International Surgery Journal
Deolekar S et al. Int Surg J. 2017 Feb;4(2):514-518
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20164793

Original Research Article

Comparison of single incision laparoscopic cholecystectomy with conventional laparoscopic cholecystectomy using conventional laparoscopic instrument: a prospective observational study

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Received: 11 December 2016
Revised: 13 December 2016
Accepted: 16 December 2016

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ABSTRACT

Background: Laparoscopic surgery is one of the most significant surgical advances of twentieth century. Laparoscopic cholecystectomy is criterion standard for the treatment of benign gall bladder diseases, and it is the most common laparoscopic surgery worldwide. The aim of the study was to compare the intra-operative and post-operative complication, conversion rate and outcome of single incision laparoscopic cholecystectomy and conventional laparoscopic cholecystectomy on short term follow up.
Methods: This prospective analytical observational design study was carried out in Tertiary Health care centre. As per convenience sampling 60 consecutive patients of cholelithiasis. Data obtained was analyzed and inferences were drawn regarding the outcomes of the SILC in terms of cosmesis, post-operative pain and any other complications and compare the outcomes against the conventional four port laparoscopic cholecystectomy.
Results: In our study we found the mean operating time for SILC was 90.5±16.37 minutes, whereas the mean operating time for CLC was 74±17.83 ($p = 0.0004$). Intra-operative blood loss for SILC and CLC was comparable and statistically insignificant. Pain in the SILC group was found to be significantly low than CLC group ($p \leq 0.0001$). The median cosmetic scale score for SILC group was 20 with range 13-21 and in conventional laparoscopic cholecystectomy group it was 16 with range 12-18 ($p < 0.0001$).
Conclusions: The major advantage of SILC is cosmetic satisfaction, while the disadvantages of SILS are longer operative time. There was no statistically significant difference in the intra-operative blood loss and conversion rate, and complications in both the techniques. Single incision laparoscopic cholecystectomy (SILC) was developed with the aim of reducing the invasiveness of traditional laparoscopy.

Keywords: Cholecystectomy, Laparoscopy, Single Incision, SILC

INTRODUCTION

Laparoscopic surgery is one of the most significant surgical advances of twentieth century. Laparoscopic cholecystectomy is criterion standard for the treatment of benign gall bladder diseases, and it is the most common laparoscopic surgery worldwide.[1,2]

Open cholecystectomy was first described by Langenbuch in 1882 and was primary treatment of gallstone disease for most of the past century. With the introduction of laparoscopic cholecystectomy, the benefits of minimally invasive procedure were known. Conventional laparoscopic surgery is traditionally carried out by using three to five small incisions (5-20 mm) each.

Each incision carries risk of morbidity, such as bleeding and injury to abdominal viscera. Pain and herniation can also be experienced in post-operative period. Therefore, the risk of intra-operative and post-operative complications increases with number of incisions that need to be made. It also results in poor cosmesis.[3]

Since the introduction of laparoscopic cholecystectomy many surgeons have attempted to reduce the number and size of ports to decrease parietal trauma and improve cosmetic results. Hence, a single incision laparoscopic cholecystectomy (SILC) was introduced. The single incision technique provides a less invasive alternative to conventional laparoscopic surgery, requiring only one incision of 20 mm size which is well disguised within the umbilical folds. The first reported cases of single incision laparoscopic cholecystectomy were reported in 1997, by Navarra et al; 4 using 2 trans-umbilical trocars and since then SILC has become a focus of minimally invasive surgery. SILC can be performed with traditional laparoscopic skills and using existing laparoscopic instruments. Because of single and smaller wounds, SILC theoretically is thought to cause less post-operative pain and provide better cosmetic results.

The aim of this study was to compare the intra-operative and post-operative complication and short term follow up of patient operated by the single incision laparoscopic cholecystectomy versus conventional laparoscopic cholecystectomy.

METHODS

The study was carried out in tertiary health care centre. The patients of age 18 years or more were included in the study.

All those patients who presented to surgery outpatient department with at least one complaint suggestive of gallstone disease i.e. pain in upper abdomen, radiation of pain to back, postprandial pain, bloating, postprandial nausea and then ultrasonography report positive for cholelithiasis, were recruited in this study. The study subjects were recruited from the patients reporting to outpatient department of surgery from1st June 2015 to 31st November 2015.

Inclusion criteria

- Adult male and female more than 18 years of age
- Symptomatic cholelithiasis and cholecystitis
- Elective cholecystectomy (in case of previous attack of cholecystitis which was managed conservatively)

Exclusion criteria

- Pregnancy
- Morbid obesity
- Multiple previous abdominal surgeries

For both the single port laparoscopic cholecystectomy (SILC) and conventional multiport laparoscopic cholecystectomy (CLC), all patients were fasted overnight. All patients received single dose of antibiotic (ceftriaxone 1 gm) half an hour before the surgery. Operations were performed under general anaesthesia without epidural anaesthesia. Local infiltration on anaesthetic around the wound was not given. Post operatively all the patients were kept nil by mouth on the day of surgery and were given injection Diclofenac sodium 75 mg intramuscularly every 8 hours as an analgesic. On the next day following surgery patients were allowed to take orally and were administered tablets of diclofenac sodium 50 mg thrice for 3 days, orally.

Operative technique

Conventional laparoscopic cholecystectomy

LC was done using two 10 mm trocars inserted in umbilical region and epigastrium, and two 5mm trocars inserted in right upper quadrant and right lumbar region. Cystic duct and artery after dissection were clipped using Liga clips. Gall bladder dissection from liver bed was done using hook cautery. The external skin wounds were sutured using non-absorbable suture.

Single incision laparoscopic cholecystectomy

The umbilicus was grasped at its base and everted. A skin incision of about 2 cm was made within the umbilical fold. Three ports are placed through separate facial incision but same skin incision and pneumoperitoneum created. One to three percutaneous sutures were placed at right subcostal margin to achieve adequate gall bladder traction in order to achieve critical view of safety. Dissection was performed using conventional instruments. Cystic duct and artery after dissection were clipped using Liga clips gall bladder was dissected from its bed using hook cautery. The fascial wounds were closed with vicryl and the skin closed using non-absorbable suture.

Figure 1: Port placement.

Figure 2: Percutaneous stitch.

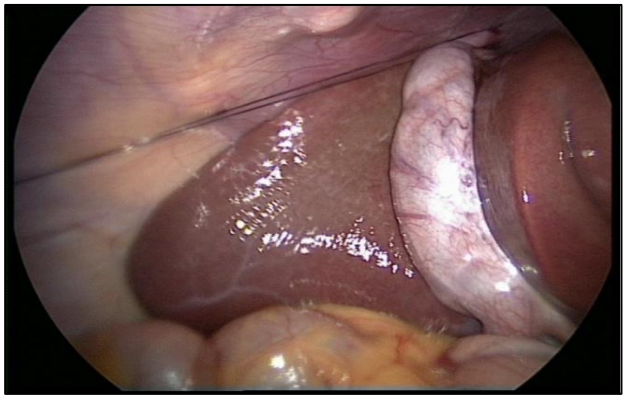

Figure 3: Fundus retraction.

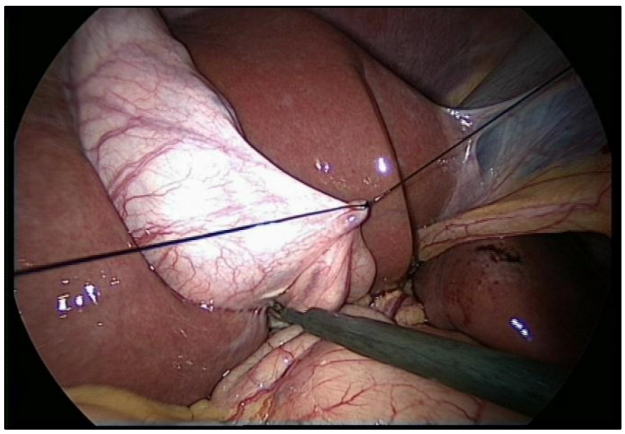

Figure 4: Hartmann's retraction.

RESULTS

A total of 60 patients were included in this study carried out from June 2015 to November 2015.

Out of the 60 patients 26.67% (16) were males and 73.33% (44) were female. Mean age of presentation was 37.83 with SD 11.9. In CLC 43.33% patients were in the age group of 18-40 years and 56.67% patients were more than 40 years of age. While in SILC 73.33% patients were in age group 18-40 while rest 26.67% were above 40 years. There is no significant difference in mean age of two groups.

Majority of the patients 81.66% had body mass index in the range of 18.5-24.9. Remaining patients 18.33% had body mass index above 25. Most of the patient presented with pain in abdomen mainly in right hypochondrium followed by pain in epigastrium. Some patient presented with symptom like dyspepsia, bloating, and heartburn. Total 10 out of 60 patients had past history of cholecystitis, 6 out of 60 patients was stented and 3 patients have DM, HT or TB history Only 2 out of 60 patients had acute cholecystitis like feature on the day before surgery on USG and got operated. Maximum patient had minimal bleeding (<15 ml).

3 patient of SILC group had moderate bleeding (15-50 ml) Median score of CLC on Day 1 is 3 and of SILC is 2 which is found statistically significant. Median score of CLC on day 7 is 2 and of SILC is 1 which is found statistically significant post-operative port site hematoma on day 1 which shows no difference in two group.

In both group 2 patient got complications in the form of gall bladder perforation and bile spillage. No major complications occur in either of group. Median score of duration of discharge for both groups is 2 days .One patient from each group developed wound infection.

Table 1: Comparison between SILC and CLC with parameters.

Parameters	SILC (N-30)	CLC (N-30)
Age (mean in years)	34.97	40.7
male: female	6:24	10:20
BMI <25 : >25	28:2	21:9
ERCP stented patient	4	2
Duration of surgery (average in min)	90.5	74
Bleeding in ML (<15: 15-50)	27:3	30:0
Conversion		
Two port	1	-
Multi-port	1	-
Open	1	1
Pain assessment (VAS) median score		
Day 1	2	3
Day 7	1	2
Port site hematoma	2	2
Additional analgesia	2	2
Complications	2	2
Day of discharge		
Median score in days	2	2
Wound infection	1	1
Cosmesis		
median score	20	16
Range	13-21	12-18

DISCUSSION

The natural progression of any surgical technique is gradual improvement and change. Open surgery was the mainstay of general surgery, but over the years due to the quest for excellence the procedures evolved, becoming less invasive with smaller incisions. The level of patient's awareness and with increasing demands on part of the patients regarding better and acceptable cosmetic outcomes, reduced morbidity and less period of hospitalization, more and more efforts were made by the surgeons to develop and refine the existing techniques and procedures to meet the patient needs without compromising the basic principles.

Since 1992 laparoscopic cholecystectomy has been recognized as the "Gold Standard" procedure for gallbladder surgery.[5] Surgeons has tried to reduce the number and size of ports in laparoscopic surgery to minimize the parietal trauma, improve cosmetic results and patient satisfaction. It leads to innovation of two development NOTES and SILC. Many studies were conducted comparing SILC and multi-port cholecystectomy, finding out feasibility with confounding results.

In our study we found the mean operating time for SILC was 90.5±16.37 minutes, whereas the mean operating time for CLC was 74±17.83 ($p = 0.0004$).

Chow et al. in 2010 in their comparative study found that the mean operative times for SILC was 126 min. and for 4-port laparoscopic cholecystectomy was 95.8 min ($p < 0.001$).[6] Sajid et al in their meta-analysis of randomized controlled trials encompassing 858 patients found the operating time for SILC was significantly longer than for conventional laparoscopic cholecystectomy ($p < 0.0001$).[7]

In the present study we studied the conversion rate for SILC to conventional laparoscopic cholecystectomy or open cholecystectomy. One patient of CLC got converted to open cholecystectomy. One patient of SILS got converted to each two port, multiport and to open cholecystectomy. Conversion of SILS to two port or multiport was mainly because of the use of conventional laparoscopic instrument. Phillips et al. in a randomized controlled trial consisting of 200 patients found that out of the 117 patients who underwent SILC only one required conversion to 4-port laparoscopic cholecystectomy.[8]

We compared pain using the visual analogue scale (VAS), one day after the surgery and on day 7. On day 1, we found that the median VAS score in SILC group was 2 with range 2-5 and on day 7 it was 1 with range 0-2 and in the conventional laparoscopic cholecystectomy group it was 3 with range 2-6 on day 1 and on day 7 it was 2 with range 1-3. Pain in the SILC group was found to be significantly low than CLC group ($p\leq 0.0001$). Pain in the CLC group was significantly more in the epigastric port site. Asakuma et al in randomized controlled trial found that the pain scores at 24 hours after the surgery were significantly less in SILC group than the conventional laparoscopic cholecystectomy group ($p = 0.002$).[9]

In the present study we evaluated the cosmetic outcome of the patients 1 month after the surgery. We used the body image questionnaire (BIQ) to compare the cosmetic outcome. Higher cosmetic scale score implies greater cosmetic satisfaction. The median cosmetic scale score for SILC group was 20 with range 13-21 and in conventional laparoscopic cholecystectomy group it was 16 with range 12-18 ($p <0.0001$). The cosmetic outcome at 1 month after surgery in SILC is significantly higher than that in conventional laparoscopic cholecystectomy group.

Bucher et al in 2011 in a randomized controlled trial consisting of 150 patients found that on day 30 the Body image scale score and Scar scale score in SILC group was significantly higher than the conventional laparoscopic cholecystectomy group ($p <0.028$).[10]

Other parameter like intra operative bleeding, conversion, port site hematoma, additional analgesia, complication like minor bile leak were found to statistically insignificant in both the group.

CONCLUSION

From the findings of the present study it can be concluded that the SILC was found to be equally good technique for laparoscopic cholecystectomies as compared with the conventional method. There was a distinct advantage of the SILC over the conventional technique in terms of cosmesis and pain on day 1 and day 7 of surgery; however the operative time required for the SILC was more than the conventional method. The results of different parameters evaluated during the present study were with the other studies reported in the literature.

ACKNOWLEDGEMENTS

Authors would like to thank the Dean, Seth GS Medical College and KEMH hospital, Parel, Mumbai, India.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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Cite this article as: Deolekar S, Thakur BA, Jajoo B, Shinde PR. Comparison of single incision laparoscopic cholecystectomy with conventional laparoscopic cholecystectomy using conventional laparoscopic instrument: a prospective observational study. Int Surg J 2017;4:514-8.