Is Fourth Port Really Required in Laparoscopic Cholecystectomy?

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Abstract Since the advent of four-port laparoscopic cholecystectomy, many modifications regarding port number and size have been tried. The feasibility of three-port technique has been found comparable to the conventional four-port laparoscopic cholecystectomy. To assess the feasibility and safety of three-port laparoscopic cholecystectomy in a prospective study. Between March 2007 and March 2009, fifty patients with cholelithiasis aged between 15 and 56 years underwent three-port cholecystectomy in a prospective study in Government medical college, Srinagar. A single surgeon did all the cases and there was no criterion for the patient selection. These were consecutive fifty surgeries done by the surgeon. The outcome was assessed in terms of intra-operative and post-operative parameters. The mean (range) age was 45 (15–56) years and there were thirty-nine females and eleven males in the study. All the procedures were completed successfully without any conversions to open or any major complications; though three patients needed the addition of a fourth port as in conventional laparoscopic cholecystectomy. The mean (range) operative time was 55 (30–90) min and the average blood loss was 30 ml. The mean (range) hospital stay was 1 (1–3) days. All patients returned to routine work within 1 week of surgery. The mean follow-up was 5 (2–7) months. We conclude, from the results above, that three-port laparoscopic cholecystectomy is safe and feasible. There are only two visible surgical scars, better cosmetic appearance with no increased risk of bile duct injury. It reduces the manpower in

the form of a second assistant. Thus, it can be recommended as a safe alternative procedure to conventional four-port laparoscopic cholecystectomy.

Keywords Laparoscopic cholecystectomy · Three ports · Feasibility

Introduction

The aim of this study was to assess the safety and feasibility of three port laparoscopic cholecystectomy. More than 1000 cases of three ports LC (laparoscopic cholecystectomy) have been reported worldwide without any deaths or major common bile duct injuries. Since its foundation, LC has been the procedure of choice for symptomatic gall bladder disease [1]. Traditionally LC is performed using four-port technique [2]. Reducing the number or size of ports did not affect the safety of the operation and furthermore enhanced the advantages of LC over open cholecystectomy [3, 4]. In fact, two ports or even a single port technique is claimed to be feasible for laparoscopic cholecystectomy. The use of the most lateral (fourth) port in the American technique, utilized to retract the gallbladder fundus, was challenged [5, 6]. Recently published studies have shown that three-port technique did not compromise the procedure safety [7]. However, these procedures were performed on an elective basis only. In this prospective study, we studied the safety, and feasibility of three-port LC.

Patients and Methods

This study was conducted in the Department of Surgery of Government Medical College, Srinagar, between March 2007

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and March 2009. Fifty consecutive patients with gallstone disease underwent three ports laparoscopic cholecystectomy in a prospective study. A single consultant surgeon carried out the surgeries with an experience of more than 300 LC. Informed consent was taken from the patient. The patients were initially evaluated in the out-patient department (OPD) and then admitted for surgery. On admission, a detailed history was asked from the patient including the presenting complaints, duration of the complaints, past history especially with reference to previous operation(s). Investigations performed included routine investigations like complete Haemogram, Kidney Function Tests, Liver function tests, ECG (electrocardiogram), chest radiograph and Ultrasonography (confirmed the presence of gall bladder stones in all patients). Choledocholithiasis cases were excluded. All the patients had their blood typed and cross matched. Pre-anesthetic checkup was done in all patients. Preoperative prophylactic antibiotics were given in all cases.

Operative Technique

The three-port technique involved inserting a 10 mm trocar at the umbilicus using the closed technique through which the 0-degree viewing videoscope was introduced. Another 10 mm trocar was inserted 3 cm below the xiphisternum; and then, a 5 mm trocar in the right hypochondrium on anterior axillary line 3 cm below the costal margin. The operating surgeon would hold the dissecting instruments with his right hand through the 10 mm trocar while, holding the gall bladder at the infundibulum with a grasper through the 5 mm trocar and moving the infundibulum right and left or back and forth to expose the Calot's triangle. Blunt dissection was used for adequate display of the cystic duct and cystic artery. The cystic duct was then clipped and divided followed by the cystic artery. In distended gallbladders we would routinely follow aspiration to ease the dissection at Calot's triangle. The gall bladder was then dissected from its bed and extracted from either the umbilical port or the epigastric port. Patients were made ambulatory on the next day. Orals were usually started on the first postoperative day and the patient discharged in the same evening.

Results and Analysis

1. **Age and sex:**—50 patients underwent three ports LC, the mean age of patients included in the study was 45 years and the range was 15–56 years. There were 39 females and 11 males in the study cohort. The fourth port was required to be inserted in 3 patients only (two of acute cholecystitis and one in mucocoele).
2. **Body Mass Index (BMI):**—31 patients in study cohort fell in ideal group, 18 were overweight and the remaining 1 was underweight. (Underweight: less than 18.5, Ideal: from 18.5 to 25, Overweight: from 25 to 30, Obese: >30).
3. **Presentation of patients:**—42 patients had gallstones without any evidence of acute inflammation of the gallbladder, whereas seven had acute cholecystitis, one had mucocoele. Out of 42 patients who did not have any clinical and/or radiological evidence of acute cholecystitis at the time of surgery, only 11 patients had a history of acute cholecystitis in the past while as 19 had biliary colic. The rest 12 were asymptomatic patients (3 were diabetics, 8 had large stones and 1 was a very young patient of 15 years).
4. **Previous Interventions/Surgeries:**—None of our patients had a history of previous upper abdominal surgical intervention.
5. **Peri-Operative details:**—The operative time, estimated blood loss, requirement of transfusions, intra-operative complications, use of suction/tube drainage, requirement of adding the 4th port and reasons thereof were recorded [Table 1].

The fourth port was required to be inserted in 3 patients only (two of acute cholecystitis and one in mucocoele). There were four complications (8%). All complications were minor in the form of diffuse hemorrhagic ooze from liver bed in three patients and bilious ooze in one patient. Both of these were coming from the gallbladder bed. The complications were managed intra-operatively by securing the proper hemostasis. There was no major bile duct injury or death in our study. No patient demanded conversion to open cholecystectomy.

Table 1 Patient parameters (intraoperative and postoperative)

Parameter		Three-port cholecystectomy (n=50)
Operative time (min)	Mean	55 min
	Range	30–110 min
Blood Loss (ml)	Mean	30 ml
	Range	15–100 ml
Blood transfusion (ml)		0 (0%)
Intraoperative complications	Major	0 (0%)
	Minor	04 (8%)
Gallbladder perforation		05 (10%)
Fourth port requirement		03
Oral intake (hrs)	Mean	16 hours
	Range	12–48 hours
Drain removal (if used, days)	Mean	01
	Range	1–2

6. **Post-operative details:**—There were three postoperative complications [Table 2]. Two of the patients developed superficial port site infection. This was managed by opening up the skin sutures and antiseptic dressing twice daily with a short course of antibiotics against staphylococcus. One patient developed fever due to thrombophlebitis, which was treated with change of intravenous access site and local heparin cream.
7. **Hospital stay:**—The mean hospital stay was 2 days; the range being 1–3 days. Most of the patients were discharge home on the evening of first postoperative day. The hospital stay got prolonged up to 3 days in patients who developed superficial wound infection.
8. **Return to work:**—most of the patients returned to their normal routine work within one week of surgery.
9. **Post operative pain relief:** Postoperative pain was quantified using verbal rating scale and the total quantity of analgesic, diclofenac sodium, (i/m Inj., plus per oral) used in the postoperative period. On an average 100 mg of diclofenac was needed.
10. **Follow up:** All patients were followed strictly after the surgery. The mean follow-up was 5 (2–7) months.
11. **Average(range) scar size** was 4 mm scar (3.5–5.5 mm) at 5 mm port and 11 mm scar (9–11 mm) at the epigastric port area, the umbilical scar was not seen. There were no port site hernias or any other delayed complications.

Discussion

There have been a number of alterations in the technique of LC. The utility of the fourth trocar, which is generally used for fundic retraction in the American technique, seemed unnecessary to some surgeons [4], other surgeons used sutures for retracting the gall bladder [9, 10]. Trichak in his prospective

study found the safety and the advantages of the three port technique in view of analgesia requirement, although he found no improvement in postoperative hospital stay [6]. His work and the other published series on this technique were carried out only on electively done patients. As a matter of fact the procedure was practiced on cases of acute cholecystitis, but not reported [8]. In this prospective, single centre, non-randomized study; we analyzed the safety and feasibility of three-port LC. When performed on acute and chronic cholecystitis, the three-port technique was found to be safe; there were no common bile duct injuries or deaths in either group. The three port technique did not change the rate of conversion when compared to the four port technique or to data published in the literature; also the operating time did not vary [9]. The present study shows clearly that the three ports LC is effective, safe and feasible not only in chronic cholecystitis, but also in an acutely inflamed gallbladder. We accomplished all the cases successfully and there were no major differences with regard to operative time, level of difficulty or complication rate as that seen in four port LC. The mean operative time in our study was 55 min with a range of 30–110 minutes. Fourth port was required in three cases. Two patients had acute cholecystitis (due to difficulty in dissecting out Calot's triangle) and the another one had a mucocoele which was difficult to handle during dissection. Five patients in total had gallbladder perforation during dissection. All the accessible stones were removed and thorough normal saline washes were given. Postoperative hospital stay in the present series was in agreement with other reports; although in some centers, four ports LC is now performed as day-care or ambulatory surgery. The results in our study are in complete concordance with the previous studies. Furthermore, it avoids the need of another assistant for traction at the fourth port. Three-port laparoscopic cholecystectomy results in less port-site pain and similar clinical outcomes with fewer surgical scars and without any increased risk of bile duct injury compared with four ports laparoscopic cholecystectomy [10]. Cerci C, et al compared the clinical outcomes of three- and four-port techniques prospectively in one hundred and forty-six consecutive patients randomized into two groups. They reported that the three-port technique is safe, effective, and economic but does not reduce the overall pain score and analgesia requirement [11]. Sun S, et al reported a meta-analysis comparing the three-port technique to the four-port technique. They concluded that the two groups had similar operating times, success rates, analgesia requirements, and postoperative hospital stays [12].

Conclusions

In conclusion, we found that the use of three ports in LC is an effective, minimally invasive surgical proce-

Table 2 Complications

Parameter	Three port Cholecystectomy (n=50)
Superficial Wound Infection	02
Hematoma / Collection	00
Fever	01
Prolonged Ileus	00
Common bile duct injury	00
Any other organ injury	00
Pleural Effusion	00
Abdominal pain	00
Jaundice	00
Port site Bleeding	00
Total	03 (6%)

ture that does not affect the procedure's safety, has the same morbidity rate, an early return to oral diet, same conversion rate and operating time when compared to the standard four ports technique. The introduction of the three-port technique meant; patients had fewer scars and a better cosmetic appearance. Other advantages include; more cost savings (an assistant is freed from the fourth port and saves manpower in an economically deprived third world area and can be performed with the use of same instruments as traditional four port cholecystectomy). However, this technique has its own limitations; at present, we recommend it to be only practiced by surgeons experienced in laparoscopic techniques.

Previous publications NIL

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