# EFFICACY OF LAPAROSCOPIC CHOLECYSTECTOMY BY 3 PORTS VERSUS 4 PORT TECHNIQUE AND TO EVALUATE THEIR USEFULNESS IN TERMS OF INTRAOPERATIVE AND POST-OPERATIVE CLINICAL OUTCOMES

**AUTHORS-** KUMAR AISHWARYA, SHADAB ASIF, MUSHTAQ ALI, HEENA

**AFFILIATION-** DEPARTMENT OF SURGERY, ERA'S LUCKNOW MEDICAL COLLEGE AND HOSPITAL, LUCKNOW

**CORRESPONDING AUTHOR:** HEENA

Resident**,**Department Of Surgery, Era's Lucknow Medical College And Hospital, Lucknow-226003

Email- kumaraishwarya19@gmail.com

## ABSTRACT

**Introduction-** Performing laparoscopic cholecystectomy is not always an easy task. Surgeons do face difficulties while performing laparoscopic procedures. To overcome the challenges faced by the surgeons and minimize the intraoperative and post-operative complications several technological innovations and advancements in the technique and procedure of laparoscopic cholecystectomy have taken place since its emergence.

**Methodology-** The present prospective observational study included 80 patients. As per SNOSE method, they were further divided into GROUP-I (n=40): Patients who underwent three-port laparoscopic cholecystectomy and GROUP-II (n=40): Patients who underwent four-port laparoscopic cholecystectomy. The intra and post-operative parameters were recorded and compared.

**Results-** Amongst the total 80 patients, the mean age was 45.79±13.97 years. In both the groups, the majority of patients were female. Adhesions were the most common complication seen intraoperatively. Infection at the port site was seen in 2 (5%) of Group-I and 3 (7.5%) of Group-II patients. None of the patients had VAS score >5 after 24 hours in either of the two groups. These clinical findings were comparable in both groups and showed no significant differences.

**Conclusion-** Both three-port and four-port laparoscopic cholecystectomy were shown to be safe and technically adaptive, with few serious problems. The surgeon should make the decision to do a three-port or four-port procedure should make the decision to do a three-port or four-port procedure, as neither appears to impact the surgical course or outcome.

**KEYWORDS-** Laparoscopic Cholecystectomy, 3 Ports Versus 4 Port Technique, Gall Stone Disease.

## INTRODUCTION

Rapid growths in health care technology have given the surgeon the power to treat diseases surgically and limit surgical invasiveness. Mouret in 1987 performed the first laparoscopic cholecystectomy changing surgical practice [1], and an increase in the frequency of laparoscopic abdominal surgery made it common by 1990[2]. It has now become the gold standard procedure for surgery of benign Gall Bladder disease today because of benefits offered by it, viz. smaller incision, less intraoperative blood loss, reduced post-operative pain, early recovery, short hospital stays and better cosmetic results [3]. Besides these advantages, complications are by far very rare [4]. Despite this beneficent picture of laparoscopic cholecystectomy, it remains a technically more demanding procedure, requiring a higher level of surgical skill and decision-making because of lesser areas under vision, accessibility and special instrumentation. Performing laparoscopic cholecystectomy is not always an easy task. Surgeons do face difficulties while performing laparoscopic procedures.

In order to overcome the difficulties faced by the surgeons and to minimize the intraoperative and post-operative complications, a number of technological innovations and advancements in the technique and procedure of laparoscopic cholecystectomy have taken place since its emergence. Traditionally, the laparoscopic procedure is performed using four trocars. The utility of the fourth trocar is stated to provide the grasp to the fundus of the gallbladder to expose Calot's triangle. However, in recent years and with growing exposure to laparoscopic cholecystectomy, the essentiality of the fourth port has often been debated. Several surgeons now consider that the fourth trocar is redundant and propose that the laparoscopic cholecystectomy can be performed effectively without loss of any efficiency even after discarding the fourth trocar. These surgeons argue that the use of fourth-port for placement of an additional but redundant port places the patient at a higher risk of pain, infection, and other complications. From the point of view of pain reduction, vulnerability to infection, and early healing, reducing the size of ports or eliminating a port seems to be a practical choice by the proponents [5].

Taking cue from these propositions, various advancements to reduce the trocar size [6] or reduction in a number of ports from four to two or three have been developed and clinically utilized by various workers. Among these advancements, a three-port laparoscopic cholecystectomy technique has been effectively used in clinical practice for nearly three decades [7].

However, traditional surgeons with a conservative approach still argue that eliminating a fourth port may pose intraoperative difficulties, prolong the operative procedure, and result in post-operative complications. However, a number of recent studies report that three-port laparoscopic cholecystectomy minimizes post-operative pain, fewer surgical scars and lesser risk of post-operative infection while at the same time assuring similar intraoperative and post-operative clinical outcomes [8]. However, some studies still say that 3-port LC patients require a longer post-operative hospital stay and may be exposed to a higher risk of intraoperative and post-operative complications [9]. Some other studies admit that three-port LC is as effective as 4-port LC, yet they highlighted the need for an experienced surgeon to achieve these outcomes.[10] Thus, the debate regarding the supremacy of three-port versus four-port LC still continues.

Hence, the present study was undertaken to compare the efficacy of laparoscopic cholecystectomy by 3 ports versus 4 port technique and to evaluate their usefulness in terms of intraoperative and post-operative clinical outcomes.

## MATERIAL AND METHOD

The present Prospective Observational Study was carried out at the Department of General Surgery, Era's Lucknow Medical College, Lucknow, during 2019-2021. After obtaining approval from the Institutional Ethical Committee (ELMC & H/ R.Cell/EC/2020/73), total of 80 patients of age >18 years with symptomatic/asymptomatic gall stone disease (acute & chronic cholecystitis) and patients presenting with acalculous cholecystitis were included. However, cholelithiasis patients with Choledocholithiasis, carcinoma of the gall bladder, complicated gall bladder, and previous abdominal surgeries were excluded.

The patients were randomized into two groups by SNOSE method, **GROUP-I (n=40):** Patients who underwent three-port laparoscopic cholecystectomy and **GROUP-II (n=40):** Patients who underwent four-port laparoscopic cholecystectomy. Informed consent was obtained from all the patients after explaining all the procedures involved in the surgery. At enrolment, demographic details like age and sex were noted. Height and weight of patients were measured,

and body mass index was calculated. Details regarding prior medical and surgical history were noted. All the patients were enquired regarding presenting complaints followed by complete haematological, biochemical, immune and urinary evaluation. Chest X-ray of all the patients was obtained. All the patients were then subjected to USG whole abdomen assessment. The findings were noted.

Subsequent to demographic, clinical, laboratory, and radiological evaluation, all the patients underwent laparoscopic cholecystectomy as per technique specific to that group (3-port or 4-port). Prior to surgery, each patient was screened in the pre-anesthetic clinic. Length of procedure was noted. It was calculated from initiation of skin incision to the completion of skin closure

Intraoperative findings like adhesion to the gall bladder region, bile duct injury, visceral injury, extrahepatic biliary channel injury and bleeding were noted. Conversion to an open procedure or to 4-port procedure (in 3-port group) was also noted.

Post-operative pain was assessed using 10-point VAS score. Maximum VAS score during the 24-hour period was noted. All the patients who did not develop any complications and who completed laparoscopic cholecystectomy without conversion were discharged from the hospital after 48 hours. Post-operative complications like infection, hematoma formation or wound dehiscence were noted up to $7^{th}$ post-operative day. Time taken to resume all routine functions was noted as the time taken to return to work. Post-operative persistence of symptoms pain abdomen, diarrhoea, nausea and vomiting were recorded as a post-cholecystectomy syndrome (PCS). Incidence of PCS till $7^{th}$ post-operative day was recorded.

### Data Analysis

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 21.0 or above statistical analysis software. The values have been represented in Number (%) and Mean±SD. Chi-square and independent samples t-test were used for the analysis of data. ‘p’ value less than 0.05 was taken as significant.

## RESULTS

Out of a total of 80 patients enrolled in the study, a total of 40 (50%) underwent laparoscopic cholecystectomy using three-port technique and comprised the Group-I of the study whereas the remaining 40 (50%) patients underwent laparoscopic cholecystectomy using four-port technique and comprised the Group-II of the study.

Age of patients ranged from 20 to 70 years. Though the mean age of patients in Group-I was higher than that in Group-II, this difference was not significant statistically (p=0.108) [Table-1]. Overall, there were 25 (31.3%) males and 55 (68.8%) females [Table-1]. Majority of patients in the study were in the normal weight BMI category (18.5-24.9 $kg/m^2$) (52.5%). There were 38 (47.5%) patients in overweight (BMI 25.0-29.9 $kg/m^2$) category. Body mass index of the patients ranged from 20.6 to 29.8 $kg/m^2$ . On statistical evaluation, the difference in mean BMI of patients in the two groups was not found to be significant (p=0.083) [Table-1]. Pain abdomen was the most common presenting complaint recorded in all the patients in both group. In Group-I, nausea was the other most common presenting complaint (72.5%) followed by vomiting (67.5%), fever (20%), jaundice (15%) and diarrhoea (12.5%), respectively. On the other hand, in Group-II too, nausea was the most common presenting complaint (65%) followed by vomiting (55%), jaundice (27.5%), diarrhoea (20%) and fever (12.5%) respectively. On evaluating the data statistically, the difference between the two groups was not significant (p>0.05) [Table-2]. Mean duration of complaints in Groups 1 and 2 was 2.16±1.42 and 2.65±1.38 weeks. Statistically, there was no significant difference between the two groups regarding the duration of complaints (p=0.124). Medical history of diabetes, hypertension, respiratory disease and thyroid disorder was positive in 5%, 5%, 0% and 17.5% patients respectively in Group-I as compared to 17.5%, 17.5%, 5% and 15% respectively in Group-II. Statistically, there was no significant difference between the two groups regarding history of medical illnesses as well as personal habits (p>0.05) [Table-2].

On general examination, pallor, icterus, cyanosis, clubbing, lymphadenopathy and edema were seen in 80%, 22.5%, 10%, 7.5%, 10% and 10% respectively in Group-I and 82.5%, 30%, 2.5%, 12.5%, 5% and 7.5% respectively in Group-II. Statistically, there was no significant difference between two groups with respect to general examination findings (p>0.05) [Table-3]. Mean haemoglobin, polymorph, monocyte and eosinophil levels were higher in Group-I as compared to that in Group-II while mean lymphocyte, prothrombin time, and INR were higher in Group-II as compared to that in Group-I. However, on comparing the data statistically, the difference between two groups was not found to be significant statistically (p>0.05). Mean serum bilirubin and serum albumin levels were higher in Group-II as compared to that in Group-I, whereas mean SGPT, SGOT, S. Alkaline phosphatase, blood urea and serum creatinine levels were higher in Group-I as compared to that in Group-II; however, for none of the biochemical levels, the difference between two groups was significant (p>0.05) [Figure-1].

**Systemic Examination findings**

No other abnormality on systemic examination (per abdomen, cardiovascular, respiratory or neurological) was seen in any patient in either of the two groups [Table-2 & 3].

**Other Investigations**

All the patients had random blood sugar levels <200 mg/dl. Normal Chest x-ray and ECG findings. All the patients were negative for HIV, HCV and HBV.

On USG, in Group-I, multiple stones, distended gall bladder, contracted gall bladder, peripancreatic fluid, and thick gall bladder wall were showed statistically insignificant ($p>0.05$) [Table-3]. Adhesions were the most common complication seen intraoperatively. It was encountered in a total of 9 (22.5%) of Group-I and 8 (20%) of Group-II cases ($p=0.785$). In both the groups, 1 (2.5%) patient each required conversion to open procedure. CBD injury also occurred in 1 (2.5%) case each in both the groups. There was no case of visceral or extrahepatic biliary channel injury. Bleeding occurred in 1 (2.5%) cases each in both the groups. Statistically, there was no significant difference between the two groups regarding complications ($p>0.05$) [Table-3]. Statistically, there was no significant difference between the two groups regarding the duration of surgery ($p=0.199$) [Table-3]. Majority of patients in both the groups experienced mild pain. In Group-I, no pain, mild pain, moderate pain, and severe pain were experienced by 10%, 72.5%, 15%, and 2.5% patients compared to 12.5%, 75%, 10%, and 2.5% patients in Group-II. Statistically, there was no significant difference between the two groups regarding post-operative pain [Table-4, Figure-2]. Time taken for resumption of routine work was 4.00±2.75 days in Group-I and 3.98±2.58 days in Group-II. Statistically, there was no significant difference between the two groups concerning the time taken for resumption of routine work ($p=0.967$). Infection at the port site was seen in 2 (5%) of Group-I and 3 (7.5%) of Group-II patients. Statistically, there was no significant difference between the two groups regarding infection at the port site ($p=0.644$). None of the patients had VAS score >5 after 24 hours in either of two groups. None of the patients had any positive culture during the evaluation period. Post-cholecystectomy syndrome (PCS) within 7 days after the surgery was seen in 3 (7.5%) of Group-I and 2 (5%) of Group-II. The difference between the two groups was not significant statistically ($p=0.644$) [Table-3, Figure-2].

## DISCUSSION

The present study was an attempt to compare the three-port and four-port laparoscopic cholecystectomy in terms of operative time, intraoperative and post-operative complications, post-operative pain and time to return to work.

We included 80 non-obese patients aged 20-70 years with a mean age of 45.79±13.97 years. Majority of patients in the present study were females (68.8%), and almost half (47.5%) were overweight. The age profile of patients in the present study was similar to that reported by Ghalige *et al.* [11] who included patients in the age range 21 to 70 years and reported the mean age of patients as 43.77 years. Similar to the present study, they also dominated female patients (69.6%). In another study, Tariq *et al.* [12] reported the mean age of patients in two study groups as 44.42 and 44.22 years and the proportion of females as 78.4%. The high prevalence of women and that of middle-aged patients in different studies could primarily be attributed to the high prevalence of gall stone disease[13]. Moreover, this disease has also been shown to be dependent on age, with a higher incidence in those aged 40 years or above [14]. A slightly higher mean age of patients was reported by Akay *et al.* [9] in their study, who reported the mean age of patients to be 50.87 and 51.49 years in two study groups. However, they also reported a dominance of females (81.5%).

The operating time in the present study was 36.38±11.77 minutes in the three-port group compared to 40.00±13.21 minutes in the four-port group. Statistically, there was no significant difference between the two groups regarding the duration of surgery. Most of the previous studies similar to the present study have reported mean duration of surgery within 35 to 45 minutes range in both three-port as well as four-port groups and did not find the difference in operative time [15-16]. The findings in the present study are close to the observation made by Shah *et al.* [17], who also observed the mean operative time in three-port group to be slightly shorter (36 minutes) as compared to that in four-port group (39 minutes) but did not find the difference to be significant. On the other hand, Mohamed and Zaazou[15] reported the operative time in three port group to be slightly longer (43.3 min) as compared to that in four-port group (40.2%), but they also did not find it to be significant statistically as in the present study. However, the duration of the procedure was reported to be much longer in both the groups by Wilkinson *et al.* [18] in their study who reported it to be 74.45 min in four-port and 66.90 min in three-port group, thus despite reporting a longer duration in both the groups they found it to be significantly shorter in three-port as compared to four-port group. Ghalige *et al.* [11] though

reported the mean operative time to be >45 minutes in both the groups (45.65 minutes in three-port and 47.28 minutes in four-port group) but similar to the present study, did not find a significant difference between the two groups. Contrary to these reports that have reported longer operative time in four-port as compared to three-port, Akay *et al.* [9] in their study reported the mean operating time to be 61.18 minutes in three-port and 58.82 minutes in four-port group, thus showing it to be longer in three-port as compared to that in four-port group. However, they also did not find a significant difference between two groups. Some other workers have reported the difference in operating time to be much higher. In their study, Tariq et al. [12] reported the mean operating time in the 3-port group to be shorter by almost 15 minutes compared to that in the 4-port group. Though the time for one trocar placement is saved in 3-port as compared to 4-port procedure yet, it 3-port procedure accompanies slight difficulty as there is no grasp to the fundus of the gallbladder and Calot's triangle exposure is compromised. That is why some 3-port cases have to be converted to 4-port [15,19]. As far as the present study is concerned, the operative procedure was supervised by skilled and experienced surgeons who did not face any such difficulty either for 3- or 4-port procedures, and that is why the operating time in the two groups did not vary significantly.

With respect to intraoperative complications, in the present study adhesions were the most common complications. Similar to the findings of the present study, Mohamed and Zaazou [15] also reported adhesions as the most common intraoperative complications seen in 13 (28.9%) of three-port and 11 (22.4%) of four-port groups. In their study too, conversion to open procedure or four-port technique was seen in 3 (6.7%) of three-port and conversion to open procedure in 2 (4.1%) of four-port group patients. Similar to the present study, in their study too, only 1 patient in each group had bleeding. Though the proportion of patients showing bile spillage was much higher in their study (13.3% in three-port and 10.2% in four-port group), overall, there was no significant difference between the two groups regarding intraoperative complications as also observed in the present study. As far as conversion to open procedure is concerned, it is a very rare occurrence, and some studies have even not reported any conversion in either of two groups [20] or in <5% of cases in both the groups [17].

A much higher occurrence of adhesions during the surgery was reported by Ghalige *et al.* [11] in their study, who witnessed them in 37% of 3-port and 32.6% of 4-port group patients but did not find a significant difference between the two groups. However, intraoperative bleeding found non-significant differences. Though they also reported a higher bile-spillage rate in the

3-port (26.1%) compared to the 4-port group (15.2%), they did not find a significant difference between two groups for intraoperative complications similar to the present study.

With respect to type of intraoperative complications too, different studies observe them in different manner. In the study by Akay *et al.* [9], the reported intraoperative complications were gall bladder perforation, stone spillage, bleeder from liver layer and coledoc injury in 5.5%, 3%, 5.5% and 3% of 3-port as compared to 3%, 2.5%, 4% and 2% patients respectively in the 4-port group. However, they also did not report a significant difference between the two groups for any of these intraoperative complications. In the present study, we also did not notice the difference between the two groups to be significant.

In the present study, we did not find a significant difference in post-operative pain between the two groups. However, many previous studies have reported the post-operative pain to be significantly lower in the three-port compared to the four-port group [15-16]. In the study by Shah *et al.* [17] reported mean post-operative VAS scores for pain to be 4.16 and 6.24 in three-port and four-port groups and found the pain scores to be significantly lower in three-port as compared to the four-port group. In the present study, however, we found the proportion of those with moderate to severe pain (VAS score 4 or above) to be slightly higher in three port (17.5%) as compared to that in four-port group (12.5%) but did not find this difference to be significant. In their study Ghalige *et al* [11] too did not observe a significant difference in VAS scores for pain between two groups till 6 hours post-operative interval. However, they found a slight but statistically significant difference in pain scores at 24 hours with mean scores being higher in four-port (2.61) as compared to that in three-port (2.26). In the present study, we assessed only the highest VAS score during the first 24-hours as the representative of post-operative pain intensity and did not find a significant difference between the two groups.

In the present study, infection at the wound site was seen in 5% of three-port and 7.5% of four-port group patients, and the difference between the two groups was not significant statistically. No case of wound hematoma or any other wound site complication was seen in either of the two groups. These findings are in agreement with the observations made by Ghalige *et al.* [11], who observed hematoma and wound infection in 1 (2.2%) patients each in the three-port group as compared to 6.5% and 0% in the four-port group and did not find it to be statistically significant. Mohamed and Zaazou[15] also made a similar observation of wound infection in 1 patient each in both the groups and wound hematoma in 1 patient of three-port and 2 patients of four-port group and did not find the difference between the two groups to be significant.

In our study, meantime for return to routine work was almost similar in both the groups. Shah *et al.* [17] reported an early return to work in three-port group as compared to the four-port group. Considering the fact, that the post-operative pain and complications were similar in two groups, the early return to work owing to elimination of one port only does not seem to be detrimental. In the present study, we discharged all the patients within 48 hours of procedure. However, there are some studies that have reported a longer hospital stay. Similar to the present study, Bari *et al.* [20] too discharged all the patients at 48 hours. They also did not show a significant difference between two groups with respect to time taken to return to normal work. In their study, Wilkinson et al. [18] reported the duration of hospital stay to be 4.66 and 5.30 days respectively in three- and four-port groups and found it to be significantly higher in four-port compared to three-port group. In their study, Ghalige *et al.* [11] also reported the post-operative hospital stay duration to be 48.78 hours in 3-port and 53.48 hours in 4-port group and time taken for resumption of work was 5.93 and 6.30 days respectively in 3- and 4-ports groups. For both duration of hospital stays and time taken for return to work the difference between two groups was not significant. In our study too, all the patients who did not require conversion to open procedure were discharged from the hospital within 48 hours and the outcome was focused on time to return to normal routine. Akay *et al.* [9] in their study found the post-operative stay in hospital to be significantly longer in 3-port as compared to that in 4-port group.

The findings of the present study, in general, were in agreement with a previous study carried out by Pandey *et al.* [14] who also did not find a significant difference between three-port and four-port LC groups concerning operating time, intraoperative complications, post-operative pain, post-operative infection and return to work/hospital stay. Eroler *et al.* [19] too made similar observations and found both the groups comparable for intraoperative as well as post-operative outcomes. Koirala *et al.* [21] also found the two groups comparable for all the intraoperative and post-operative outcomes studied.

The present study's findings indicate that in experienced hands, both the procedure is comparable and do not reflect any difference in intraoperative and post-operative outcomes [22]. Eroler *et al.* [19] also emphasized the need of experienced hand to obtain better clinical outcome in 3-port as compared to 4-port technique.

In another study, Kumar and Rana [23] also found that except for post-operative pain and time taken for recovery, for all the other outcomes the two groups were similar. A number of other

workers also reported similar outcomes [17,23]. In the present study, we compared the maximum VAS score for pain as the representative value and did not find a significant difference between two groups concerning pain. Unfortunately, there are some overenthusiastic attempts to prove three-port technique to be better. In one such study, Chauhan *et al.* [24] reported wound infection rate to be significantly higher in four-port compared to that in the 3-port group, yet on our re-evaluation, we did not find it significant. They also reported the mean VAS scores for pain to be significantly lower in 3-port as compared to 4-port group. However, on our re-evaluation we found these differences to be non-significant.

A recent meta-analysis of 17 studies that included a total of 2524 LC patients also reports that "in an elective setting with uncomplicated cholelithiasis as an indication for cholecystectomy, three-port laparoscopic cholecystectomy is comparable with the four-port technique in terms of procedural and morbidity outcomes and may be associated with less post-operative pain, shorter length of hospital stays and shorter time to return to normal activities" [25]. The findings of the present study also endorse their confirmatory finding that three-port laparoscopic cholecystectomy is comparable with the four-port technique in terms of procedural and morbidity outcomes but do not support that it "may be associated with less post-operative pain, shorter length of hospital stay and shorter time to return to normal activities". A similar view was also expressed by Mirza *et al.* [26], and Koirala e*t al.* [21] in their studies also did not find a significant difference between 3-port and 4-port LC groups for all the parameters studied by them.

The findings of the present study thus highlight and try to resolve the debate regarding the supremacy of three-port over four-port laparoscopic cholecystectomy or vice versa and infer that in the expert hands, both the techniques are comparable and it should be left on the surgeon's choice to select the method preferred by them. Further studies to explore the findings of the present study are also recommended.

## CONCLUSION

The present study's findings showed that both three-port and four-port laparoscopic cholecystectomy were safe and technically adaptable and did not pose much significant complications. There was no significant difference between the two groups. The decision to choose the type of procedure (three-port or four-port) should depend on the surgeon's choice as they do not seem to affect the surgical course or outcome.

## REFERENCE

1. McSherry CK. Open Cholecystectomy. Am J Surg 1993; 165: 435-39.
2. Duron JJ, Hay JM, Msika S, Gaschard D, Domergue J, Gainant A, Fingerhut A. Prevalence and mechanisms of small intestinal obstruction following laparoscopic abdominal surgery: A retrospective multicentre study. Arch Surg 2000; 135: 208-12.
3. Shukla A, Seth S, Ranjan A. A comparative study between laparoscopic and open cholecystectomy in cases of cholecystitis with cholelithiasis: one year experience in tertiary care center. Int Surg J. 2017 Mar;4(3):903-907.
4. Talpur KAH, Malik AM, Sangrasi AK, Memon AI, Leghari AZ, Qureshi JN. Comparative study of conventional open versus laparoscopic cholecystectomy for symptomatic cholelithiasis. Pak J Med Sci 2011;27(1):33-37.
5. Poon CM, Chan KW, Lee DW, et al. Two-port versus four-port laparoscopic cholecystectomy. Surg Endosc. 2003; 17 (10): 1624–1627
6. Leggett PL, Bissell CD, Churchman-Winn R, Ahn C. Three-port microlaparoscopic cholecystectomy in 159 patients. Surg Endosc. 2001; 15 (3): 293–296
7. Slim K, Pezet D, Stencl J, Jr., et al. Laparoscopic cholecystectomy: an original three-trocar technique. World J Surg. 1995; 19 (3): 394–397
8. Mohamed AE, Zaazou MM. Three-port versus conventional four-port laparoscopic cholecystectomy: a comparative study. Egypt J Surg 2020; 39:119-23
9. Akay T, Orun S, Leblebici M. Three-port versus standard four-port laparoscopic cholecystectomy: A clinical trial. Laparosc Endosc Surg Sci 2019;26(4):175-180.
10. Sharma PK, Mehta KS. Three Port Versus Standard Four Port Laparoscopic Cholecystectomy- A Prospective Study. JK Science 2015; 17(1): 38-42.
11. Ghalige HS, Siddaraju HS, Satyanarayan V. Three Port versus Conventional Four Port Laparoscopic Cholecystectomy: Comparative Study', International Journal of Current Medical and Pharmaceutical Research, 2020; 06(01): 4915-4922.
12. Tariq M, Hafeez M, Fatima F, Khalid U, Ateeque S, Zainab A, Zainab M. Three-port versus four-port laparoscopic cholecystectomy a two years experience at two armed forces tertiary care hospitals. Pak Armed Forces Med J 2020; 70 (2): 402-08.
13. Barbara L, Sama C, Morselli-Labate AM, Taroni F, Rusticali AG, Festi D, et al. A population study on the prevalence of gallstone disease: the Sirmione study. Hepatology 1987;7:913-9.

14. Pandey MC, Mishra SP, Nagar HS, Rawat HS, Shrivastava RK. Three port versus four port cholecystectomy- a retrospective descriptive study. J. Evolution Med. Dent. Sci. 2018;7(10):1178-1181.
15. Mohamed AE, Zaazou MM. Three-port versus conventional four-port laparoscopic cholecystectomy: a comparative study. Egypt J Surg 2020; 39:119-23
16. Kumar A, Kumar D, Gupta P, Shakya JPS. Three port versus four port laparoscopic cholecystectomy: a comparative study. Indian J Appl Res 2018; 8(10):18–20.
17. Shah SF, Waqar SH, Chaudry MA, Hameed S. Three ports versus four ports laparoscopic cholecystectomy. RMJ 2017; 42(3):359–362.
18. Wilkinson T, Mehrotra P, Y. Bansod P, Murtaza A. Three port versus four port laparoscopic cholecystectomy- a prospective study. Int J Med Res Rev [Internet]. 2017;5(3):235-41.
19. Eroler E, Dilektasli E, Tihan D, Duman U, Bayam EM, Erol FM et al. Reducing one port in laparoscopic cholecystectomy: does that really make a diference? Int J Clin Exp Med 2016; 9(6):11558–11565.
20. Bari SU, Islam FU, Rather AA, Malik AA. Three port versus four port laparoscopic cholecystectomy: A prospective comparative clinical study. Int J Res Med Sci. 2019;7(8):3054-59.
21. Koirala R, Gurung T, Rajbhandari A, Rai P. Three-port versus four-port laparoscopic cholecystectomy: a randomized controlled trial. Nepal Med Coll J 2019; 21(1):40–43.
22. Sharma PK, Mehta KS. Three Port Versus Standard Four Port Laparoscopic Cholecystectomy- A Prospective Study. JK Science 2015; 17(1): 38-42.
23. Kumar P, Rana AKS. Three-port versus four-port laparoscopic cholecystectomy: a comparative study at a tertiary care centre in North India. Int Surg J 2018;5:426-32.
24. Chauhan H, Kothiya J, Savsaviya J. Three ports versus four port laparoscopic cholecystectomy: a prospective comparative clinical study. Int Surg J 2020;7:3666-9.
25. Hajibandeh S, Finch DA, Mohamedahmed AYY, Iskandar A, Venkatesan G, Hajibandeh S, Satyadas T. Meta-analysis and trial sequential analysis of three-port vs four-port laparoscopic cholecystectomy (level 1 evidence). Updates in Surgery, 2021; 73(2), 451–471.
26. Mirza AA, Asif M, Sukh N, Saeed A, Jamil K, Zaidi AH. Outcome of three ports versus four ports laparoscopic cholecystectomy in terms of mean operative time, hospital stay and pain. Ann Pak Inst Med Sci 2017; 13(2):169–172.

## TABLE & FIGURE

**Table 1: Demographical distribution of cases in two groups.**

| SN | Age Group | Group-I (n=40) | | Group-II (n=40) | | Total (n=80) | | P-Value |
|---|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | No. | % | |
| AGE DISTRIBUTION | Mean age±SD (Range) in years | 43.28±15.01 (24-70) | | 48.30±12.54 (20-69) | | 45.79±13.97 (20-70) | | t=1.625; p=0.108 |
| | ≤30 Years | 13 | 32.5 | 3 | 7.5 | 16 | 20.0 | |
| | 31-40 Years | 7 | 17.5 | 8 | 20.0 | 15 | 18.8 | |
| | 41-50 Years | 6 | 15.0 | 11 | 27.5 | 17 | 21.3 | |
| | 51-60 Years | 7 | 17.5 | 10 | 25.0 | 17 | 21.3 | |
| | >60 Years | 7 | 17.5 | 8 | 20.0 | 15 | 18.8 | |
| SEX | Male | 11 | 27.5 | 14 | 35.0 | 25 | 31.3 | $\chi^2$=0.524; p=0.469 |
| | Female | 29 | 72.5 | 26 | 65.0 | 55 | 68.8 | |
| BMI ($Kg/m^2$) | Mean BMI±SD (Range) | 24.88±1.81 (22.2-29.3) | | 25.72±2.42 (20.6-29.8) | | 25.30±2.17 (20.6-29.8) | | t=1.758; p=0.083 |
| | Normal (18.5-24.9) | 24 | 60.0 | 18 | 45.0 | 42 | 52.5 | |
| | Over Weight (25.0-29.9) | 16 | 40.0 | 22 | 55.0 | 38 | 47.5 | |

**Table 2: Comparison of two groups for presenting and duration of complaints, medical history, surgical history and personal history**

| VARIABLE | Group-I (n=40) | | Group-II (n=40) | | Statistical significance | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | $\chi^2$ | p |
| **Pain abdomen** | 40 | 100 | 40 | 100 | 0 | 1 |
| **Vomiting** | 27 | 67.5 | 22 | 55.0 | 1.317 | 0.251 |
| **Nausea** | 29 | 72.5 | 26 | 65.0 | 0.524 | 0.469 |
| **Diarrhea** | 5 | 12.5 | 8 | 20.0 | 0.927 | 0.363 |
| **Fever** | 8 | 20.0 | 5 | 12.5 | 0.827 | 0.363 |
| **Jaundice** | 6 | 15.0 | 11 | 27.5 | 1.867 | 0.172 |
| **Mean duration of complaints ±SD in weeks** | 2.16±1.42 | | 2.65±1.38 | | t=1.555; p=0.124 | |
| **Diabetes** | 2 | 5.0 | 7 | 17.5 | 3.130 | 0.077 |
| **Hypertension** | 2 | 5.0 | 7 | 17.5 | 3.130 | 0.077 |
| **Respiratory disease** | 4 | 10.0 | 2 | 5.0 | 0.721 | 0.396 |
| **Thyroid disorder** | 7 | 17.5 | 6 | 15.0 | 0.092 | 0.762 |
| **Surgical history** | 6 | 15.0 | 6 | 15.0 | 0.000 | 1.000 |
| **Smoking/ tobacco use** | 7 | 17.5 | 9 | 22.5 | 0.313 | 0.578 |
| **Alcohol use** | 3 | 7.5 | 5 | 12.5 | 0.556 | 0.456 |

**Table 3: Comparison between two groups for USG, General examination, Intraoperative and post-operative findings.**

| FINDINGS | | Group-I (n=40) | | Group-II (n=40) | | Statistical significance | |
|---|---|---|---|---|---|---|---|
| | | No. | % | No. | % | $\chi^2$ | P |
| USG | Multiple stones | 3 | 7.5 | 1 | 2.5 | 1.053 | 0.305 |
| | Distended Gall bladder | 0 | 0 | 2 | 5.0 | 2.051 | 0.152 |
| | Contracted gall bladder | 4 | 10.0 | 2 | 4.0 | 0.721 | 0.396 |
| | Peripancreatic fluid | 5 | 12.5 | 4 | 10.0 | 0.125 | 0.723 |
| | Thick GB wall | 3 | 7.5 | 1 | 2.5 | 1.053 | 0.305 |
| GENERAL EXAMINATION | Pallor | 32 | 80.0 | 33 | 82.5 | 0.082 | 0.775 |
| | Icterus | 9 | 22.5 | 12 | 30.0 | 0.581 | 0.446 |
| | Cyanosis | 4 | 10.0 | 1 | 2.5 | 1.920 | 0.166 |
| | Clubbing | 3 | 7.5 | 5 | 12.5 | 0.556 | 0.456 |
| | Lymphadenopathy | 4 | 10.0 | 2 | 5.0 | 0.721 | 0.396 |
| | Edema | 4 | 10.0 | 3 | 7.5 | 0.157 | 0.892 |
| INTRAOPERATIVE | Adhesions | 9 | 22.5 | 8 | 20.0 | 0.075 | 0.785 |
| | Conversion to open procedure | 1 | 2.5 | 1 | 2.5 | 0.000 | 1.000 |
| | CBD Injury | 1 | 2.5 | 1 | 2.5 | 0.000 | 1.000 |
| | Visceral injury | 0 | 0 | 0 | 0 | 0.000 | 1.000 |
| | Exrtrahepatic biliary channel injury | 0 | 0 | 0 | 0 | 0.000 | 1.000 |
| | Bleeding | 1 | 2.5 | 1 | 2.5 | 0.000 | 1.000 |
| | Mean duration of surgery±SD (min) | 36.38±11.77 | | 40.00±13.21 | | t=1.296; p=0.199 | |
| POST-OPERATIVE | Time taken for resumption of normal duties (Mean±SD) in days | 4.00±2.75 | | 3.98±2.58 | | t=0.042; p=0.967 | |
| | Infection at port site | 2 (5.0%) | | 3 (7.5%) | | $\chi^2$=0.213; p=0.644 | |
| | Pain (>VAS score >5) after 24 hours | 0 | | 0 | | - | |
| | Culture positivity | 0 | | 0 | | - | |
| | PCS upto day 7 | 3 (7.5%) | | 2 (5.0%) | | $\chi^2$=0.213; p=0.644 | |

**Table 4: Comparison between two groups for post-operative pain (Maximum VAS score during 24-hr post-operative period)**

| Pain | Group-I (n=40) | | Group-II (n=40) | | P-value |
|---|---|---|---|---|---|
| | No. | % | No. | % | |
| No pain (VAS 0) | 4 | 10.0 | 5 | 12.5 | $\chi^2$=0.528; p=0.913 |
| Mild pain (VAS 1-3) | 29 | 72.5 | 30 | 75.0 | |
| Moderate pain (VAS 4-7) | 6 | 15.0 | 4 | 10.0 | |
| Severe pain (VAS >7) | 1 | 2.5 | 1 | 2.5 | |

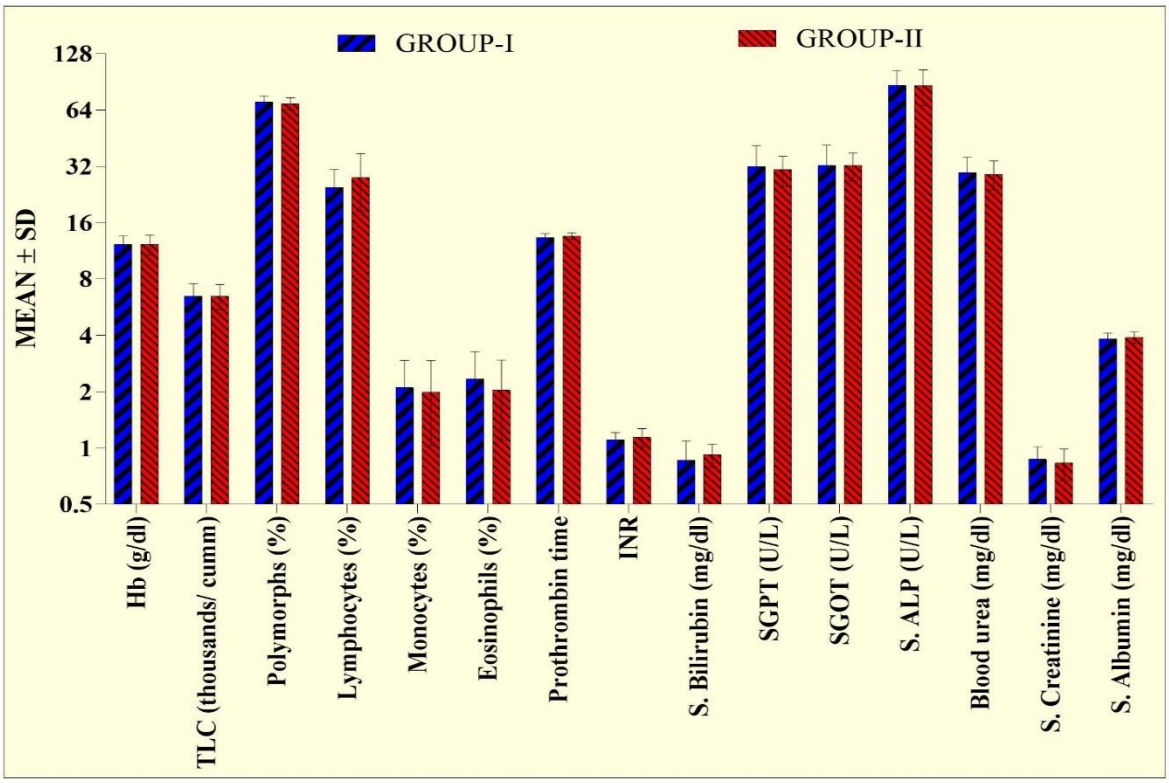


**Figure-1: Comparison of Hematological and Biochemical Profile of two study groups**

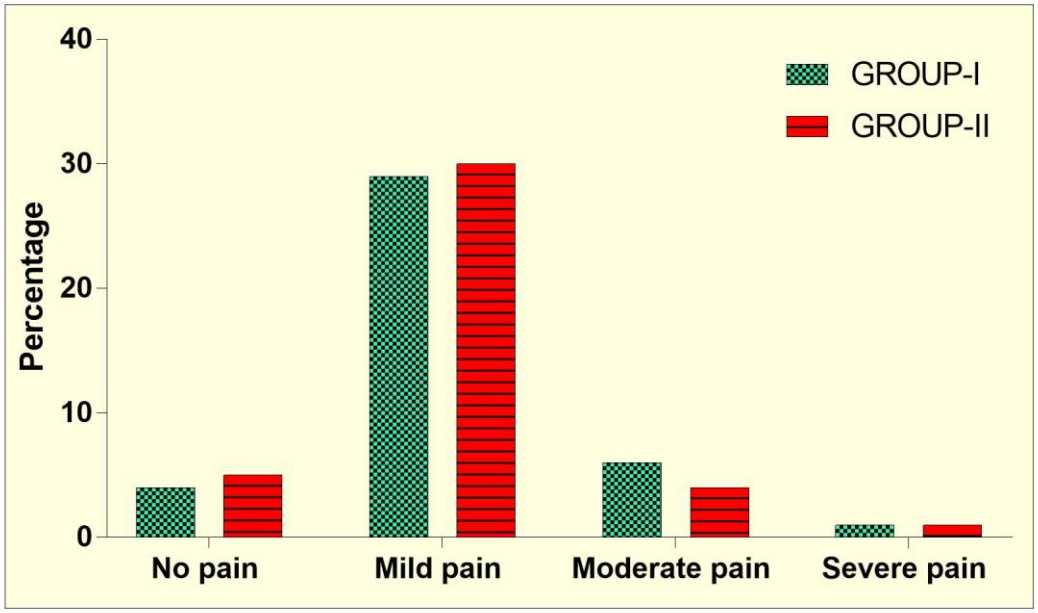


**Figure-2: Comparison between two groups for post-operative pain**

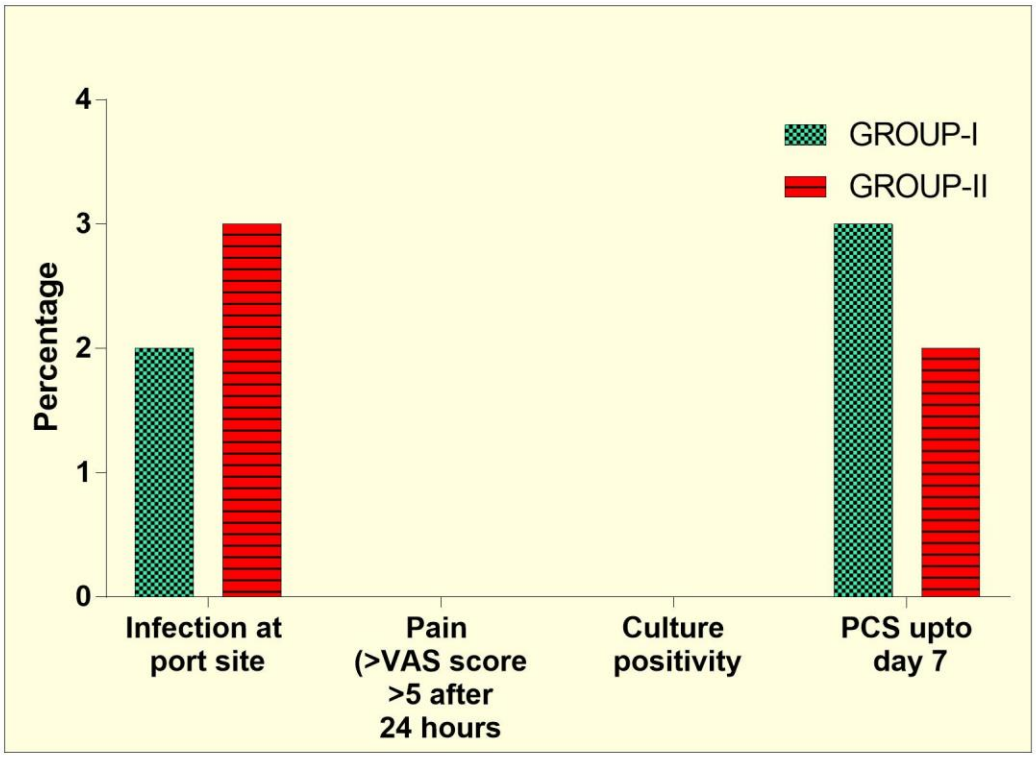


**Figure-3: Comparison between two groups for post-operative complications**