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To Evaluate the Safety and Feasibility of the Single-Incision Laparoscopic Cholecystectomy (SILC) Procedure

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ABSTRACT
Gallstones (cholelithiasis) are a common condition and cholecystectomy is the surgical removal of the gallbladder. To evaluate the safety and feasibility of the single-incision laparoscopic cholecystectomy procedure. This was a hospital based non randomized prospective study conducted from 1 march 2015 to november 2016 in the Upgraded general surgery department of S.M.S Hospital and attached group of hospitals, Jaipur. Gall bladder disease is found to be more common in Females and 30-49 years of life. Mean Operative time was 46.96±10.99 minutes (26-75 min), Conversion to open procedure was done in 4 patients. Mean Hospital stay was 1.24±0.46 days (1-3). SILC using conventional instruments So less expensive. Single incision laparoscopic cholecystectomy is feasible and safe using conventional laparoscopic instruments.

INTRODUCTION

Cholecystectomy is the surgical removal of the gallbladder. Indications for cholecystectomy include symptomatic gallstones, cholecystitis, biliary colic, risk factors for gall bladder cancer (porcelain gallbladder), pancreatitis caused by gall stones and gallbladder polyp. With continuous development in techniques and devices, laparoscopy has moved in the direction of minimally invasive surgery.

Recently, a new minimal invasive technique of laparoscopic cholecystectomy has been developed, in which all instruments are inserted through single umbilical (navel or belly button) incision named as single-incision laparoscopic cholecystectomy (SILC)[1]. It is now considered the SILC by many as a bridge between traditional cholecystectomy and natural orifices transluminal endoscopic surgery. Single incision laparoscopic cholecystectomy utilizes three ports through a single skin incision at the umbilicus and is being considered as a "no scar" surgery because the incision is placed within the umbilical folds. It has gained increasing attention due to the potential to maximize the benefits of laparoscopic surgery without increasing the cost[2-4]. The advantages of SILC include less postoperative pain, faster return to daily activities, better cosmetic outcome (single small scar) and ability to convert to standard four-port laparoscopic surgery. The disadvantages of SILC are restriction of hand movements and clashing of the instruments either intra-abdominally or extra-abdominally, thus more difficult to perform than multi-port laparoscopic cholecystectomy with higher technical demands. SILC may have a specific learning curve[5].

The goals of SILC cholecystectomy are to decreased pain, decreased length of hospital stay, better aesthetic results, increased patient satisfaction for cosmesis[24,27,29]. SILC has been proved to be feasible and safe and it is possible to do this procedure without use of special instruments and costly ports by several studies and may be a safe alternative to conventional laparoscopic cholecystectomy.

Aim: To evaluate the safety and feasibility of the single-incision laparoscopic cholecystectomy procedure.

MATERIALS AND METHODS

This was a hospital based non randomized prospective study conducted from 1 march 2015 to november 2016 in the Upgraded general surgery department of S.M.S Hospital and attached group of hospitals, Jaipur. Patients satisfying the inclusion and exclusion criteria were taken up for the study. In each patient relevant history, general physical examination and the relevant investigations were done (as per Proforma) to confirm the diagnosis and assess surgical status of the patient. Each patient was explained about the operative strategy of having a single incision in the abdomen with the possibility of requiring several more incisions or conversion to an open technique if indicated and consent was taken in their native language as per informed consent form. All patients were evaluated for operative time, Gender, age, abdominal operation history, intraoperative description, hospital stay, intraoperative complications, drain insertion, conversion to open cholecystectomy and postoperative complications were included in the present study for analysis.

Postoperatively, all patients received and an identical protocol of care. The findings noted down for the patients and results were evaluated at end of this study.

Inclusion Criterion:

- Chronic Cholecystitis
- Acute cholecystitis
- USG proven Cholelithiasis
- GB polyp

Exclusion Criterion:

- Patient not giving consent
- Empyema, gangrene Gall Bladder
- Concomitant Choledocholithiasis
- Previous upper abdominal surgery
- Suspected GB Cancer
- A.S.A iii and iv
- B.M.I >35 kg m^{-2}
- Imunosupressed and HIV positive patients
- Pregnancy

RESULTS

Majority of the patients in this study were female (87.01%). Most of the patient in our study was in the age group of 20-49 years. With mean age of our study was 39.91 Years with standard deviation of 13.29 and Range was 17-75 years (Table 1).

In our study most of the patient was a case of cholelithiasis. Total 20 cases had previous history of abdominal surgery.

Adhesions were found in 21.43% patients, distended GB was found in 12.34% patients, contracted GB was found in 9.09% patients and normal GB was found in 57.14% patients (Fig. 1).

Table 1: Sociodemography

Age (Years)	Patients	Percentage
10-19	3	1.94
20-29	34	22.07
30-39	40	25.97
40-49	38	24.67
50-59	22	14.28
60-69	15	9.74
70-79	2	1.29
Mean-SD	39.91	13.29

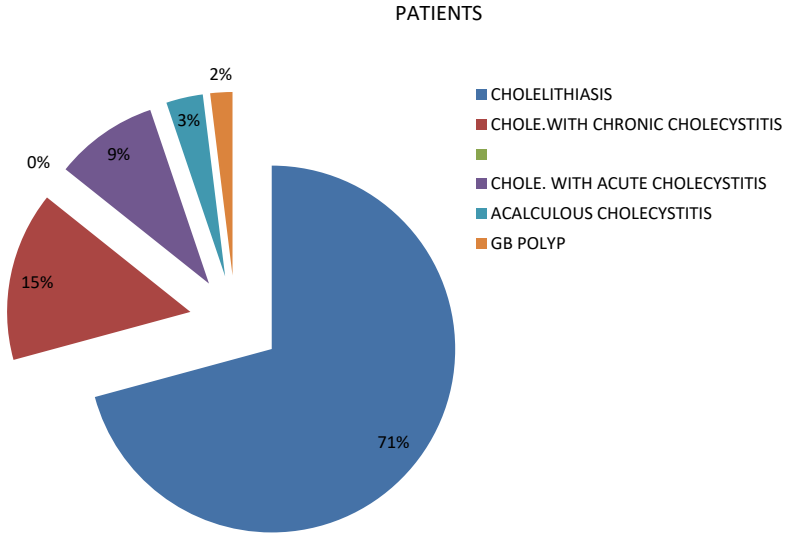

Fig. 1: USG findings

Table 2: Intra op findings and complications

Findings	Patients	Percentage
Adhesions	33	21.43
Distended GB	19	12.34
Contracted GB	14	9.09
Normal GB	88	57.14
Complications		
Bleed	11	7.14
Content leak from GB	14	9.09
Spillage of stone	8	5.2

Table 3: Operating time

	Mean	SD	Range
Operating time (min)	46.96	10.99	26.30-75
Hospital stay (days)	1.24	0.46	1-3

Table 4: Scare and satisfaction

	Mean	SD	Range
Scar length (cm)	2.07	0.30	1.6-2.7
Patient satisfaction score	9	0.93	7-1 0

Out of 154 patients 11 patients (7.14%) had intra-op. bleeding. In 7 patients source of bleeding was from Cystic artery that was controlled with clipping of cystic artery. In another 4 patients bleeding was from liver bed which was controlled with electrocautery. In 14 patients there was bile leak in the form of small perforation in the gall bladder (either during retraction or during dissection from liver bed) which was held by the grasper. In all the cases irrigation with normal saline and suction done. 8 patients had spillage of stones due to GB perforation. These stones were extracted by tooth extracter and sunction was done. No one has bile duct injury or trochar related injury (Table 2).

The mean operative time was 46.96 min. Maximum operative time was 75 minutes and minimum was 26.30 minutes. Success rate of the SILC was 97.41%. Three patients needed conversion to open because omentum and duodenum were densly adherent to the Gall Bladder. One patient needed conversion because of difficulty in dissection due to adhesion and bleeding from cystic artery. Mean hospital stay was 1.24 days with standard deviation of 0.46 and ranging from 1-3 days (Table 3).

Wound infection was found in 3 cases which were resolved with oral antibiotics and dressing. No peritonitis and bile duct injury was observed.

Mean scar length was 2.07 cm with standard deviation of 0.30 and ranging from 1.6-2.7 cm. Importance of scar cosmesis varied with the background and age of the patient and those who attached no importance were those who came from a village background and were aged over 50 years (Table 4).

DISCUSSION

Single-incision laparoscopy is a new technique, which has evolved due to the recent development of minimally invasive surgery. Most patients in our study were in the age group of 20-49 years with mean age was 39.91 years. similar age range was seen by Yilmaz *et al*.[6].

In our study 87% were female with the female to male ratio was 7:1, similarly Oruc *et al*.[5] reported cholelithiasis in 68% females.

In our study ultrasound finding was suggestive of cholelitiasis in 109 patients, cholelithiasis with chronic cholecystitis in 23 patients, cholelithiasis with acute cholecystitis in 14 patients, acalculus cholecystitis in 5 patient and GB polyp in 3 patients. Yilmaz *et al*.[6] performed SILC in 150 patients with USG finding of gall stone in 137 patients, acute cholecystitis 10 and GB Polyp 3 patients.

In our study, mean operative time was 46.96 min. Maximum operative time was 75 minutes and minimum was 26.30 minutes, which was comparable to study by Oruc *et al*.[5] Operative time was more in initial cases which decreased and became more constant as the experience increased.

The operating time for SILC was found to be significantly more than that for SLC. An inference that agrees with almost all reported studies[7,8]. This is partly a reflection of the increased operating time during the initial learning curve[9] and later the time increase because of the clashing and restricted mobility of the instruments at the very narrow umbilical fulcrum and careful closure of the umbilical ports. Although others have reported equal times for SILC and SLC after the learning curve is over[10]. Our operating time also improved after the learning curve and experience from 75 min in the first 20 patients to 32 min.

In our study 14 (9.09%) patients had content leak and 8 had stone spillage from the GB . content leak was controlled with the grasper and stones were removed by extractor. In all the cases suction was done. A study by Oruc *et al*.[5] found that 16% of patients having GB perforation.

In our study, three patients needed conversion to open because omentum and duodenum were densly adherent to the Gall Bladder. One patient needed conversion because of difficulty in dissection due to adhesion and bleeding from cystic artery.In our study failure rate of SILC is 2.6% which is very less when compare to Systematic review and meta-analysis of randomized clinical trials comparing single-incision versus conventional laparoscopic cholecystectomy 2012 British journal of surgery by Trastulli *et al*.[11] where failure rate of SILC was 8.4%.

In the present study we found three cases presented with wound infection which were managed conservatively with oral antibiotics and dressing. Major complications like bile duct injury or peritonitis were not observed. A study by Pan et al.[2] found 7 cases of echymosis around the wound resolved itself and 1 case of delayed bile leak which was managed with USG guided aspiration.

In our study the mean hospital stay was 1.24±0.46 days and ranging from 1-3 days. Studies by Yilmaz *et al*.[6] (150 cases), Oruc *et al*.[5] (25 cases), Pan *et al*.[6] (180 cases) found mean hospital stay of 1.33 days, 24 hrs, 1.9±1.2 days respectively.

In our study mean scar length was 2.07 (range 1.6-2.7 cm) and patient mean satisfaction score was 9. similarly Abdelaziz et al.[12] scar length was 1.58 cm (range 1.3-2.1 cm) and patient satisfaction score was 9.32 (range 7-10).

None of these complications occurred in our study and mortality rate was zero. In a study by Ma *et al*.[3], one case of port site hernia in a patient with ascites requiring subsequent repair was reported.

CONCLUSION

Single incision laparoscopic cholecystectomy is feasible and safe using conventional laparoscopic instruments. Certain intraoperative difficulties are encountered while performing SILS that are not present while performing four port cholecystectomy. Operative time is more for SILS but this may be attributed to the learning curve. High cosmetic results and patient satisfaction can be serve to the patients of low socioeconomic group where expensive ports and instruments cann't be affordable.

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