

Research Article

Single Incision Laparoscopic Cholecystectomy Using Harmonic Scalpel: A Single Institute Experience

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Received: 23.02.2021

Accepted: 09.03.2021

Published: 13.03.2021

Journal homepage:<https://www.easpublisher.com>**Quick Response Code**

Abstract: **Introduction-**Laparoscopic Cholecystectomy is the gold standard procedure for symptomatic cholelithiasis for years. Laparoscopic cholecystectomy procedure is refined over years to increase its efficacy, decrease complication rates and increase cosmeses. Single incision laparoscopic cholecystectomy being one of them. SILC has some documented advantages in comparison to four ports LC. Use of Harmonic Ace in SILC has further improved the efficiency of this procedure and complications rate has been decreased, thus making SILC a promising surgical technique in treatment of symptomatic cholelithiasis. **Methods-**Patients of symptomatic cholelithiasis were enrolled in the study and 35 patients underwent harmonic ace assisted single incision laparoscopic cholecystectomy. Results were documented in form of duration of surgery, quantity of CO₂ used, intra operative stone spillage, intra operative blood loss, post-operative pain at 6 hour and 24 hour after the surgery, duration of hospital stay, any postoperative complications. **Result:** Operative time, intra operative blood loss, amount of CO₂ used, post-operative pain score at 24 hour, intraoperatively stone spillage, all parameters were found to be statistically significant except for post-operative pain score at 6 hours, post-operative complications and conversion into 4 port / 2 port /open cholecystectomy which were not statically significant. **Conclusion:** SILC is emerging as a promising technique for symptomatic cholelithiasis and use of harmonic ace has improved it further in terms of less operative time, less amount of blood loss and CO₂ used, less chances of intraoperative stone spillage, less post-operative hospital stay, less pain post operatively.

Keywords: Laparoscopic Cholecystectomy Using Harmonic Scalpel.

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INTRODUCTION

In 1882, Carl Langebuch (1846-1901) of Germany performed the first cholecystectomy [1]. In 1985 (103 years later), Prof Dr Erich Mühe of Germany performed the first laparoscopic cholecystectomy (LC). The first reports of SILS cholecystectomy came in 1997 in a letter to the editor in the British Journal of Surgery by Navarra [2], Piskun reported on 10 patients on whom he performed a SILS cholecystectomy by placing two 5-mm trocars through a common umbilical incision and using transabdominal sutures to manipulate the gallbladder [3]. The fascial bridge between the two trocars was then joined and the specimen extracted through this single umbilical incision. The harmonic scalpel was introduced in 1993 (Ethicon Endo-Surgery). It has been shown to be a valuable tool for numerous surgical procedures; including cholecystectomy, bowel resection, and adhesiolysis [4]. The instrument minimizes lateral thermal tissue damage. There is almost no need for instrument changes.

At present, monopolar electrocautery is the main cutting method used for gallbladder dissection from the liver bed. It is associated with local thermal and distant tissue damage, which might cause inadvertent perforation of the gallbladder during gallbladder bed dissection [5]. Ultrasonic dissection generates less thermal injury, produces a smaller zone of tissue damage and more precise dissection, and has been suggested as an alternative to monopolar electrocautery in laparoscopic cholecystectomy [6]. Theoretical benefits for use of harmonic scalpel as dissection technique is –

1. Less operative time
2. Less bleeding
3. Early post-operative recovery
4. Less spillage of stones
5. Less chances of converting into open cholecystectomy
6. Less pain post operatively
7. Less amount of CO₂ used.

METHODS

All consecutive patients of symptomatic cholelithiasis confirmed by USG reporting and all patients are operated by same team of surgeons in the Department of General Surgery, IGMC Shimla.

Inclusion criteria for our study were

1. Age between 21 and 80
2. ASA score of <3
3. Symptomatic Gall stones

Patients in one of the following groups were considered as high risk patients and were not included in the study.

1. Patient with BMI >40
2. Patient with choledocholithiasis with cholelithiasis
3. Previous upper abdominal surgery
4. Patient with bleeding disorder
5. Acute cholecystitis
6. Patient on warfarin
7. Patient not willing to participate in Study.

All eligible patients underwent single incision laparoscopic cholecystectomy using harmonic ace by technique as described below-

SILC performed with the help of 2 slings of sutures, which included following steps:

1. Under general anesthesia, a 15-20 mm (approximately) curvilinear skin incision made through the inner margin of the umbilicus. Subcutaneous tunnelling was done on either side to avoid scissoring of instruments.

Pneumoperitoneum was created via closed method and set at pressure of 12 mmHg. Two 10 mm trocar, one for 10 mm 30 degree laparoscope and one trocar as a working port were inserted through incision.

2. Fundus of gall bladder was retracted with the help of a suture using a straight needle, which was inserted through right 8th intercostal space in the anterior axillary line. Needle was passed through seromuscular layer of the gallbladder fundus and pulled toward the anterior abdominal wall. This suture was used for retraction by the assistant.
3. Hartmann's pouch was punctured and retracted using the second suture which was inserted in the epigastrium and taken out through the right hypochondrium to expose calot's triangle.
4. Harmonic scalpel was used for calots triangle dissection. Cystic artery and duct were skeletonised and liga clips were applied. Sectioning was performed with application of harmonic ace on minimum position. The gallbladder dissection from the liver bed was carried out using the ultrasonically activated scalpel in the maximum position from the infundibulum to the fundus, taking advantage of the positive effects of cavitation and coagulation.
5. Extraction of gall bladder was done through 10 mm trocar after removal of the suspending sutures from the abdominal wall. The umbilical incision was closed with subcuticular sutures or metal clips.



The following parameters were recorded in each group-

A. Intraoperative Parameters

1. Operative findings including status of gall bladder, presence of adhesions, any intra operative stone spillage.

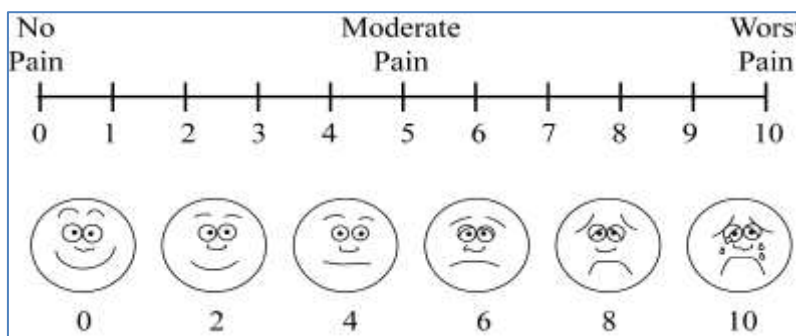
2. Operative time calculated (in minutes) for all cases from skin incision to skin closure
3. Bleeding –Assessed through gauge visual analogue method- % saturation of gauge piece

Size of gauge in c.m.	25% soaked	50% soaked	75%soaked	100% soaked
10x10	3 m.l.	6 m.l.	9 m.l.	12 m.l.
30x30	25 m.l.	50 m.l.	75 m.l.	100 m.l.
45x45	40 m.l.	80 m.l.	120 m.l.	160 m.l.

4. Quantity of CO₂ used
5. Use of drain
6. Conversion to Open Cholecystectomy / double port / four port cholecystectomy

B. Postoperative Parameters

1. Postoperative pain at 6h and 24h after surgery using visual analogue scale (VAS) used and the requirement of post-operative analgesics was noted.



Correlation between Visual and verbal scale

- 1-3 = mild pain
 - 4-6 = moderate pain
 - 7-10 = severe pain
2. Length of Hospital Stay (in days)
 3. Any postoperative complications

Data collected, cleaned and entered into excel spread sheet.

1. Expressions of discrete variables were as percentages or proportions.
1. Chi-Square test was used to study difference in distribution of discrete variables.
2. Expression of continuous variables were as Mean + SD or median + Interquartile range.
3. Significance of difference in continuous variables was analysed using Student T test or Wilcoxon Signed Rank Test depending on distribution of variables.
4. For all statistical analysis two tailed tests were used.

Data was analysed using Epi – info version 7.2.2. P value <0.05 was considered as statistically significant.

At the end of study data was compiled and outcome parameters were studied as follows:

- Duration of surgery
- Quantity of CO₂ used
- Intra operative stone spillage
- Intra operative blood loss
- Post-operative pain at 6 hour and 24 hour after the surgery
- Duration of hospital stay
- Any postoperative complications

RESULTS

Out of 35 patients, 5 patients were male and 30 were female. All underwent harmonic ace assisted dissection.

AGE DISTRIBUTION

PARAMETERS OBSERVED	Mean value with use of H.A
Operative Time(min)	33.9
CO ₂ Used (L)	30.2
Blood loss (ml)	20.96
Intraoperative stone spillage(no. of cases)	2
Conversion to four/double port/open cholecystectomy(no. of cases)	0
Pain score at 6 hour	5.8
Pain score at 24 hour	2
Length of hospital stay(days)	0.600
Post op complication	0

Mean operative time for is 33.9 ± 10.6 .

In terms of CO₂ used mean CO₂ used is 30.2 ± 14.9 litres.

Mean blood loss is 20.9 ± 35.6 ml.

Mean stay in hospital is 0.60 ± 0.64 days.

Average pain score at 6 hours and 24 hours is 5.84 and 2 respectively.

In terms of stones spillage, 2 patients had intra operative stone spillage.

No case was converted to open and there were no post-operative complications noted.

DISCUSSION

Our study is pilot study, so we cannot compare our data with other studies .However different parameters are discussed as follows and data from different studies (four port laparoscopic cholecystectomy based studies) is incorporated .Like our study operating time was significantly less with the use of harmonic in the study conducted by Jain *et al.* (64.7 ± 13.74 vs. 50 ± 9.36 ; $p = 0.001$) and Kadil *et al.* (61.88 ± 17.16 vs. 52.14 ± 9.8 ; $p < 0.0001$) [7, 8]. In their studies, Jain *et al.* and Kandil *et al.* have observed a significant reduction in blood loss [7, 8]. Huscher *et al.* [9] and Bessa *et al.* [10] suggest a significant reduction in blood loss in four port laparoscopic cholecystectomy, by use of harmonic ace like same results in our study. As in our study Kandil *et al.* showed in their study that the risk of GB perforation was significantly higher with the use of electrocautery but it was significantly reduced with the use of harmonic ace (18.6% vs. 7.1%, respectively; $p = 0.04$) [8]. Risk of GB perforation was not found significant in the study conducted by Mukesh *et al.* [11]. Mahabaleshwar *et al.* revealed a 14.23 times greater risk of GB perforation [12]. Mahabaleshwar *et al.* also concluded that the postoperative pain is less with the use of harmonic ace [12]. As in our study, post-operative pain scores after 24 hours were found to be significantly better in harmonic ace assisted LC by Kandil *et al.* as well (4.48 ± 1.89 vs. 3.12 ± 1.84 ; $p =$

0.000) [8]. Kandil *et al.* suggest less conversion rate with the use of HA. El Nakeeb *et al.* Suggest conversion rate was 5% with electrocautery group and 3.3% with HA group ($p = 0.65$). Guanqun *et al.* [13] shows mean stay in hospital after surgery as 3.0 ± 0.4 with the use of harmonic ace. Gelmini *et al.* [14] shows mean post-operative hospital stay as 2 days, but in our study post-operative hospital stay was statistically significant. Guanqun *et al.* Show no significant post-operative complications same as our study.

CONCLUSION

Gall stones are very common now days and are a major burden on health delivering facilities. Large number of surgeries is performed in our centre on daily basis. SILC being performed in our centre on regular basis so operative time is now comparable to four port laparoscopic cholecystectomy, it has got advantage in term of decrease post-operative pain and hospital stay , so burden on health care system is decreased. With the use of harmonic ace SILC has become a safe surgery in comparison to electrocautery assisted dissection. Post-operative hospital stay has decreased to some more extent; there is lesser post-operative pain and fewer chances of post-operative complications. All the above mentioned factors have decreased the morbidity and burden on health care facilities automatically decreased .So harmonic ace use has made SILC a better suited surgery and results are comparable to four port laparoscopic cholecystectomy.

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Cite This Article: Ashish Thakur *et al* (2021). Single Incision Laparoscopic Cholecystectomy Using Harmonic Scalpel: A Single Institute Experience. *East African Scholars J Med Sci*, 4(3), 66-70.