

**ORIGINAL RESEARCH**

# Comparative Analysis of Three Port and Four Port Laparoscopic Cholecystectomy: An Institutional Based Study

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**ABSTRACT**

**Background:** The advantages of laparoscopic procedure are lesser postoperative pain, lesser incidence of surgical site infection and shorter hospital stay. The present study was conducted to compare three port laparoscopic cholecystectomy with four port laparoscopic cholecystectomy. **Materials&Methods:** The study comprised of 120 patients which were randomly taken for a three port (Group 1, 60 patients) or four port laparoscopic cholecystectomy (Group 2, 60 patients). Our primary outcome measure was pain score and analgesia requirement after surgery. Statistical analysis SPSS was used for statistical analysis. Student-test was used to evaluate the significance of each parameter. P value < 0.05 was considered statistically significant. **Results:** Operative times were similar between the two groups (P=0.1079). Intra-operative complications were same in no. in both groups (P=1.00). Post-operative pain score on VAS in three port group was 2.32±1.12 and in four port group was 2.88±1.19 (p=0.259\*). The amount of analgesia in the early postoperative period was significantly higher in Group 2. There was also statistically significant difference in the number of oral analgesic tablets consumed by the patients after they were discharged from hospital. Mean postoperative stay was not statistically significant. Days to return to normal activity in 3 port group and four port was not statistically significant. There was no significant difference between the two groups regarding the mean patient satisfaction score for the scar on day 7. **Conclusion:** The present study concluded that the three-port technique is as safe as the standard four-port technique with an advantage of less pain and less analgesic requirement and better cosmetic results.

**Keywords:** Laparoscopic Cholecystectomy, Three Port, Four Port.

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**INTRODUCTION**

Cholelithiasis is the most common biliary pathology, accounts for about 10% of world population. Most of the cholelithiasis patients are asymptomatic. Prevalence in North India is two to four folds when compared to those in South India.<sup>1,2</sup> Around 3% of the asymptomatic patients will require cholecystectomy per year. Incidence of gallstone disease increases from 21 years and reaches a peak in 5th and 6th decade of life. Women are commonly affected than men. For gall stone disease that is symptomatic, laparoscopic cholecystectomy is a safe method of treatment. Laparoscopic cholecystectomy is the gold standard treatment for gallstone disease.<sup>2</sup> The first laparoscopic cholecystectomy (LC) was performed in 1987 by Phillip Mouret and later established by Dubois and Perissat in 1990.<sup>3,4</sup> Laparoscopic cholecystectomy has

been traditionally performed by the standard four port technique. With increasing experience, various modifications were made to further enhance advantages of laparoscopic cholecystectomy. Laparoscopic cholecystectomy can be safely performed by using three ports and more recently two ports and even single port only.<sup>5,6</sup> These newer techniques take similar time to perform operation and caused less postoperative pain reducing analgesic requirement and have better cosmetic benefits.<sup>5,9</sup> The present study was conducted to compare three port laparoscopic cholecystectomy with four port laparoscopic cholecystectomy.

**MATERIALS&METHODS**

The study was conducted prospectively on all adult patients with ultrasound documented cholelithiasis,

gall bladder Polyposis or gall bladder adenomyomatosis admitted in the Department of General Surgery, Saraswathi Institute of Medical Sciences, Anwarpur, Hapur, Uttar Pradesh (India) for elective surgeries. The study comprised of 120 patients which were randomly taken for a three port (Group 1, 60 patients) or four port laparoscopic cholecystectomy (Group 2, 60 patients). Before the commencement of the study ethical approval was taken from the ethical committee of the institute and informed consent was taken from the patient after explaining the study. Patients which were excluded from the study included patients with acute cholecystitis, patients with surgical jaundice associated cholidocholithiasis, carcinoma of gall bladder and patients who had undergone endoscopic retrograde cholangiopancreatography (ERCP) less than three weeks before. Additionally, patient's consent for conversion to an open procedure was obtained. The patients were assured that conversion from one procedure to another procedure does not mean failure, and the two techniques differ only in terms of access to the gallbladder. Patients were randomly taken either for three port or four port laparoscopic cholecystectomy under general anesthesia using same anesthetic drugs. Pneumoperitoneum was created by inserting veress needle through a supra-umbilical incision. After creating pneumo-peritoneum, 10 mm cannula (camera port) was inserted through the same incision used for veress needle. 300 operating telescope from Karl storz was placed through this port and peritoneoscopy performed. In four port technique, a 10 mm epigastric port was placed in the midline to the right of falciparum ligament, 5 cm below the xiphisternum (working port). A 5 mm subcostal port, 5 cm below the right costal margin in the mid clavicular line and another 5mm port in the anterior axillary line at the level of umbilicus were placed under direct vision. In three-port technique a 10 mm epigastric port and one 5 mm subcostal port were placed in the right hypochondrium in the mid clavicular line in the same fashion as in standard four port cholecystectomy. The fourth port in the anterior axillary line was omitted. Dissection started high in the neck of gallbladder and kept close to the gallbladder until the anatomy was well defined. The cystic artery and cystic duct were defined, separated and clipped. The gallbladder was dissected off the liver bed using monopolar cautery and finally extracted. The drain was placed in all the patients. The skin incisions were closed by silk sutures. Operative time was recorded from the beginning of first incision till the closure of last incision. All the patients were put on intravenous fluid during first 12 hours. Two doses of intravenous antibiotics were given, one in the evening and one in

morning. Intramuscular injection of diclofenac 75 mg was given 12 hourly for first 24 hours for postoperative pain control and any patient requiring any additional analgesic injection was documented. Patients were put on orals on the first operative day and advised to take oral analgesic tablets (aceclofenac 100 mg) on need basis only. Patients were monitored for pulse rate, temperature, respiratory rate, colour and quantity of discharge from drain and any jaundice. Our primary outcome measure was pain score and analgesia requirement after surgery. An independent doctor assessed the pain score by using 10-cm unscaled visual analog scale (VAS) for each dressing site for the next 48 hours after operation. Patients were discharged on the second postoperative day and were advised to take analgesics in tablet form on need basis and to keep a record of it. Patients were followed for at least four weeks on a weekly basis. During these visits patients were followed as per the proforma and they were particularly asked about the severity of pain at port sites and the number of analgesics tablets needed, if any. Statistical analysis SPSS version 20.0 was used for statistical analysis. Student-test was used to evaluate the significance of each parameter. P value < 0.05 was considered statistically significant.

## RESULTS

In the present study, in four port group, 33.33 % were male and 66.66% were females. On the other hand, in three port group, 38.33 % patients were male and 61.66% were females. The average age of the patient in three port group was 39.4±12 years while in four port group average age of the patient was 41.8±10 Years. The average operative time in three port group was 28.35±5.60 minutes compared to 29.64±4.25 minutes in the four port Group. Operative times were similar between the two groups (P=0.1079). Intra-operative complications were same in no. in both groups (P=1.00). The post-operative pain score on VAS in three port group was 2.32±1.12 and in four port group was 2.88±1.19 (p=0.259\*). The amount of analgesia in the early postoperative period was significantly higher in Group 2. There was also statistically significant difference in the number of oral analgesic tablets consumed by the patients after they were discharged from hospital. Mean postoperative stay in the hospital was 2 days in both the groups and it was not statistically significant. Days to return to normal activity in 3 port group and four port were 8.04±0.56 v/s 8.18±0.69 (p=0.2620), which was not statistically significant. There was no significant difference between the two groups regarding the mean patient satisfaction score for the scar on day 7, which 8.18±0.39 for the three port Group vs 8.12±0.48 for four port Group 2.

**Table 1: Demographic data**

Variable	Three-port	Four-port
<b>Gender n(%)</b>		
<b>Male</b>	23(38.33%)	20 (33.33%)

<b>Female</b>	37(61.66%)	40(66.66%)
<b>Age in years(Mean±SD)</b>	39.4±12	41.8±10

**Table 2: Comparison of study variables**

<b>Variable</b>	<b>Three-port</b>	<b>Four-port</b>	<b>P value</b>
<b>Operating time in min</b>	28.35±5.60	29.64±4.25	0.1079
<b>Intra-operative complications</b>	4	4	1.00
<b>Post-operative pain score on VAS (1-10)</b>	2.32±1.12	2.88±1.19	0.259*
<b>Analgesic injection Requirement</b>	1.97±0.46	2.23±0.42	0.171*
<b>Need for fourth port</b>	Nil	NA	Nil
<b>Conversion rate</b>	Nil	Nil	Nil
<b>Hospital stay</b>	2 days	2 days	1.00
<b>Analgesic tablet Requirement</b>	5.53 ±0.74	5.87± 0.71	0.198*
<b>Number of days to return to normal activity (Mean)</b>	8.04±0.56	8.18±0.69	0.2620
<b>Cosmesis satisfaction score</b>	8.18±0.39	8.12±0.48	0.4748

## DISCUSSION

Laparoscopic cholecystectomy is considered to be the procedure of choice for elective cholecystectomy. With the increasing experience in advanced laparoscopic techniques, LC is performed by Four ports of entry into the abdomen (standard procedure), Three ports of entry into the abdomen, Two ports of entry into the abdomen, Single port of entry into the abdomen (SILS), NOTES.<sup>10</sup>

In the present study, In four port group, 33.33 % were male and 66.66% were females. On the other hand, in three port group, 38.33 % patients were male and 61.66% were females. The average age of the patient in three port group was 39.4±12 years while as in four port group average age of the patient was 41.8±10 Years. The average operative time in three port group was 28.35±5.60minutes compared to 29.64±4.25 minutes in four port Group. Operative times were similar between the two groups (P=0.1079). Intra-operative complications were same in no. in both groups (P=1.00). Post-operative pain score on VAS in three port group was 2.32±1.12 and in four port group was 2.88±1.19 (p=0.259\*). The amount of analgesia in early postoperative period was significantly higher in Group 2. There was also statistically significant difference in the number of oral analgesic tablets consumed by the patients after they were discharged from hospital. Mean postoperative stay in the hospital was 2 days in both the groups and it was not statistically significant. Days to return to normal activity in 3 port group and four port were 8.04±0.56 v/s 8.18±0.69 (p=0.2620), which was not statistically significant. There was no significant difference between the two groups regarding the mean patient satisfaction score for the scar on day 7, which 8.18±0.39 for the three port Group vs 8.12±0.48 for four port Group 2.

Kumar M et al reports a randomized trial that compared the clinical outcomes of 3-port laparoscopic cholecystectomy versus conventional 4-port laparoscopic cholecystectomy. Demographic data were comparable for both groups. Patients in the 3-port group had shorter mean operative time (47.3±29.8 min vs 60.8±32.3 min) for the 4-port group (P=0.04)

and less pain at port sites (mean score using 10-cm unscaled VAS: 2.19±1.06 vs 2.91±1.20 (P=0.02). Overall pain score, analgesia requirements, hospital stay, and patient satisfaction score (mean score using 10-cm unscaled VAS: 8.2±1.7 vs 7.8±1.7, P=0.24) on surgery and scars were similar between the 2 groups.<sup>11</sup> Al-Azawi, D., et al compared the three-port and four-port LC in acute (AC) and chronic cholecystitis (CC). Two hundred and eighty-three patients underwent three-port LC and 212 patients underwent four-port LC. In total, 163 (32.9%) patients were diagnosed with AC and 332 (67.1%) with CC by histology. There was no statistical difference between the three and four-port groups in terms of complications, conversion to open procedure (p = 0.6), and operating time (p = 0.4). Patients who underwent three-port LC required less opiate analgesia (pethidine) than those who underwent four-port LC (p = 0.0001). The hospital stay was found to be related to the amount of opiates consumed (p = 0.0001) and was significantly shorter in the three-port LC group (p = 0.005).<sup>12</sup>

Bari SU et al compared the results of three-port and four-port laparoscopic cholecystectomy at single center in terms of technical feasibility, safety of the procedure, operative time, intra-operative complications, postoperative pain and postoperative analgesia requirement. The average operative time in three port group was 29.2 minutes (range, 15-37) compared to 30.66 minutes (range, 15-42) in four port group, which was statistically insignificant. The final visual analog scores for pain in the postoperative period was 2.30 vs 2.86 in three port and four port group respectively, with a P value=0.008, which was statistically significant.<sup>13</sup>

## CONCLUSION

The present study concluded that the three-port technique is as safe as the standard four-port technique with an advantage of less pain and less analgesic requirement and better cosmetic results.

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