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Original Research Article

A study of reduced port laparoscopic cholecystectomy

Biraju D. Nimbark[1], Mithun V. Barot[2]*

Department of Surgery, [1]Gujarat Medical Education and Research Society, Gandhinagar, [2]Pramukhswami Medical College, Karamsad, Anand, Gujarat, India

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***Correspondence:**
Dr. Mithun V. Barot,
E-mail: mithunbarot@gmail.com

ABSTRACT

Background: The objective was to study various technical feasibility and safety, benefit of three port cholecystectomy over four port cholecystectomy.
Methods: Total 25 patients have taken part in study with valid consent, in B.J. Medical College, Ahmedabad. All patient study regarding operative time, conversion rate, inta-operative complication, immediate postoperative complication, postoperative pain, requirement of postoperative analgesic, hospital stay, feasibility and safety.
Results: Out of 25 patient mean ages 39.5 ranging from 25 to 60. Female 88%, male 12% are in this study. 72% patient have multiple stone, 28% have single stone. 96% and 4% patient has distended and contracted GB respectively. 92% patient have normal GB wall and 8% have thickened GB wall. 8%, 68% and 20% patient were discharge on 3rd, 2nd and 1st postoperative day respectively. Mean postoperative day was 4 ranging from 1to 10. Conversion rate to open procedure is 12% in this study.
Conclusions: Three port cholecystectomy is safe procedure in expert hand. It has less requirement of analgesic with less hospital stay with good cosmetic result.

Keywords: Laparoscopic cholecystectomy, Three port cholecystectomy, Cholelithiasis, Minimal invasive surgery

INTRODUCTION

The first laparoscopic cholecystectomy (LC) was performed in 1987 by Phillip Mouret and later established by Dubois and Perissat in 1990.[1,2] Standard laparoscopic cholecystectomy is done by using 4 trocars.[1] With increasing surgeon experience, laparoscopic chole-cystectomy has undergone many refinements including reduction in port size. It has been argued that the fourth trocars may not be necessary, and laparoscopic cholecystectomy can be performed safely without using it. Cooperative manipulation of the surgical instruments is very important for this procedure, for exposing Calot's triangle and dissecting the gallbladder from the gallbladder bed when using the 3-port techniques. Several studies have reported that 3-port laparoscopic cholecystectomy is technically possible.[1-3] Several studies have demonstrated that less postoperative pain is associated with a reduction in either size or number of ports.[1,2]

We did a prospective randomized controlled clinical study to explore the feasibility of reducing port number without compromising the safety in cases of laparoscopic cholecystectomy and evaluated the real benefit associated with it in terms of pain, recovery, and patient satisfaction.

We sought to investigate the technical feasibility, safety, and benefit of 3-port laparoscopic cholecystectomy versus standard 4-port laparoscopic cholecystectomy in our setup. Technical feasibility was defined as performance of the LC without much difficulty by using

the 3-port technique. The need of a fourth port was considered a failure of the 3-port technique and the reason behind this is discussed herein.

Benefits were measured by various parameters like operative time, days of hospital stay, postoperative recovery time after discharge, days taken to return to work, cosmetic satisfaction, quantitative requirement of analgesia after surgery, and assessment of postoperative pain score using a 10-cm unscaled visual analogue score (VAS).

METHODS

Study place

The study was conducted at the department of General Surgery, Civil hospital, Ahmedabad, a publicly funded tertiary care institution. Twenty-five patients with symptomatic gallstone disease were admitted for elective surgery.

Study period

October 2014–October 2016.

Study design

The patients were initially evaluated and routine worked up in the out-patient department including ultrasound abdomen and then admitted for surgery. All patients were screened and those who were not fit for general anaesthesia ASA Grade IV, patients with significant portal hypertension, acute pancreatitis, uncorrectable coagulopathies, suspected/proven malignancy and choledocholithiasis will be excluded from the study group. Anaesthesia with a standard protocol was given. Prophylactic dose of antibiotic was given just prior to induction. RT insertion with appropriate sized Foley's catheterisation was done prior to shifting the patient on table. In case of conventional method of laparoscopic cholecystectomy, primary 10 mm umbilical (camera) port placement was done by open method. Second 10 mm (main working port) was inserted in epigastrium; third 5 mm (accessory working) port placed in the mid-clavicular line just below the right costal margin. Fourth port 5 mm was inserted in Right flank region to retract gall bladder with holding fundus. In our study reduced port laparoscopic cholecystectomy was done by using one 10 mm umbilical port for camera, one 10 mm operating port in the epigastrium, one 5 mm port in the right hypochondrium for retraction at gall bladder neck (Figure 1). The fundus of the gall bladder was tied with a suture passed from the anterior axillary line (Figure 2), (Figure 3). Following further dissection calots triangle is with tow structure going inside gallbladder (Figure 4). Reduced port laparoscopy was considered in the sense of. A) Reducing the size of incision**.** B) Reducing the numbers of the ports. C) Reducing the size of port.

Figure 1: Two options demonstrating possible port placement, depending on the surgeon's preference. (Note: Midclavicular right subcostal, for a right-handed dissection. Midline epigastric, for a left-handed dissection).

Figure 2: Suture passer as retractor: suture passer is passed through the Rt hypochondriac region after making a small nick. Suture is passed through the fundus of the gallbladder and both ends of the suture brought out through the suture passer needle.

Figure 3: Two port view of gall bladder fundus help with stay suture with abdominal wall.

Figure 4: Two port view of Calots triangle with cystic duct clip.

Subject selection

Inclusion criteria

Inclusion criteria were patient diagnosed with symptomatic gallstone disease; patient willing to participate in study and give informed written consent; patient's age above 18 yrs either gender.

Exclusion criteria

Exclusion criteria were patient not fit for General Anaesthesia; patients with significant portal hypertension, acute pancreatitis, uncorrectable coagulopathies, suspected/ proven malignancy and choledocholithiasis

Two port laparoscopic cholecystectomy

Following the placement of umbilical port, instead of a 10 mm, a 5 mm epigastric port is placed. Two special 2.3 mm alligator graspers are used trans-abdominally for grasping the fundus and Hartmann's pouch of the gallbladder for its retraction and manipulation, respectively. Using the standard Maryland laparoscopic instrument, the cystic duct and artery are dissected as in the four-port technique. For clipping the cystic duct and artery, a 5 mm clip applicator is used with 200 mm clips. In case of wider cystic duct, single-hand suturing of the duct is done with 2/0 silk. Alternatively, the position and size of the scope is changed to a 5 mm 30° scope through the epigastric port and clips (300/400 mm) are applied through the 10 mm umbilical port. The structures are divided and dissection proceeded by reversing the laparoscope and dissecting instruments to their original sites. Gallbladder specimen is retrieved through the umbilical port by rail-road technique or using 5 mm 30° scope through the epigastric port and 10 mm jaw forceps from the umbilical port.

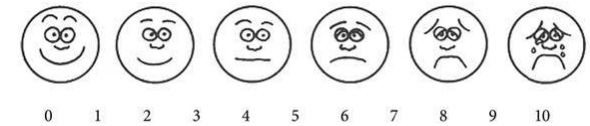

Figure 5: Standard visual analogue score (VAS) scale.

A negative suction drain (optional) was inserted in cases of bile/stone spillage. The outcomes were measured in terms of operating time, conversion rate, intra-operative complications, immediate post-operative complications, pain score, analgesic requirement and hospital stay. Conversion rate include conversion to open cholecystectomy. Intra-operative complications include gall bladder wall perforation, bile leak, bleeding from liver bed, iatrogenic liver injury and bile duct injury. Postoperative analgesia was recorded by VAS and number of analgesics required. In all patients the same analgesics, initially intravenous analgesics during the hospital stay and on discharge oral analgesics were used on need base. Pain score were measured using visual analogue score (VAS) every 12 and 24 hourly. A VAS score 1-3 is called as low pain score (mild) and 4-10 as high pain score (severe) (Figure 5).

Cosmetic appearance was assessed using the Hollander wound evaluation scale, which addresses following six clinical items.[5] 1) Step-off borders; 2) counter irregularities; 3) scar width; 4) edge inversion; 5) excess inflammation; 6) overall cosmetic appearance. Each of these items was graded between 0 and 1 the optimal score was 6 and the score lower than this was considered suboptimal.

RESULTS

A total of 25 patients, with a diagnosis of symptomatic gallstone disease, which underwent laparoscopic cholecystectomy from October 2014 to October 2016, were collected. Following parameters were observed and analysed. Information data was represented as charts. Data was also compared with similar studies in the past.

Table 1: Age distribution (n=25).

Age group (in years)	No. of patients	Percentage (%)
20-29	5	20
30-39	6	24
40-49	9	36
50-59	4	16
60-69	1	4

Table 2: Gender distribution (n=25).

Sex	No. of patients	Percentage (%)
Female	22	88
Male	3	12

Table 3: Mean age (n=25).

	Mean age (yr)
Present study	39.5

In present study there were 25 patients with mean age 39.5 ranging from 25 to 60 years. Female group accounts for 88% and male group for 12% of study.

In present study 72% patients have multiple GB stones while 28% patients have single GB stone. 96% patients have distended gallbladder and 4% patients have contracted gallbladder. Out of these, 92% patients have normal GB wall with 8% have thickened GB wall. None of these have peri GB collection.

In the present study symtomatology distribution of patients' shows abdominal pain in100% of patient as a most common symptom followed by flatulence is 16%

and nausea 16%. While vomiting 4% belching 8% and bloating 12% are other minor symptoms.

Table 4: USG gallbladder (n=25).

USG gallbladder	No. of patients	Percentage (%)
Contracted	1	4
Distended	24	96
Wall normal	23	92
Wall thickened	2	8
Peri GB collection	0	0

Table 5: USG gallbladder (n=25).

USG gallbladder	No. of patients	Percentage (%)
Single stone	7	28%
Multiple stones	18	72%

Table 6: Patient symptoms (n=25).

Symptoms	No. of patients	Percentage (%)
Abdominal pain	25	100
Nausea	4	16
Vomiting	1	4
Belching	2	8
Bloating	3	12
Flatulence	4	16

Table 7: Complications (n=25).

Complications	No. of patients	Percentage (%)
Haemorrhage	0	0
Bile duct injury	0	0
Bile leak	1	4
Gallstone spillage	0	0
Pancreatitis	0	0
Wound infection	0	0
Incisional hernia	0	0
Pneumoperitoneum related: **Co2 embolism** **Vasovagal reflex** **Hypercarbic acidosis** **Cardiac arrythmia**	0	0
Trocar related: **Abdominal wall bleeding** **Hematoma** **Visceral injury** **Vascular injury**	0	0
Wound infection and/ abscess	0	0
Deep vein thrombosis	0	0
Conversion to open procedure	3	12

In present study 1 patient have bile leak and 3 patients were convertated to open procedure due difficult gallbladder itraoperatively.

Table 8: Postoperative hospital stay.

Day of postoperative hospital stay	No. of patients	Percentage (%)
1	5	20
2	17	68
3	2	8
10	1	4

Table 9: Mean postoperative hospital stay (n=25).

	Mean postoperative hospital stay
Present study	4 days

In present study 8% patients discharged on 3rd postoperative day, 68% were discharged on 2nd postoperative day while 20% were discharged on 1st post-operative day. Mean postoperative stay was 4 ranging from 1 to 10.

DISCUSSION

Traditional LC is performed using a four-port technique.[1] Reducing the number and size of ports further enhanced the advantages of laparoscopic over open cholecystectomy.[1] These modifications actually reduced the pain and analgesia requirement.[2,3] Poon et al conducted a randomised study on 120 patients for comparison of four-port and two-port LC. They found that two-port LC involved less operative time, less port-site pain, similar clinical outcomes and fewer surgical scars.[4,5] The value of the lateral (fourth) trocar in the American technique used to hold the gall bladder fundus has been challenged by researches such as Otani et al and Cheah et al.[6,7] The phenomenon of reduced pain due to reduced number and sizes of the ports has been established by researchers such as Bisgaard et al and Cheah et al.[3,7] Recently published data showed that the three-port technique did not compromise the procedures safety.

In a study by Dafir et al 68.6% had multiple GB stones with 58.1% had distended gallbladder while 41.8% had contracted gallbladder. 72.7% had normal GB wall and 11.1% had thickened wall.[1] In other study by Dafir et al all patients had 100% abdominal pain, 12.5% had belching, 11.1% had bloating, 6.46% had flatulence, 17.7% had nausea and 13.7% had vomiting.[1] So the symptoms can be comparable to present study. In a study by Dafir et al mean postoperative hospital stay was 2.8 days. So In this study mean postoperative hospital stay is 1.2 day longer than above studies. This difference may be due to different protocols for discharging the patient.[1] In the study done by Dafir et al mean age was 50and female group accounts for 80.6% while male group was 19.4%.[1]

In the present study symptomatology distribution of patients shows abdominal pain as a most common symptom followed by flatulence and nausea. While vomiting, belching and bloating are other minor symptoms. In present study 72% patients have multiple GB stones while 28% patients have single GB stone. 96% patients have distended gallbladder and 4% patients have contracted gallbladder. Out of these, 92% patients have normal GB wall with 8% have thickened GB wall. None of these have peri GB collection. In present study 8% patients discharged on 3rd postoperative day, 68% were discharged on 2nd postoperative day while 20% were discharged on 1st post-operative day. Mean postoperative stay was 4 ranging from 1 to 10.

A randomised study evaluating postoperative pain in patients undergoing three- versus four-trocar chole-cystectomy demonstrated less analgesic use in the three-trocar group.[4,8] 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.[9] Scarless surgery is the ultimate goal for both surgeons and patients.[9] Minimally invasive surgical techniques continue to evolve. Advancement in instrumentation has allowed more complex surgeries to be performed laparoscopically.[10]

CONCLUSION

We conclude that the three-port laparoscopic cholecystectomy technique is feasible, safe and has similar clinical outcomes to those of the conventional four-port laparoscopic cholecystectomy. There is no increase in the bile duct injuries but a reduced pain and need of analgesics and less number of hospital stay. It can be a viable improvisation of three-port Laparoscopic cholecystectomy technique.

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