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Original Research

Comparison of efficacy of 3-port laparoscopic cholecystectomy versus standard 4-port laparoscopic cholecystectomy

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ABSTRACT:

Background: Cholecystectomy is the treatment of choice for symptomatic gall stone disease. The most important advantage of laparoscopic cholecystectomy (LC) is that it abolishes the trauma of access as well as the transient ileus that follows open abdominal surgery. Hence; under the light of above obtained data, we sought to investigate the technical feasibility, and safety of 3-port laparoscopic cholecystectomy versus standard 4-port laparoscopic cholecystectomy. **Materials & methods:** The present study was conducted on 40 patients who were schedule to undergo elective laparoscopic cholecystectomy. The patients were divided into two groups: Three-port group, and Four-port group. Both the groups included 20 patients each. All the patients underwent LC according to their respective study groups. Primary outcome measure was **pain score** after surgery. Assessment of the pain score was done by using a 10-cm visual analog scale (VAS). The Student t test and Chi- square test was used to evaluate the significance of each parameter. **Results:** Mean VAS on day of discharge and on follow-up among the patients of the three port group was found to be 6.56 and 2.86 respectively. Mean VAS on day of discharge and on follow-up among the patients of the four port group was found to be 7.26 and 3.99 respectively. Mean pain score, as assessed by VAS was significantly higher among subjects of four port group. **Conclusion:** In terms of postoperative pain control, 3 port LC is better in comparison to 4 port LC.

Key words: Laparoscopic cholecystectomy, Gallstones

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INTRODUCTION

Cholecystectomy is the treatment of choice for symptomatic gall stone disease. Laparoscopic cholecystectomy requires skill, dexterity, and the ability to perform surgery with a two-dimensional view of the patient's organs. It also requires coordination of hand motions that may appear reversed on the video monitor if the camera is directed at the surgeon.¹

The most important advantage of laparoscopic cholecystectomy (LC) is that it abolishes the trauma of access as well as the transient ileus that follows open abdominal surgery. 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.² Minimal invasive surgical techniques continue to evolve. As

technology and instrumentation continue to improve, so are the complexities of operations that can be performed in a minimal invasive way.³

As the technique became a routine procedure, modifications were made in order to make it less invasive and more cosmetic. Initially, a 3-port LC (LC3P) instead of the standard 4-port LC (LC4P) approach was preferred when the anatomy was clearly visualized at the time of the initial laparoscopic evaluation and no technical difficulties were anticipated. Natural orifice transluminal endoscopic surgery (NOTES) has been shown to offer further improvements in advantages of laparoscopic cholecystectomy, i.e., decreased pain, early ambulation, and better cosmesis. The goal is to minimize the invasiveness of this procedure by reducing the number of ports (as using fewer incisions is less traumatic), arguing that the fourth trocar may not be necessary and 3-port laparoscopic cholecystectomy can be performed safely.²⁻⁵

Reducing the number of ports can reduce the port site complications including pain, port site leakage, port site herniations, port site bleeding, bowel injury, superior epigastric vessel injury, subcutaneous emphysema and pneumothorax.^{5, 6} Hence; under the light of above obtained data, we sought to investigate the technical feasibility, and safety of 3-port laparoscopic cholecystectomy versus standard 4-port laparoscopic cholecystectomy.

MATERIALS & METHODS

The present study was conducted on 40 patients who were schedule to undergo elective laparoscopic cholecystectomy .The patients were divided into two groups:

- Three-port group
- Four-port group

Both the groups included 20 patients each.

Inclusion criteria:

- Indications for elective laparoscopic cholecystectomy.
- Patients with 18 years of age and above

Exclusion criteria:

- Emphyema gall bladder.
- Patients who are not fit for laparoscopic surgery.

All the patients underwent LC according to their respective study groups. Primary outcome measure was **pain score** after surgery. Assessment of the pain score was done by using a 10-cm visual analog scale (VAS). The Student t test and Chi- square test was used to evaluate the significance of each parameter.

Results

Mean age of the patients of the three port group four port group was 43.5 years and 44.1 years respectively. Majority of the patients of both the study groups were females. Mean operative time among the patients of the three port group and the four port group was 56.11 minutes and 44.39 minutes respectively. On comparing, the results were found to be statistically significant. Mean VAS on day of discharge and on follow-up among the patients of the three port group was found to be 6.56 and 2.86 respectively. Mean VAS on day of discharge and on follow-up among the patients of the four port group was found to be 7.26 and 3.99 respectively. Mean pain score, as assessed by VAS was significantly higher among subjects of four port group.

Table 1: Age-wise distribution of patients of both the study groups

Age group (in years)	Three port		Four port	
	Number of patients	Percentage	Number of patients	Percentage
18- 30	2	10	2	10
31-40	5	25	4	20
41-50	9	45	7	35
51-60	2	10	5	25
More than 60	2	10	2	10
Total	20	100	20	100

Table 2: Gender distribution of the subjects of both the study groups

Gender	Three port		Four port	
	Number of patients	Percentage	Number of patients	Percentage
Males	2	10	3	15
Females	18	90	17	85
Total	20	100	20	100

Table 3: Mean operative time of patients of both the subjects of both the study groups

Operative time (mins)	Three port	Four port	Mann-Whitney U value	p- value
Mean ± SD	56.11 ± 9.85	44.39 ± 9.75	125.6	0.00 (Significant)

Table 4: Mean Post-op pain score on VAS

Postoperative pain score on VAS	Three port	Four port	Mann-Whitney U	P- value
One day of surgery	6.56	7.26	235.11	0.00 (Significant)
At one week follow-up	2.86	3.99	366.12	0.00 (Significant)

DISCUSSION

The most common technique for laparoscopic cholecystectomy is a four trocar procedure. There are several alternatives in trocar placement. One common technique is where a camero trocar is placed in the umbilicus and three trocars are placed in the right subcostal line. There are some studies which suggest that fewer trocars (two or three) might decrease the postoperative pain, but that the operation might be more difficult to perform.⁵⁻⁸ Hence; under the light of above obtained data, we sought to investigate the technical feasibility, and safety of 3-port laparoscopic cholecystectomy versus standard 4-port laparoscopic cholecystectomy.

In the present study, mean age of the patients of the three port group four port group was 43.5 years and 44.1 years respectively. Majority of the patients of both the study groups were females. Mean operative time among the patients of the three port group and the four port group was 56.11 minutes and 44.39 minutes respectively. On comparing, the results were found to be statistically significant. Mean VAS on day of discharge and on follow-up among the patients of the three port group was found to be 6.56 and 2.86 respectively. Tamrakar KK et al assessed the efficacy and safety of the use of only three ports for laparoscopic cholecystectomy. 78 patients with the diagnosis of cholelithiasis were operated. Patients were randomized into 3-ports group and 4-ports group using random number. Operative time taken for the procedure and operative findings were noted. Postoperative pain and complications were noted in both groups. There was no significant difference in the operating time taken for the 3-ports laparoscopic cholecystectomy and 4-ports laparoscopic cholecystectomy. However operating time was significantly higher when the cases that had dense adhesions present were compared with those who did not have. Conversion from 3-ports technique to 4-ports technique was determined mainly by the degree of adhesions and to some degree by the BMI of the patient. Postoperative wound infection rate was similar among the two groups. There was no incidence of biliary injury in both the groups. 3-ports laparoscopic cholecystectomy is safe and efficient approach for the selected patients who seek for lesser invasive method of laparoscopic cholecystectomy.¹⁰

In the present study, mean VAS on day of discharge and on follow-up among the patients of the four port group was found to be 7.26 and 3.99 respectively. Mean pain score, as assessed by VAS was significantly higher among subjects of four port group. Kumar P et al compared the safety outcome and advantages of three-port and four-port LC. This prospective study included 90 patients presenting with symptomatic gall stone disease or gall bladder polyp more than 1cm at base. Patients with jaundice and choledocholithiasis were

excluded. Patients were divided into two groups: A and B, who underwent three-port and four-port LC respectively. Outcomes of the two groups were assessed and compared in terms of duration of surgery, intra-operative and post-operative variables including rate and nature of complications, conversion rates, post-operative pain, duration of hospital stay, return to work and cosmetic outcome. Statistically significant difference was found between the two groups in terms of Visual Analogue Score for pain at 6 and 24 hours, analgesic requirement, duration of hospital stay and return to work; all being less in the three- port LC group. Cosmetic outcome as perceived by patients was also better in the three-port group. Results of other variables were comparable in the two groups. Three-port procedure is safe and appears to be more cost effective than four-port LC. If LC is performed by an experienced surgeon, it can be started with three ports, if required, a fourth port can be inserted.¹¹ Pandey MC et al evaluated the outcome of 3 port LC for treatment of cholelithiasis by comparing the result with 4 port LC with respect to safety and efficacy. In this comparative study, a total of 150 patients of laparoscopic cholecystectomy for gall stone disease were studied by dividing them into two groups. The results were compared in terms of complications, conversion from 3 port to 4 port and from LC to open procedure, hospital stay, pain score, operative time, need of analgesia and bile duct injury. A total of 150 patients of cholelithiasis were treated by laparoscopic cholecystectomy. Three port LC was performed in 60 (40%) patients and 4 port LC was performed in 90 (60%) patients. In group 1, 44.4% patients complained of mild pain and 55.5% experienced moderate-to-severe pain on VAS post-operatively, while in group 2 70% patients complained of mild pain and 30% patients complained of moderate-to-severe pain post-operatively. There was no bile duct injury reported in either group. However, in group 2 (3 port LC) 3 cases (5%) converted to 4 port LC and there was no conversion (open) reported in group 1 (4 port LC). In this comparative study, they found that use of 3 port LC did not affect the procedure safety, conversion rate, operating time and complication rate.¹²

CONCLUSION

In terms of postoperative pain control, 3 port LC is better in comparison to 4 port LC.

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