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Original Research Paper

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COMPARATIVE STUDY OF SINGLE INCISION LAPAROSCOPIC CHOLECYSTECTOMY AND CONVENTIONAL LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT

Background: Single Incision Laparoscopic Surgery, is an alternative to conventional multi-port laparoscopic surgeries with the aim to reduce complications associated with multiple incisions and increase cosmesis. In this study we aim to compare the single incision approach vs the conventional approach for laparoscopic cholecystectomy.

Materials: We conducted a prospective cohort study at a tertiary care set up, comparing 30 patients each undergoing conventional laparoscopic cholecystectomy and single incision laparoscopic cholecystectomy. Data recorded included demographics, intra-operative and post-operative course, duration of hospital stay, hospital cost and expenditure.

Results: We found out that single incision laparoscopic cholecystectomy is associated with longer operative time (65 mins vs 55 mins), a longer hospital stay (5 days vs 2.5 days) and higher hospital expenditure. Intraoperative complications like bleeding and inadvertent gall bladder perforation were more in the single incision group (10% vs 3.3%), and on follow up, 2 patients from the single incision group had surgical site infection and port site herniation compared to none from the conventional laparoscopy group. The patients reported better cosmetic outcome in the single incision laparoscopic cholecystectomy group.

Conclusion: Single incision laparoscopic cholecystectomy is better than conventional laparoscopic cholecystectomy with regards to final cosmesis and quality of life parameters, however, it comes with higher economic burden, longer operative times and untoward intra-operative and post-operative events.

KEYWORDS : laparoscopy, single incision, cholecystectomy

BACKGROUND

Single-incision, or single-site, laparoscopic surgery has emerged as alternative technique to improve cosmesis and minimize complications associated with multiple incisions. Since its advent in 1997, the idea of "scar less" surgery has gained increasing popularity among patients as well as surgeons. Theoretical benefits of single-incision laparoscopic surgery include less pain and less narcotic requirements postoperatively, shorter hospital stays, quicker return to work, and better cosmesis while continuing to limit operative complications and costs (1). However, very few studies exist that compare single-incision surgeries to traditional laparoscopic techniques. This study, is an attempt to assess the single incision and conventional four-port laparoscopic procedures for cholecystectomy

METHODS

A prospective cohort was conducted in a tertiary care hospital from October 2016 to October 2018 with sample size of 60 patients, 30 allotted to either of categories randomly after matching for the obvious confounding variables. SILS procedure as carried out in our institute is illustrated.

Operative technique

A single, curvilinear umbilical incision of approximately 2 cm length was made followed by wide separation of the subcutaneous tissues till the linea alba. Vertical incision of 1.5 – 2 cm was taken at the junction of linea alba and anterior rectus sheath and SILS port was introduced and Pneumoperitoneum achieved. A single stitch was taken through the Fundus of gallbladder and retracted superolateral towards anterior abdominal wall in right hypochondrium region. Grasping instrument to retract Hartman's pouch inferolaterally was introduced through the right 5mm trocar and hence adequately exposing Calots triangle. Another working instrument was introduced through the left 5mm trocar of SILS port. Calots dissection is carried out and once critical view of safety was achieved, artery and ducts were clipped. Gallbladder dissected off the fossa and placed into retrieval bag. The camera was switched to the lateral right port and the specimen was extracted through the 10-mm trocar. Using a single PDS figure-of-eight suture, linea alba at incision site was repaired. skin was closed using 4-0 Monocryl in a running subcuticular fashion. Same instruments were used in both SILC and conventional laparoscopic cholecystectomy.

Case selection

patients belonging to age group of 18-60 of ASA class 1 and 2 with symptomatic cholelithiasis, of size less than 3cm without any evidence of acute cholecystitis were included in the study. Patients with any other pathologies of gallbladder, pregnancy, history of cholangitis or CBD stones or with previous history of abdominal surgeries were excluded.

Data Collection

Data were collected on patient age, sex, date of admission, date of surgery, date of discharge, surgical complications if any, operative time and hospital costs for the procedure. Quality of Life (QoL) scoring was done using SF-36

questionnaire preoperatively, and then reassessed at 3 months post operatively. The pain experienced by the patient was graded subjectively by the patient on a Visual analogue Scale of 1 to 10 and recorded every 12 hourly for the first 24 hours post-operatively. Analgesics were given if VAS score was >5. The final cosmesis, as perceived by the patient using the Scar Scale on a scale of 3 to 15, was noted 3 months post operatively, with 3 being the best result and 15 being the worst.

Statistical Methods

Means and ranges were reported for each data point. All categorical variables were analysed using the chi-square test and Fisher exact test when appropriate. All continuous variables were analyzed using the t test (when the variable had a normal distribution in the group). For continuous variables, mean/median, minimum, and maximum values were provided. Statistical significance was defined as $P < 0.01$.

RESULTS

From October 2016 to October 2018, 30 patients underwent SILC and 30 patients underwent conventional cholecystectomy. Results are summarized in table 1.

	SILS (30)	Conventional (30)	p value
Age (in years)	39.5(19-60)	40(24-60)	
Operative time (in minutes	65(40-80)	55(45-80)	0.0001
SF-36 SCORE (preoperative)	54(43-69	61(43-70)	
Hospital stay (in days)	5(2-9)	2.5(1-5)	<0.001
Cost of the procedure)	22,506(22,445- 22,565	3,066(3,035-3,115)	<0.0001

Dull aching pain was the most common complaint noted in all patients. Chronic calculous cholecystitis was diagnosed in 17% of patients in SILS group(n=5) and 20%(n=6) of patients in conventional LC group. Rest of the cases were diagnosed with Cholelithiasis. The median operative time for SILS procedure was significantly longer, 65 minutes, as compared to 55 minutes for conventional LC. (p- 0.0001).

	SILC	Conventional	p value
Intraoperative bleeding	3	1	0.3
Iatrogenic perforation of Gallbladder	3	1	0.3
Surgical Site infection	2	0	
Port site hernia	2	0	

Intra-operative complication encountered were bleeding (>100ml) and perforation of gallbladder, which were encountered in 10 % of cases (n=3) in SILS each and in 3.33% of cases(n=1) of conventional LC each. Surgical site infection was noticed in 6.67% (n=2) of SILC cases. No immediate post operative complication was reported in conventional LC study group. Two of the patients in SILC group followed up for a period of one year developed port site hernia in one of the patients.

	SILC	Conventional	p value
VAS (post op day 1)	5.5(4-8)	5.9(4-8)	0.017
Total analgesic dose (in mg)	50(50-100)	50(50-100)	0.656
Scar Scale	4.5(3-6)	5.43(4-8)	0.001
Median change in SF-36 score [(postop) – (preop)]	25(14-41)	19(12-28)	<0.0001

Pain experience by the patient and scar cosmoses achieved (at post op day 30) was evaluated subjectively with Visual Analog Score and scar scale scoring respectively. The total analgesic requirement if given and median change in quality of life at 3rd month post op as assessed by SF-36 score was documented and results are tabulated as above

CONCLUSION

Similar to other studies, operative time was significantly longer in the SILS group than in the conventional LC group. The mean operative time for SILC was 10 minutes longer than that for conventional LC. The average difference in operative times in a study by Greaves and Nicholson et al was 12 minutes (3) and was 15 minutes in a study by Cheng et al (2). The SILC procedure is technically demanding due to improper ergonomics with loss of triangulation of instruments and difficulty in retraction of Hartmann's pouch and opening up of calot's triangle. Improper visualization of critical view of safety and coupling between the instruments also make the procedure more challenging. However, much of this difficulty can be overcome with experience of both the surgeon and the assistant. A recent systematic review showed no statistically significant difference in immediate post operative complications or postoperative pain scores for those undergoing SILC versus conventional LC (4). However, Phillips et al (5) showed higher pain scores for those undergoing SILC, but no difference in analgesic use between SILC and traditional cholecystectomy patients. Late post operative complications like port-site incisional hernia remains a major setback of single-incision laparoscopic surgical procedures due to larger fascial defect in SILS. Two patients(6.67%) developed port site hernia in this study. The true incidence remains largely unknown because most patients are asymptomatic and therefore do not seek surgical aid. A study by Agaba et al (6) achieved a 97% follow-up compliance rate at 36 month and a reported port site hernia in 2.9%. Athayde et al (7) reported a higher incidence of late incisional hernia when followed up for 40 months in patients of SILS. However multiple factors like obesity, surgical site infections, type of trochar used, incidence of preexisting umbilical hernias and concurrence of other co morbidities and malnutrition to name a few play a significant role in incidence of port site hernias and a detailed study considering these confounding factors has to be carried out. The higher cost of SILC was statistically significant and the difference was substantially large. Higher cost was attributed to the use of disposable ports in the study. Large scale adaptation of SILS may decrease the cost of ports in near future. The SILC procedure appeared to give a better cosmetic result on postoperative day 30 with median score of 4.5 as compared with median score of 5.4 in conventional LC procedure. The better cosmetic result was attributed to single incision site which was umbilical in SILC procedure which became almost non-existent on post-operative day 30 and hidden inside the umbilicus.

The Single Port Laparoscopic Cholecystectomy (SILC) procedure is better than conventional laparoscopic cholecystectomy (LC) with respect to only the final cosmetic appearance and degree of improvement in "quality of life" parameters, which come in exchange for extremely higher total costs incurred by patients and longer operative time by surgeons. Development of port site hernia is a major setback for a procedure that is popularized based on its cosmetic superiority. SILS is still evolving, and it is unclear whether it will replace conventional laparoscopy in the future. Further studies are required to answer important questions about its safety profile and long-term outcome data.

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