosmetic results for patients. This study's objective was to assess and compare the efficacy of the three-port LC technique with the two-port LC technique, in order to determine if one approach offers any advantages over the other. **Material and methods:** This study was carried out within the Department of General Surgery. It was designed as a prospective comparative study. In Group A, an odd number of patients underwent surgery using the three-port technique, while in Group B, an even number of patients underwent surgery with the two-port technique. **Material and methods:** The study enrolled a total of fifty patients who were experiencing symptoms related to gallstone disease. Prior to participation, informed consent was obtained from each of these patients. All the surgical procedures were conducted while the patients were under general anesthesia. **Results:** Out of the total patients, 41 were female, and 9 were male. The average age of the patients was 38.67 years. Group A had a shorter operative time, whereas Group B experienced less postoperative pain. Additionally, Group B exhibited superior cosmetic outcomes, with patients expressing higher satisfaction regarding the appearance of their scars. **Conclusion:** Patients generally seemed to favor the two-port method, largely owing to the lower pain scores and overall comfort it offered.

## INTRODUCTION

Since its establishment in 1987 by Philip Mouret in Lyon, France, laparoscopic cholecystectomy (LC) has become the preferred surgical procedure for treating symptomatic gall bladder disease [1]. The advantages of LC include shorter hospital stays, swift recovery of physical function, lower incidence of postoperative discomfort, reduced morbidity and mortality rates, and favorable cosmetic outcomes [2]. Traditionally, LC has involved the use of four abdominal ports: one for the camera, two for tissue manipulation, and another for retraction [3]. However, as surgeons gained more experience, they refined LC techniques, leading to a reduction in port size [4]. Some practitioners have successfully employed three or even two trocars and miniaturized instruments for LC [4], [5], claiming that these approaches are equally efficient and result in less postoperative pain compared to the standard LC [6], [7]. International literature has reported the safety and feasibility of two-port LC. This study aims to compare the outcomes of two-port LC with those of three-port LC to determine whether the former offers any additional benefits.

## MATERIAL AND METHODS

This study was carried out within the Department of General Surgery. A total of fifty adult patients suffering from symptomatic cholelithiasis participated in the study after providing informed consent. The three-port technique was applied to an odd number of patients, forming Group A, while the two-port technique was utilized for an even number of patients, constituting Group B. Ethical approval was granted by the Institute Ethics Committee before the study commenced. The three-port technique involved using specific ports: one 10-mm umbilical port for the camera, one 10-mm operating port in the epigastrium, and one 5-mm port in the right hypochondrium for retraction at the gall bladder neck. Additionally, a suture was passed from the anterior axillary line to tie the fundus of the gall bladder. In the two-port technique, a 10-mm port was inserted in the umbilicus for the camera, and another 10-mm port was placed in the epigastrium for the surgical operation. For retracting the gall bladder fundus, a suture was threaded through the right hypochondrium along the anterior axillary line. Additionally, another suture



was

passed about 5 cm below the previous one in the anterior axillary line and tied to the neck of the gall bladder, providing lateral traction during dissection at Calot's triangle. To gauge postoperative pain, the Visual Analogue Scale was employed. This scale typically consists of a 100 mm line, with the endpoints clearly marked as "no pain" and "pain as bad as it could be." Patients were asked to mark the line at the point that represented their pain intensity, providing a quantitative measure of pain intensity. Cosmetic appearance was evaluated using the Hollander Wound Evaluation Scale, which encompasses six clinical aspects:

- 1) Step-off borders
- 2) Contour irregularities
- 3) Scar width
- 4) Edge inversion
- 5) Excess inflammation
- 6) Overall cosmetic appearance

Each of these elements was graded on a scale from 0 to 1, with the best achievable score being 6. Any score below 6 was considered suboptimal in terms of cosmetic outcome assessment.

## II. RESULTS

There were 41 female patients and 9 male patients. The mean patient age was 38.67 years (range 18-60 years). The mean follow-up time was 9.24 months (range 5-18 months). The mean operative time was 38.346 min for Group A and 41.243 min for Group B. No statistically significant difference in initiation of oral feeds between the two study groups. The mean hospital stay was 2 days for Group A and 1.862 days for Group B. The severity of postoperative pain in group A was mild in 8 patients (26.67%), moderate in 18 patients (60.00%) and severe in 4 patients (13.33%). As regards Group B, the severity of postoperative pain was mild in 20 patients (66.67%), moderate in 9 patients (30.00%) and severe in 1 patient (3.33%). Conversion to open surgery was not done for any group. No port-site hernia was observed in both groups. Cosmetic appearance and patient satisfaction for the scar were excellent in 20 patients (66.67%) and good in 10 patients (33.33%) in Group A, whereas in Group B, it was excellent in 27 patients (90.00%) and good in 3 patients (10.00%). Table 1 shows patient characteristics and follow-up results. The two-port method appeared to have better

acceptability among patients, judging by the lower pain score and better cosmesis.

## III. DISCUSSION

Traditional LC is performed using a four-port technique. [10], [11] Reducing the number and size of ports further enhanced the advantages of laparoscopic over open cholecystectomy. [4] These modifications actually reduced the pain and analgesia requirement. Poon et al. conducted a randomized study on 50 patients for comparison of three-port and two-port LC. They found that two-port LC involved less operative time, less port-site pain, similar clinical outcomes and fewer surgical scars. [5] The phenomenon of reduced pain due to reduced number and sizes of the ports has been established by researchers such as Cheah et al. and Bisgaard et al. [12], [13] The value of the lateral (fourth) trocar in the American technique used to hold the gall bladder fundus has been challenged. [14], [15] Recently published data showed that the two-port technique did not compromise the procedure's safety. In the new era of minimal access surgery, the preferred outcomes under consideration are not only safety, but also quality, which is often defined by pain and cosmetic results. Scarless surgery is the ultimate goal for both surgeons and patients. [17] Minimally invasive surgical techniques continue to evolve. Advancement in instrumentation has allowed more complex surgeries to be performed laparoscopically. [18] Two-port LC has shown a higher patient satisfaction score. [19] A randomized study evaluating postoperative pain in patients undergoing three- versus four-trocar cholecystectomy demonstrated less analgesic use in the three-trocar group. [16] A report on two-port LC has already shown that all patients would choose this technique over a four-port approach, as the postoperative pain is significantly reduced and the procedure outcome is cosmetically more acceptable to the patients. [20] Intra-abdominal spillage of gall bladder contents during LC is found in about 29% of cases and is associated with an increased risk of intra-abdominal abscess. [21] None of the patients in our study had any intra-abdominal abscess, even though bile spillage was seen in some of the cases. The reason for this may be the saline irrigation that was done in those cases. There were no reported complications at the needle puncture sites in the abdominal wall in any of the



patients undergoing two- port and two-thread LC, [22]similar to our findings. Two- port LC has been reported to be safe and feasible, but it is technically difficult even in expert hands because of the limited operative field. [17] However, whether it offers any additional advantages remains controversial. [5]

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#### CONFLICTS OF INTEREST

The authors declared no conflict of interest.

#### AUTHORS' CONTRIBUTIONS

All authors equally contributed to preparing this article.

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TABLE 1: Patient characteristics and operative results

Variables	Group A (four-port)	Group B (two-port)	Total	Test	Pvalue
Age					
Mean±SD	38.6±9.49	33.80±10.26	33.72±9.81	0.06	0.95(NS)
Minimum-maximum	18-50	18-50	18-50		
Sex[n(%)]					
Male	10(28.6)	11(31.4)	21(30.0)	0.07	0.79(NS)
Female	25(71.4)	24(68.6)	49(70.0)		
Follow-up(months) Mean±SD	12.97±4.68	13.40±4.84	13.18±4.73	0.37	0.70(NS)
Minimum-maximum	6-23	6-23	6-23		
Operative time(min) Mean±SD	36.28±9.80	39.14±11.78	37.71±10.85	1.1	0.27(NS)
Minimum-maximum	20-55	20-60	20-60		
Oral feeding(h) Mean±SD	12.11±4.67	12.40±5.01	12.25±4.81	0.24	0.80(NS)
Minimum-maximum	6-24	5-24	5-24		
Hospital stay(days) Mean±SD	2.0±0.60	1.71±0.54	1.85±0.59	2.07	0.042*
Minimum-maximum	1-3	1-3	1-3		
Postoperative pain[n(%)]					
Mild	8(31.4)	20(62.9)	28(47.1)	7.91	0.019*
Moderate	18(54.3)	9(34.3)	27(44.3)		
Severe	4(14.3)	1(2.9)	5(8.6)		