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ORIGINAL RESEARCH

Comparison of Three-Port Versus Standard Four-Port Laparoscopic Cholecystectomy

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Abstract

Background: We investigated and compared 3-port laparoscopic cholecystectomy versus standard 4-port laparoscopic cholecystectomy.

Materials & methods: The present study included 60 patients who will be undergoing elective laparoscopic cholecystectomy. The patients were divided into two groups:Three-port group, and Four-port group. Patients were randomized to receive either 3-port laparoscopic cholecystectomy (3-port group) or conventional laparoscopic cholecystectomy (4-port group) in a synchronized manner. All operations were performed by specialist laparoscopic surgeons under general anaesthesia. Our primary outcome measure was pain score. Assessment of the pain score was done by using a 10-cm visual analog scale (VAS).

Results: The time taken for four port group was significantly less than the time taken for three port group which came out to be statistically significant. 6.67 percent of the patients of the three port group were converted to four port. 3.33 percent of the patients each of both the study groups were converted to open cholecystectomy. Mean VAS was comparatively higher among patients of four port group in comparison to three port group.

Conclusion: The three port technique is as safe as the standard four port for laparoscopic cholecystectomy. The main advantages of the three port technique are that it is less painful, safe, and leaves few scars.

Key words: Laparoscopic cholecystectomy, Three-port

Introduction

Gallstone disease is often thought to be a major affliction in modern society. Treatment of gallstones depends partly on whether they are causing symptoms or not. Recurrent episodes of upper abdominal pain related to gallstones are the most common indication for the treatment of gallstones.[1]

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. 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. As the technique became a routine procedure, modifications were made in order to make it less invasive and more cosmetic. Cholesterol crystal nucleation is considered the earliest step in cholesterol

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gallstone formation. Various conditions affecting the crystallization process include biliary cholesterol supersaturation, excess pronucleating proteins, or shortage of nucleationinhibiting proteins, and factors related to the gallbladder, such as hypomotility.[2- 4]

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.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]Hence; under the light of above obtained data, we sought to investigate and compare 3-port laparoscopic cholecystectomy versus standard 4-port laparoscopic cholecystectomy.

Materials & methods

The present study included 60 patients who will be undergoing elective laparoscopic cholecystectomy. The patients were divided into two groups:

- Three-port group
- Four-port group

Patients were randomized to receive either 3-port laparoscopic cholecystectomy (3-port group) or conventional laparoscopic cholecystectomy (4-port group) in a synchronized manner. Both the groups included 30 patients each.

Inclusion criteria

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

Exclusion criteria

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

All operations were performed by specialist laparoscopic surgeons under general anaesthesia. Our primary outcome measure was pain score. 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. For analysis of the visual analogue scores, the Mann-Whitney U test will be used.

Results

Mean age of the subjects of the three-port group and four port group was 46.2 years and 44.3 years respectively which was comparable in both the groups. Majority proportion of patients of both the study groups were males. Pain abdomen was the most common reporting symptom i.e the chief complaint, which was found to be present in 100 percent patients of both the study groups. Dyspepsia was the next most common symptom encountered in both the study groups. The time taken for four port group was significantly less than the time taken for three port group which came out to be statistically significant. 6.67 percent of the patients of the three port group were converted to four port. 3.33 percent of the patients each of both the study groups were converted to open cholecystectomy. Mean VAS was comparatively higher among patients of four port group in comparison to three port group.

Table 1: Mean operative time of patients of both the subjects of both the study groups

Parameter	Three port	Four port	p- value
Mean operative time (minutes)	56.8	43.9	0.00 (Significant)
SD	10.2	10.8	

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Table 2: Number of cases of converted into four port/open cholecystectomy

Number of conversions	Three port		Four port	
	Number of patients	Percentage	Number of patients	Percentage
To four port	2	6.67	NA	NA
To open cholecystectomy	1	3.33	1	3.33
No conversion	27	10	29	96.67

Table 3: Mean Post-op pain score on VAS

Postoperative pain score on VAS	Three port	Four port	P- value
One day of surgery at 6 hours	6.92	8.10	0.00 (Significant)
At discharge	3.11	4.95	0.00 (Significant)

Discussion

Traditionally LC is performed using four ports, however the value of lateral (fourth) trocar in the American technique used to hold the gall bladder was challenged. Numerous modifications in the form of reducing the number of ports (3-port,2-port,SILS) and reducing size of ports from 10mm to 5 mm by using mini instruments have shown to be effective and reducing morbidity in terms of postoperative pain and scarring as compared to standard four port cholecystectomy.[6- 9] Hence; under the light of above obtained data, we sought to investigate and compare 3-port laparoscopic cholecystectomy versus standard 4-port laparoscopic cholecystectomy.

In the present study, the time taken for four port group was significantly less than the time taken for three port group which came out to be statistically significant. 6.67 percent of the patients of the three-port group were converted to four port. 3.33 percent of the patients each of both the study groups were converted to open cholecystectomy. Mean VAS was comparatively higher among patients of four port group in comparison to three port group. The results were consistent with the observations of Singal et al who reported mean operative time in three port and four port group to be 93.16 minutes and 50.66 minutes respectively which was statistically significant.In a study done by Trichak S et al, mean operative time was observed to be 59.22 mins and 57.05 mins in three port and four port respectively. Reshie TA et al reported mean OT to be 50.18 mins and 47.58 mins in three port and four port respectively. Kumar P et al reported mean OT to be 46.07 mins and 42.1 mins in three port and four port respectively. The above-mentioned studies observed a higher operative time in three port as compared to four port group but the results were statistically insignificant.[8- 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. 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]

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Conclusion

The three port technique is as safe as the standard four port for laparoscopic cholecystectomy. The main advantages of the three port technique are that it is less painful, safe, and leaves few scars. At the same time, it is also recommended that the surgeon should not hesitate to put fourth port to ensure safe completion of Surgery. The conversion should not be taken as failure of the method but as a method for safe completion of the procedure.

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