International Surgery Journal
Gupta P et al. Int Surg J. 2016 May;3(2):900-904
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20161164

Research Article

To compare single incision laparoscopic cholecystectomy with standard laparoscopic cholecystectomy for treatment of symptomatic cholelithiasis: a prospective randomized study

Pulkit Gupta[1], Naveen Kumar Agarwal[1]*, Preeti Gupta[2], Sohan Pal Singh[1]

[1]Department of Surgery, [2]Department of Radiodiagnosis, Muzaffarnagar Medical College and Hospital, Uttar Pradesh, India

Received: 14 March 2016
Accepted: 12 April 2016

***Correspondence:**
Dr. Naveen Kumar Agarwal,
E-mail: drnaveenagarwal@gmail.com

ABSTRACT

Background: SILC can best be described as a procedure in evolution. There is no consensus on surgical technique and exclusion criteria for SILC and conflicting reports regarding the merits and demerits of this procedure are present in literature. Efforts to improve outcomes of laparoscopic cholecystectomy heralded the advent of single incision laparoscopic cholecystectomy. The objective of this study was to evaluate and compares single incision laparoscopic cholecystectomy (SILC) with standard four port laparoscopic cholecystectomy (SLC).
Methods: All the 80 patients were operated by the same surgeon, all adult patients (>18years of age) with symptomatic cholelithiasis were included and were randomized to two groups, group A consisting of 40 patients undergoing SILC and group B consisting of 40 patients undergoing SLC. Patients with acute cholecystitis, empyema gall bladder, obstructive jaundice, choledocholithiasis, H/O ERCP or pancreatitis, previous abdominal surgery, pregnancy and major comorbidity were excluded. Results were compared with those of standard laparoscopic cholecystectomy (SLC).
Results: The mean operating time was 58.73 minutes as compared to 45.10 mins in SLC. Conversion to SLC was required in 4 patients with SILC and 4 patients' required one extra port. Mean VAS pain scores at 1hours (6.18 versus 6.53, p=0.206), at 6 hours (5.6 versus 6.12, p=0.112), and next morning (4.85 versus 4.75, p=0.772). Mean VAS score (9.27 versus 6.67, p=0.05) and mean VCS score (1.25 versus 4.05, p=0.04) for cosmesis. Additional analgesic was required in 32.5% versus 45% (p= 0.251). Significance was calculated by student "t" test. A p value less than .05 was considered significant.
Conclusions: Transumblical SILC is a superior alternative when cosmesis is considered and is comparable to SLC in terms of post-operative pain, hospital stay but the operative time is significantly more.

Keywords: SILC, SLC

INTRODUCTION

Laparoscopic cholecystectomy is considered as a gold standard for treatment of gallstone disease in the present era since its introduction in 1985.[2,3] Surgical standards of practice continue to evolve towards less invasive surgical approaches with fewer operative complications. Efforts to improve outcomes of laparoscopic cholecystectomy heralded the advent of single port laparoscopic cholecystectomy.[1] Major advantages proposed for this technique are that the patient experiences much less pain as compared to traditional laparoscopic surgery and recovers fasters there is only one incision. The healed incision leaves practically no scar, thus making SILC

cosmetically a superior option.[4,5] Major difficulties with this new technique is the sacrifice that has to be made in term of comfort and ergonomics. As all the instruments and camera are inserted through the same incision. The ability to triangulate instruments around the target is lost. SILC is a new advanced surgery which uses the specialized equipment which is very costly. SILC can best be described as a procedure in evolution. There is no consensus on surgical technique and exclusion criteria for SILC. Conflicting reports regarding the merits and demerits of this procedure are present. Modifications of existing laparoscopic instruments has been made to make SILC easier, however more complex modifications result in more expensive equipment. This study aims at testing the feasibility of single incision laparoscopic cholecystectomy and comparing it with standard four port cholecystectomy, by using standard laparoscopic instruments and ports available to all Laparoscopic surgeons.

METHODS

Approval from ethical committee of Institution was obtained to conduct the study. All patients >18 years presenting with symptomatic uncomplicated gall bladder stone disease confirmed by ultrasound in our unit from March 2014 to April 2015 were included in study. The study included 80 patients who were randomized by using sealed envelopes which were opened immediately before the surgery to group A consisting of 40 patients undergoing SILC and group B consisting of 40 patients undergoing conventional four port laparoscopic cholecystectomy. Patients with ultrasound findings of acute cholecystitis, empyema gall bladder, choledocholithiasis, pancreatitis, or obstructive jaundice previous abdominal surgery, pregnancy and major comorbidity were excluded. Informed consent for the procedure was taken. All the patients were operated under general anaesthesia.

Operative technique for SILC- umbilicus averted and 1.5 cm slightly curved transversely placed incision across the upper third of the umbilicus is deepened up to the fascia and upper flap is undermined for about 1 cm. The procedure is carried out at a pneumoperitonium of 14 mmHg. The scopes used are 10 and 5 mm, both 30 degrees, 10 mm clip applicator and routine laparoscopic instruments. 10 mm port is placed in midline and two 5 mm on each side of 10 mm by separate punctures. The three port punctures are 0.5 cm apart in transverse line. The camera assistant needs to hold the camera with his left hand and has to stand cranial to the operating surgeon, instead of standing behind the surgeon as in SLC. Gall bladder is extracted through 10 mm umbilical port. The trans fascial 10 mm hole at the umbilicus is closed usingvicryl and the umbilicus was then reconstructed.

Opeative technique for SLC- In standard laparoscopic cholecystectomy, after creating pneumoperitonium using veress10 mm laparoscope is inserted in to abdomen through the umbilical port. Three additional ports are then placed under direct vision (10 mm epigastric, 5mm in right subcostal area in mid clavicular line and 5mm in right axillary line). After dissection of calots triangle cystic duct and artery are clipped and transected. Gall bladder is then dissected from cystic plate and removed from epigastric port.

The following parameters were noted. Operative time was noted starting from time of giving incision to time of closure of skin, Perforation of the gall bladder during dissection, bile spillage, stones spillage was noted, Postoperative pain was assessed by an independent investigator using the visual analogue scale. This was done 1 hour and 6 hours after surgery, and repeated the next morning. Both groups were administered 75 mg of Diclofenac intra-muscularly, in the evening and next morning of surgery. Any additional analgesic requirement was noted, early postoperative complications in the form of bile leaks, infection and dehiscence were noted, cosmesis was judged, using the vancouver scar scale, at 3 weeks. Subjective satisfaction from the scar was assessed using a 10-point visual analogue scale; delayed complications in the form of biliary strictures or incisional hernia were assessed till 6 months after surgery.

RESULTS

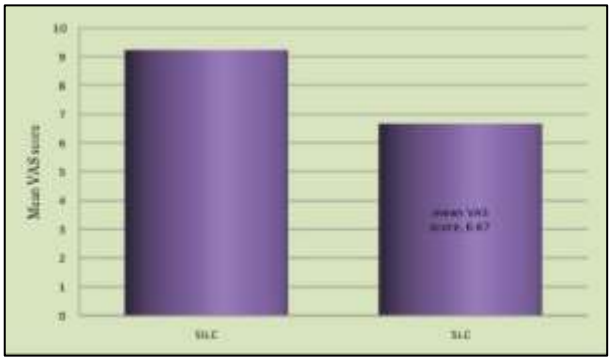

Figure 1: Mean VAS score.

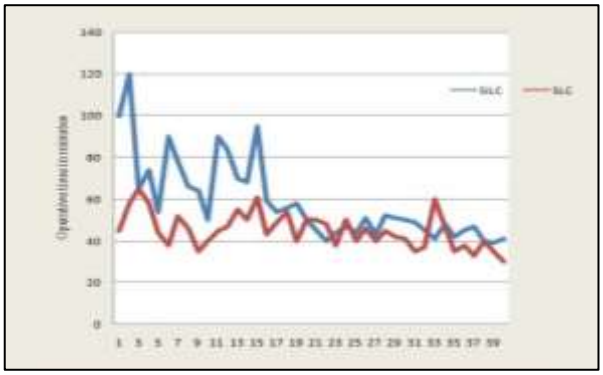

Figure 2: Operative time.

This The present study was conducted in Department of Surgery, Muzaffarnagar Medical College and Hospital, Uttar Pradesh, India. 80 patients were randomized to undergo single incision laparoscopic cholecystectomy (SILC) or conventional four port cholecystectomy. The two groups were compared to each other and the results are as follows.

Table 1: Comparison of parameters between SILC and SLC.

Parameter		SILC	SLC	P-value
Mean Age (years)		40.08 (18-75)	42.80 (22-45)	0.116
Sex	Males	10	8	0.363
	Females	30	32	
BMI		25.39 (19-32)	26.99 (20-34)	0.060 5
Mean operative time (minutes)		58.73	45.10	0.001
Mean OT of last 20 Patients (minutes)		45.20	41.1	0.05
Pericholecystic adhesions		8	6	0.556
Bile spillage		12	8	0.302
Requirement of extra port		4	0	0.112
Conversion		4	0	0.112
Mean pain score at 1 hours		6.18	6.53	0.206
Mean pain score at 6 hours		5.6	6.125	0.112
Mean pain score in morning		4.85	4.75	0.772
Additional analgesic requirement		13	18	0.251
Post-operative stay		1.88	2.20	0.214
No. of patients with wound infection		2	4	0.189
Mean score for cosmesis (VAS)		9.23	6.67	0.05
Mean score for cosmesis (VCS)		1.25	4.05	0.04

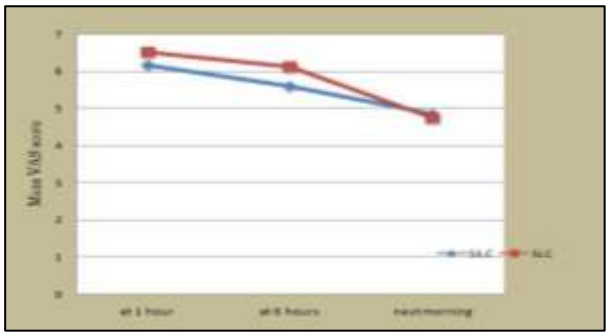

Figure 3: Postoperative pain.

DISCUSSION

With the advent of minimal access surgery there is a constant effort to reduce post-operative complications and improve cosmesis. This has led to introduction of SILC which involves performing the entire surgery through a single port site. Several studies have been conducted to compare both these techniques but no consensus has been reached as to which is better. Then there is an issue of relearning laparoscopic surgery and the possible need to invest in new and costly instruments for SILC approach. However on these two counts there is minimal disadvantage as SILC is an easily learnable and performable procedure, which adheres to the principles of laparoscopic surgery with few modifications and acceptable compromises. Also the procedure can be easily performed with standard laparoscopic instruments.

The port accessibility does not require new innovative and costly ports because more and more SILC procedures are being reported as using single incision technique with only conventional ports.[7-10] We routinely use one central 10 mm port and two low profile 5 mm tube ports (Figure 4 C). This helps by limiting the bulk of the ports and the related clashing at the umbilicus. In our opinion and practice a 10 mm and two 5 mm ports in the same transverse line can easily be accommodated through separate trans-fascial punctures in the 1.0-1.5 cm umbilical incision as the skin can be made to stretch in either direction. This is important, because if the punctures are too close, there is a chance of the holes joining each other, and then it becomes very difficult to maintain an adequate pneumo-peritoneum because of the leaking gas. Our policy was to visualise strasberg critical view before clipping cystic duct and cystic artery in order to maintain the safety of procedure.

The operating time for SILC was found to be significantly more than that of SLC. An inference that agrees with almost all reported studies.[11-14] This is partly a reflection of the increased operating time during the initial learning curve and the clashing and restricted mobility of the instruments at the very narrow umbilical fulcrum and careful closure of the umbilical port.[15] Although others have reported equal times for SILC and SLC after the learning curve is over. Our operating time also improved over the learning curve and experience, but was always significantly more than that for SLC. Adaptation to the endoscopic like end on view, of the telescope and lateral movements of the instruments with intra corporeal crossing give a more than adequate clearance of the Calot's triangle or the “strasberg's critical view”.

In our experience abdominal wall injury in the infra umbilical region was noted leading to contusion and pain in 2 patients. In SILC there is paucity of space outside the abdomen for free movement of instruments as all the instruments are entering from the farthest port; they are

also more obliquely placed compared with conventional laparoscopy.

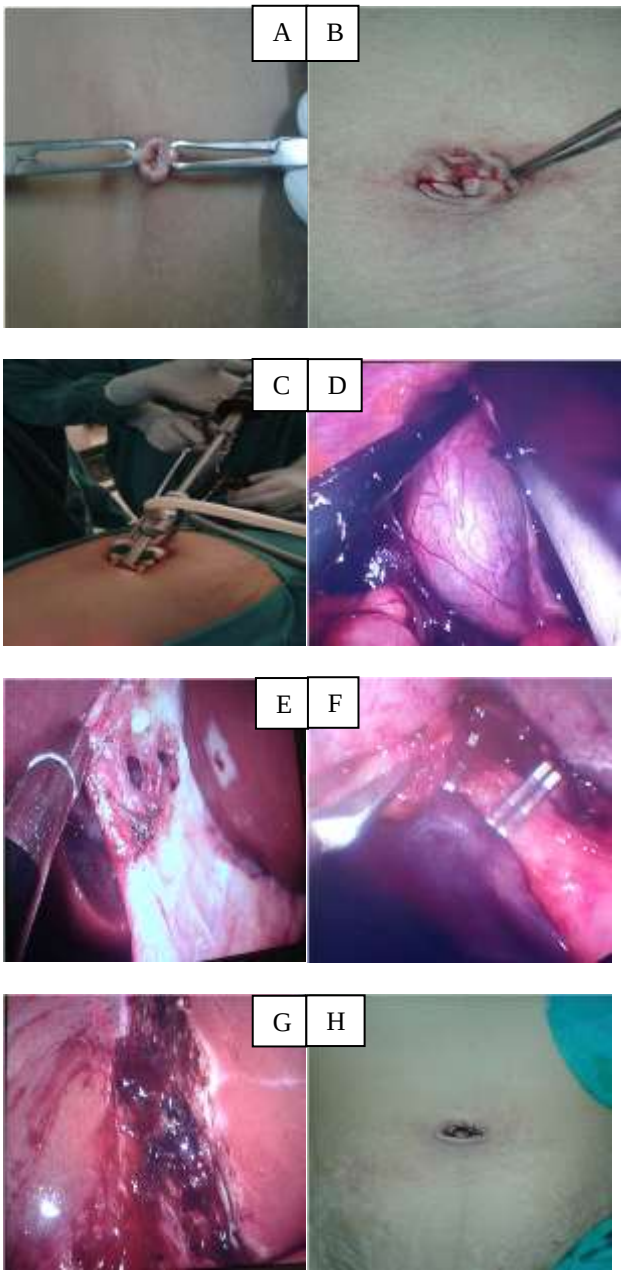

Figure 4: A-H; (A) Eversion of umbilicus, (B) trans umbilical incision, (C) port placement at umbilicus, (D) retraction of gall bladder, (E) Calot's dissection, (F) clipping of cystic duct, (G) hemostasis at gall bladder fossa, (H) postop umbilicus.

This leads to lowermost part coming in contact and putting pressure on the lower abdominal wall. Repeated pressure and longer duration of the operation could be the reason for the development of contusion. This could be prevented in subsequent cases by taking precaution not to put excessive pressure on abdominal wall and by placing cotton pad between instruments and abdominal wall. Four patients with difficult dissection in our study required an additional epigastric/subcostal port. The 4 conversions to standard laparoscopic cholecystectomy that we had were in patients with chronic cholecystitis where the thick gall bladder grasping was a problem and where the xiphiumbilical length was longer than our standard laparoscopic instruments. No patient was converted to open procedure. The common causes of conversion to SLC mentioned are inflammation, adhesions, excessive fibrosis and unclear Calot's anatomy. The conversion rates reported vary from 9.3% to 14.9%.[14,16]

Status of postoperative pain still remains unclear with varying reports in the literature of SILC resulting in less pain more pain or no difference as compared with SLC. Our figures suggest that though SILC has lower pain scores, there is no significant difference between the two groups.[12,13,17-19]

The final operative site scar at the umbilicus in SILC is cosmetically very acceptable, because after a month of surgery the scar is hardly seen. So is this an answer to scar less surgery? But this is only possible with trans umbilical incisions, which do not go beyond the umbilical ring as is our practice and is also mentioned in other reports. However, variations in the position of the single whole incision may not always result in scar less result. Thus infra umbilical incision, which been reported in other studies or the vertical incision although being functionally adequate, will not give as good a cosmetic result as the trans umbilical transverse incision.[21-23]

CONCLUSION

Single incision laparoscopic cholecystectomy is feasible using conventional laparoscopic instruments and has cosmetically better outcome as compared to SLC. There is no significant difference in post-operative pain, length of hospital stay and post-operative complications between SILC and SLC but operative time is significantly more in SILC.

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

REFERENCES

1. Navarra G, Pozza E, Occhionorelli S, Carcoforo P, Domini I. One wound laparoscopic cholecystectomy. Br J Surg. 1997;84:695.
2. Litynski GS. Highlights in the history of laparoscopy. Frankfurt, Germany: Barbara Bernert Verlag. The Journal of the American Association of Gynecologic Laparoscopists. 1997;4(5):624.
3. Reynolds W. The first laparoscopic cholecystectomy. JSLS. 2001;5(1):89-94.
4. Kehagias l, Karamanakos SN, Markopoulos GA, Kalfarentzos F. Benefits and drawbacks of SILC cholecystectomy: a report of 60 SILC cholecystectomies with conventional instruments

from an academic centre. Surg Innov. 2012;19(4):438-45.
5. Tacchina R, Greco F, Matera D. Single-incision laparoscopic cholecystectomy surgery without a visible scar. Surg Endosc. 2009;23:896-9.
6. Draaijers LJ, Tempelman FR, Botman YA, Tuinebreijer WE, Middelkoop E, Kreis RW, et al. The Patient and observer scar assessment acale: a reliable and feasible tool for scar evaluation. Plast Reconstr Surg. 2004;113(7):1960-5.
7. Romanelli JR, Roshek TB, 3rd, Lynn DC, Earle DB. Single-port laparoscopic cholecystectomy: Initial experience. Surg Endosc. 2010;24:1374-9.
8. Chow A, Purkayastha S, Aziz O, Paraskeva P. Single-incision laparoscopic surgery for cholecystectomy: an evolving technique. Surg Endosc. 2010;24:709-14.
9. Petrotos AC, Molinelli BM. Single-incision multiport laparoendoscopic (SIMPLE) surgery: early evaluation of SIMPLE cholecystectomy in a community setting. Surg Endosc. 2009;23:2631-4.
10. Chamberlain RS, Sakpal SV. A comprehensive review of single-incision laparoscopic surgery (SILS) and natural orifice transluminal endoscopic surgery (NOTES) techniques for cholecystectomy. J Gastrointest Surg. 2009;13:1733-40.
11. Marks J, Tacchino R, Roberts K, Onders R, Denoto G, Paraskeva P, et al. Prospective randomized controlled trial of traditional laparoscopic cholecystectomy versus single-incision laparoscopic cholecystectomy: Report of preliminary data. Am J Surg. 2011;201(3):369-73.
12. Ma J, Cassera MA, Spaun GO, Hammill CW, Hansen PD, Aliabadi-Wahle S. Randomized controlled trial comparing single-port laparoscopic cholecystectomy and four-port laparoscopic cholecystectomy. Ann Surg. 2011;254:22-7.
13. Lirici MM, Califano AD, Angelini P, Corcione F. Laparo-endoscopic single site cholecystectomy versus standard laparoscopic cholecystectomy: Results of a pilot randomized trial. Am J Surg. 2011;202:45-52.
14. Gangl O, Hofer W, Tomaselli F, Sautner T, F¨ugger R. Single incision laparoscopic cholecystectomy (SILC) versuslaparoscopic cholecystectomy (LC); a matched pair analysis, Langenbecks Arch Surg. 2011;396:819-24.
15. Qiu Z, Sun J, Pu Y, Jiang T, Cao J, Wu W. Learning curve of trans umbilical single incision laparoscopic cholecystectomy (SILS): a preliminary study of 80 selected patientswith benign gallbladder diseases. World J Surg. 2011;35:2092-101.
16. Antoniou SA, Pointner R, Granderath FA. Singleincisionaparoscopic cholecystectomy: a systematic review. Surg Endosc. 2011;25:367-77.
17. Bucher P, Pugin F, Buchs NC, Ostermann S, Morel P. Randomized clinical trial of laparoendoscopic single-site versus conventional laparoscopic cholecystectomy. Br J Surg. 2011;98:1695-702.
18. Tsimoyiannis EC, Tsimogiannis KE, Pappas-Gogos G, Farantos C, Benetatos N, Mavridou P, et al. Different pain scores in single transumbilical incision laparoscopic cholecystectomy versus classic laparoscopic cholecystectomy: A randomized controlled trial. SurgEndosc. 2010;24(8):1842-8.
19. Lee PC, Lo C, Lai PS, Chang JJ, Huang SJ, Lin MT, et al. Randomized clinical trialof single-incision laparoscopic cholecystectomy versus minilaparoscopic cholecystectomy. Br J Surg. 2010;97:1007-12.
20. Esposito C. One-trocar appendectomy in pediatric surgery. SurgEndosc. 1998;12:177-8.
21. Bresadola F, Pasqualucci A, Donini A, Chiarandini P, Anania G, Terrosu G, et al. Elective transumbilical compared with standard laparoscopic cholecystectomy. Eur J Surg. 1999;165:29-34.
22. Wheeless CR, Thompson BH. Laparoscopic sterilization: Review of 3, 600 cases. Obstet Gynecol. 1973;42:303-6.
23. Cuesta MA, Berends F, Veenhof AA. The invisible cholecystectomy: a transumbilical laparoscopic operation without a scar. Surg Endosc. 2008;22:1211-3.

Cite this article as: Gupta P, Agarwal NK, Gupta P, Singh SP. To compare single incision laparoscopic cholecystectomy with standard laparoscopic cholecystectomy for treatment of symptomatic cholelithiasis: a prospective randomized study. Int Surg J 2016;3:900-4.