



COMPARATIVE STUDY BETWEEN SINGLE INCISION AND STANDARD LAPAROSCOPIC CHOLECYSTECTOMY

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ABSTRACT **Aim:** To do a comparative study of the feasibility, practicality advantages and shortcomings of Single Incision Laparoscopic Surgery, using conventional ports and instruments; with conventional laparoscopic surgery.

Material And Methods: This comparative randomised study was conducted in a tertiary care centre teaching hospital, Maharani Laxmi Bai Medical College, Jhansi between February 2019 to September 2020. 50 consecutive patients who fit into the inclusion criteria were included in the study. Patients were included in the multiport cholecystectomy arm and in the single port cholecystectomy arm.

Result: The mean operating time was higher in the SLC group (41.88±7.178min vs 34.72±5.842 min) which was statistical significant (p value=0.003).

Conclusion: Time required for single incision laparoscopic cholecystectomy is higher than for standard laparoscopic cholecystectomy, probably because it is technically difficult.

KEYWORDS : Four port technique, Laparoscopic surgery, Single port surgery

INTRODUCTION

Laparoscopic cholecystectomy is the standard operative procedure for patients with symptomatic cholelithiasis^[1]. Introduced in 1985, laparoscopic cholecystectomy, has been an important development in general surgery^[2-3]. Its introduction resulted in surgical procedures with reduced blood loss, enhanced recovery and less major wound complications. Single incision laparoscopic surgery techniques were introduced in the 1990s^[4]. When performing this particular type of laparoscopic surgery only one incision is made, usually through the umbilicus. In general, smaller and fewer incisions result in less pain, accelerate postoperative recovery and improve cosmetic result^[5-6]. After its introduction, standard multiport cholecystectomy was for a long time under debate and frequently contradicted, a situation in which nowadays single-port cholecystectomy finds it-self in. Some studies report higher percentages of bile duct injuries, more blood loss and longer operating time when performing single port cholecystectomy^[7-8]. In contrast, although other studies suggest that single site laparoscopic surgery is a safe and adequate procedure, single site surgery for cholecystectomy for uncomplicated cholelithiasis is still subject of debate^[9-11].

AIM AND OBJECTIVES

Aim:

- To do a comparative study of the feasibility, practicality advantages and shortcomings of Single Incision Laparoscopic Surgery, using conventional ports and instruments; with conventional laparoscopic surgery.

Objectives:

- To evaluate the advantage of SILC procedures for cholecystectomy in comparison to conventional laparoscopic procedures
- To evaluate operative feasibility of SILC using conventional laparoscopic instruments.
- To evaluate complications and disadvantages of SILC by conventional laparoscopic instruments in comparison to multiport laparoscopic procedures.
- The comparison will be done on following parameters:
 - Intraoperative complications
 - Operative time
 - Blood loss
 - Rate of conversion
 - Intra corporeal knotting/clipping
 - Drain (morrison pouch)
 - Post operative complication
 - Wound complication
 - Bile leakage
 - Bile duct injury
 - Post operative pain score (VAS)
 - Post operative hospital stay
 - Primary outcome
 - Cosmesis score [1-10]
 - Length of incision
 - Time to initial oral intake
 - Time to return work
 - Quality of life score

MATERIAL AND METHODS

Study Design:

This comparative randomised study was conducted in a tertiary care centre teaching hospital, Maharani Laxmi Bai Medical College, Jhansi between February 2019 to September 2020.

Methodology:

50 consecutive patients who fit into the inclusion criteria were included in the study. Patients were included in the multiport cholecystectomy arm and in the single port cholecystectomy arm.

Patients Selection:

The inclusion criteria were:

- Age of patient between 15 and 60 years
- Diagnosis of chronic/acute cholecystitis, symptomatic cholelithiasis, recurrent mild biliary pancreatitis, Gall Bladder (GB) polyp, GB Sludge, empyema, mucocele

The exclusion criteria were:

- Severe co-morbid conditions (uncontrolled diabetes, hypertension, severe direct hyper bilirubinemia)
- ASA Grade-4

Randomization:

Random allocation of patients presenting with symptoms suggestive of gallbladder disease with confirmatory USG study was done to the two groups using the sealed envelope technique which was opened just before the skin incision. The two groups were as follows

- Group 1: Single Port Umbilical Surgery
- Group 2: Standard (4 port/ 3 Port) Laparoscopic Surgery

Data Collection:

Patient data were kept in computer data files and also a hand written proforma has been filled by residents of dept.

The details of preoperative assessment, intraoperative observation, postoperative course and postoperative follow up with reference to following points were recorded in a proforma.

Imaging Study:

- USG abdomen
- MRCP to rule out CBD stone in doubtful cases.

Operative Method:

- In Single incision laparoscopic surgery
- A single trans-umbilical 1.5 – 1.8 cm incision is made by pulling out umbilicus by allis forceps.
- Veress needle inserted and pneumoperitoneum created & maintain by CO₂.
- After exposing the Fascia one 10 mm port. two 5mm ports are inserted, through the anterior sheet of abdominal rectus muscle, each placed 1cm laterally from 10 mm port.
- Further technique will differ with different type of SILS procedure. For example in Cholecystectomy- After insertion of 5mm port, patients put in Anti trendelenberg position & tilted to left.
- Dissection performed with grasper in left hand & maryland dissector with cautery attached in right hand.
- The cystic artery & duct were first exposed then separately clipped with standards 5mm scope in left 5mm trocar & 10mm clip applicator in 10 mm ports.
- The gall bladder then extracted with a standard GB grasper through umbilical site. Careful control of haemostasis is achieved.
- Finally port site was closed with an absorbable suture & the umbilical restored to its anatomical position.
- Standard laparoscopic cholecystectomy would be carried out by 3 or 4 port technique.

RESULT

Parameters	Group A (SILC) [n=25]	Group B (SLC) [n=25]	p value
Mean Age	34.12±12.524	43.56±12.203	0.01 (S)
BMI (18.5-24.9)	25.71±2.596	26.25±2.805	0.48 (NS)
Hemoglobin (13-17)	11.86±1.873	11.45±0.867	0.32 (NS)
S. Albumin (3.8-5.5)	4.27±0.556	6.11±8.733	0.29 (NS)
S.ALP (<270 IU/L)	70.30±23.965	71.60±27.665	0.85 (NS)
S. Bilirubin Total (0-1.2 mg/dl)	1.00±0.280	1.05±0.183	0.45 (NS)
S. Bilirubin (0-0.2 Direct mg/dl)	0.63±0.158	0.95±1.474	0.28 (NS)
Mean operating time (in min)	41.88±7.178	34.72±5.842	0.03 (S)
Mean post operative pain score (VAS)			
8 hours	5.00±0.000	5.00±0.000	1.00 (NS)
16 hours	4.00±0.000	4.00±0.000	1.00 (NS)
24 hours	3.08±0.227	3.27±0.458	0.06 (NS)
48 hours	2.20±0.408	2.08±0.277	0.22 (NS)
Time to initial oral intake (in hour)	8.88±0.971	8.40±7.707	0.75 (NS)
Mean discharge time (in days)	2.52±0.770	2.40±0.645	0.55 (NS)
Mean time to return work (in days)	4.44±1.121	4.08±1.187	0.27 (NS)

DISCUSSION

As more and more procedures get included in the single incision laparoscopic surgery (SILS) basket, the all important question still remains partly answered. Is there any advantage of SILS approach over the standard laparoscopic surgery? Then there is the issue of re-learning laparoscopic surgery and the possible need to invest in new and costly instruments for the SILS approach. However, on the latter two counts there is minimal disadvantage as SILS is an easily learnable and performable procedure, which adheres to the principles of laparoscopic surgery albeit with a few modifications and acceptable compromises. Also the procedure can, just as easily or even more so, be performed with standard rigid laparoscopic instruments^[17-20]. We have been using the standard rigid laparoscopic instruments for all our SILC procedures. Cautery attachment point at the proximal end of the

instrument should be in line with the long axis rather than jutting out cranially^[12].

The majority of comparative studies have shown that the time required to complete the SILC procedure is greater as compared to 3 port or 4 port SLC (Marker SR et al^[13], A. Agrusa et al^[14], L. Geng et al^[15], L.N. Jorgensen et al^[16], Brittney Culp et al^[17], Sinha et al^[12]) but Ugurlu Umüt et al^[18] from Turkey in 2013 reported that the SILC procedure required less time as compared to SLC procedure.

My study also concurs with the finding of a statistically increased operative time for SILC procedure (mean operating 42 minutes and in SLC mean operating time 35 minutes, p value=0.003 [S]).

Peroperative Complication:

Sinha et al^[12] study showed that post operative biliary leak was 0.52% in SILC group and <0.8% in SLC group, which was not significant.

The majority of comparative studies have shown that the incidence of biliary complication is similar in both the groups (Pierre Allemann et al^[28], Sinha et al^[12]) but Joseph mark et al in his 2012 study showed increase in the rate of bile duct injury in SILC procedure as compared to SLC procedure.

My study concurs with the fact that the incidence of per operative complications (per operative bleeding) is more in SILS group than SLC group.

Morrison's Pouch Drain:

In my study morrison's drain put in only 3 patient of SILS group while in SLC group morrison's drain put in all the patients.

Postoperative Complication:

The majority of comparative studies have shown no difference in postoperative wound complication or biliary peritonitis (Hauters P. et al^[19], Partelli. S et al^[20], Pulkit Gupta et al^[21]) but Lianhyuan Geng et al^[15] showed that wound infections were a major concern after SILC.

But this current study shows increase incidence of post operative wound complications in SLC (8%) than SILS (4%).

Need For Analgesia And Mean Post Operative Pain Score (VAS):

The majority of comparative studies have shown less post operative pain in SILC group as compared to SLC group (Waldemar Kurpiewski et al^[22], Zahid Mehmood et al^[23], Lianhyuan Geng et al^[15], A Agrusa et al^[14], Partelli et al^[20], Sinha Rajeev et al^[12]) but Marker SR et al^[13], Zehetner et al^[17] and Kimbelry M. Brown^[24] reported no significant difference between both the groups.

But this current study not concurs with the fact that the incidence of post operative pain is less in SILC group as compared to SLC group. There is not significant p value (0.2297 [NS]).

Mean Time To Initial Oral Intake:

Geng L et al^[15] showed that time to initial oral intake is identical in both the groups.

In this current study time to initial oral intake for SILC group was 8.88±0.971 and for SLC group was 8.40±7.707 which is not statistically significant.

Mean Discharge Time:

Yilmaj et al^[25] showed no significant difference between SILC and SLC with regard to time of hospital stay.

The majority of comparative studies (Lianhyuan Geng et al^[15], A Agrusa et al^[14], Zehetner et al^[17], Sinha Rajeev et al^[12], Yilmaj et al^[25]) have shown no significant difference in hospital stay in both the groups.

This current study also showed similar post operative hospital stay 2.52±0.770 in SILC and 2.40±0.645 in SLC group.

Mean Time To Return Work:

Sinha et al^[12] study showed that time to resume work was identical in both the groups.

In my study mean time to resume work in SILC group was 4.44±1.121 days where is 4.08±1.187 days in SLC group, which was not

significant.

This current study result match with Geng L et al^[15] and Sinha et al^[21].

CONCLUSION

In our study the following conclusions were made:

1. Patients presenting to Maharani Laxmi Bai Medical College with gall stone diseases were maximally between 31-50 years of age. In my study SILS in preferred in young age group.

2. Time required for single incision laparoscopic cholecystectomy is higher than for standard laparoscopic cholecystectomy, probably because it is technically difficult.

3. There is no significant difference in intra operative complications, post operative complications, intensity of pain, length of postoperative hospital stay, time to oral intake and time to resume work occurred in the single port surgery as compared to standard laparoscopic cholecystectomy.

4. Mortality was nil in the present study. The sample size in our study is small to make any definite conclusion. The procedure can be selectively and judiciously performed by surgeons trained in regular laparoscopic surgery specially those doing 4 port laparoscopic cholecystectomy. Widespread application must await results obtained from level I evidence from prospective trials.

REFERENCES:

- Madureira FA, Manso JE, Madureira Fo D, Iglesias AC. Randomized clinical study for assessment of incision characteristics and pain associated with LESS versus laparoscopic cholecystectomy. *Surg Endosc.* 2013;27:1009–1015.
- Luna RA, Nogueira DB, Varela PS, Rodrigues Neto Ede O, Norton MJ, Ribeiro Ldo C, Peixoto AM, de Mendonça YL, Bendet I, Fiorelli RA, et al. A prospective, randomized comparison of pain, inflammatory response, and short-term outcomes between single port and laparoscopic cholecystectomy. *Surg Endosc.* 2013;27:1254–1259.
- Saad S, Strassel V, Sauerland S. Randomized clinical trial of single-port, minilaparoscopic and conventional laparoscopic cholecystectomy. *Br J Surg.* 2013;100:339–349.
- Inoue H, Takeshita K, Endo M. Single-port laparoscopy assisted appendectomy under local pneumoperitoneum condition. *Surg Endosc.* 1994;8:714–716.
- 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;98:1695–1702.
- Reibetanz J, Ickrath P, Hain J, Germer CT, Krajcinovic K. Single-port laparoscopic cholecystectomy versus standard multiport laparoscopic cholecystectomy: a case-control study comparing the long-term quality of life and body image. *Surg Today.* 2013;43:1025–1030.
- Trastulli S, Cirocchi R, Desiderio J, Guarino S, Santoro A, Parisi A, Noya G, Boselli C. Systematic review and meta-analysis of randomized clinical trials comparing single-incision versus conventional laparoscopic cholecystectomy. *Br J Surg.* 2013;100:191–208.
- Joseph S, Moore BT, Sorensen GB, Earley JW, Tang F, Jones P, Brown KM. Single-incision laparoscopic cholecystectomy: a comparison with the gold standard. *Surg Endosc.* 2011;25:3008–3015.
- Wagner MJ, Kern H, Hapfelmeier A, Mehler J, Schoenberg MH. Single-port cholecystectomy versus multi-port cholecystectomy: a prospective cohort study with 222 patients. *World J Surg.* 2013;37:991–998.
- Gangl O, Hofer W, Tomaselli F, Sautner T, Függer R. Single incision laparoscopic cholecystectomy (SILC) versus laparoscopic cholecystectomy (LC)-a matched pair analysis. *Langenbecks Arch Surg.* 2011;396:819–824.
- van den Boezem PB, Kruyt PM, Cuesta MA, Sietses C. Single-incision versus conventional laparoscopic cholecystectomy: a case control study. *Acta Chir Belg.* 2012;112:374–377.
- Sinha R. Transumbilical single-incision laparoscopic cholecystectomy with conventional Instruments and ports: The way forward? *J Laparoendosc Adv Surg Tech A.* 2011;21:497–503.
- Markar SR, Karthikesalingam A, Thrumurthy S, Muirhead L, Kinross J, Paraskeva P. Single-incision laparoscopic surgery (SILS) vs. conventional multiport cholecystectomy: systematic review and meta-analysis. *Surg Endosc.* 2012 May;26(5):1205-13.
- A. Agrusa. Laparoscopic, three-port and SILS cholecystectomy: a retrospective study. *G Chir.* 2013 Sep-Oct; 34(9-10): 249–253. Published online 2013 Oct 29.
- Liangyuan Geng, Changhua Sun, Jianfeng Bai: "Single Incision versus conventional laparoscopic cholecystectomy Outcomes: A meta analysis of randomized controlled trials" October 02, 2013.
- Jørgensen LN, Rosenberg J, Al-Tayar H, Assaadzadeh S, Helgstrand F, Bisgaard T. Randomized clinical trial of single- versus multi-incision laparoscopic cholecystectomy. *Br J Surg.* 2014 Mar;101(4):347-55.
- Zehetner J, Pelipad D, Darehzereshki A, Mason RJ, Lipham JC, Katkhouda N. Single-access laparoscopic cholecystectomy versus classic laparoscopic cholecystectomy: a systematic review and meta-analysis of randomized controlled trials. *Surg Laparosc Endosc Percutan Tech.* 2013 Jun;23(3):235-43.
- Umit Ugurlu, MD, M. Tahir Oruc, MD. Comparison of Single-incision Laparoscopic Cholecystectomy with Standart Laparoscopic Approach. Society of American Gastrointestinal and Endoscopic Surgeons. Program Number: P516
- Hauters P, Auvray S, Cardin JL, Papillon M, Delaby J, Dabrowski A, Framery D, Valverde A, Rubay R, Siriser F, Malvaux P, Landenne J. Comparison between single-incision and conventional laparoscopic cholecystectomy: a prospective trial of the Club Coelio. *Surg Endosc.* 2013 May;27(5):1689-94.
- Partelli S, Barugola G, Sartori A, Crippa S, Falconi M, Ruffo G. Single-incision laparoscopic cholecystectomy versus traditional laparoscopic cholecystectomy performed by a single surgeon: findings of a randomized trial. *Surg Today.* 2016 Mar;46(3):313-8.
- Pulkit Gupta1 , Naveen Kumar Agarwal1 *, Preeti Gupta2 , Sohan Pal Singh1.To compare single incision laparoscopic cholecystectomy with standard laparoscopic

- cholecystectomy for treatment of symptomatic cholelithiasis: a prospective randomized study. *Gupta P et al. Int Surg J.* 2016 May;3(2):900-904
- Kurpiewski W, Pesta W, Kowalczyk M, Glowacki L, Juśkiewicz W, Szykarczuk R, Snarska J, Stanowski E. The outcomes of SILS cholecystectomy in comparison with classic four-trocar laparoscopic cholecystectomy. *Wideochir Inne Tech Maloinwazyjne.* 2012 Dec;7(4):286-93.
- Zahid Mehmood, Anis Subhan, Nasir Ali, Shahid Rasul, Mazhar Iqbal, Rabbia Khan, Muhammad Tariq Karim, Syed Mohammad Shafqutallah, Mirza Sikander Baig. Four Port versus Single Incision Laparoscopic Cholecystectomy. *Journal of Surgery Pakistan (International)* 15 (3) July - September 2010
- Brown KM, Moore BT, Sorensen GB, Boettger CH, Tang F, Jones PG, Margolin DJ. Patient-reported outcomes after single-incision versus traditional laparoscopic cholecystectomy: a randomized prospective trial. *Surg Endosc.* 2013 Sep;27(9):3108-15.
- Husnu Alptekin, Huseyin Yilmaz, Fahrettin Acar, M Ertugrul Kafali. ncisional Hernia Rate May Increase After Single-Port Cholecystectomy Article (PDF Available) in *Journal of Laparoendoscopic & Advanced Surgical Techniques* 22(8):731-7 - October 2012 with 214 Reads.