

FOUR PORT VERSUS SINGLE INCISION LAPAROSCOPIC CHOLECYSTECTOMY

ZAHID MEHMOOD, ANIS SUBHAN, NASIR ALI, SHAHID RASUL, MAZHAR IQBAL,
RABBIA KHAN, MUHAMMAD TARIQ KARIM, SYED MOHAMMAD SHAFQUTALLAH,
MIRZA SIKANDER BAIG

ABSTRACT

<i>Objective</i>	<i>To compare the conventional four port laparoscopic cholecystectomy with the single incision laparoscopic cholecystectomy (SILS).</i>
<i>Study design</i>	<i>Randomized controlled trial.</i>
<i>Place & Duration of study</i>	<i>Surgical Ward 3, Jinnah Postgraduate Medical Center Karachi, from October 2009 to March 2010.</i>
<i>Methodology</i>	<i>This study was carried out on sixty patients, divided into 2 equal groups of 30 patients each. Group I, was offered four port laparoscopic cholecystectomy and in group II, single incision laparoscopic surgery was performed. Mean operative time, duration of hospital stay, pain score and infection rate were compared between two groups.</i>
<i>Results</i>	<i>Female predominance was found. There were 26 (86.7%) and 28 (93.3%) females in group I and II respectively. Mean age of the patients was 42.67 ± 9.05 years and 44.42 ± 8.59 years in group I and II respectively. The operative time was 38.50 ± 8.92 minutes and 80.17 ± 30.16 minutes in group I and II respectively that showed significantly higher mean operative time in group II than group I (<i>p</i> value 0.0001). Pain was measured as continuous variable using VAS scale (0-10 cm scale). It was 2.93 ± 0.98 in group I and 5.23 ± 1.52 in group II. There was no case of wound infection in group I whereas in group II there were 2 (6.66%) cases. Mean hospital stay was significantly higher in group II as compared to group I.</i>
<i>Conclusion</i>	<i>SILS should be performed in selected patients who have more concern of cosmesis.</i>
<i>Key words</i>	<i>Laparoscopic cholecystectomy, Single incision laparoscopic cholecystectomy, Cholecystectomy.</i>

INTRODUCTION:

Laparoscopic cholecystectomy is the gold standard treatment for symptomatic gall bladder disorders all over the world. This operation is conventionally performed by using four ports into the abdomen.¹ The tendency of minimizing surgical trauma encourages the use of new approaches in laparoscopic surgery.² In recent years, successful

attempts to reduce number of traditionally used four ports have been reported. Reducing the number of ports has been shown to improve outcomes.³ Later three-port and two-port laparoscopic cholecystectomy were described and have been reported as safe and feasible.⁴

In the new era of minimal access surgery, the preferred outcomes under consideration are not only the safety, but also quality, which is often defined by pain and cosmetic results. Scar-less surgery is the ultimate goal for both, surgeons and the patients.⁵

Correspondence:

Dr. Zahid Mehmood
Surgical Ward-3, Jinnah Postgraduate Medical Centre,
Karachi, Pakistan.
E-mail: drzmpk@yahoo.com

Single-incision laparoscopic surgery is a rapidly evolving field as a bridge between traditional

laparoscopic surgery and natural orifice transluminal endoscopic surgery. SILS can be performed using refinements of existing technology, and surgeons can perform SILS without any new instruments, specific competence, or training.⁶ These efforts are some of the fundamentals of the natural orifice transluminal endoscopic surgery (NOTES) approach,⁷⁻¹⁰ which obviates transabdominal incisions completely.

SILS was described as early as 1992 by Pelosi *et al*,¹¹ who performed a single-puncture laparoscopic appendectomy, and in 1997, by Navarra *et al* who performed a laparoscopic cholecystectomy via two transumbilical trocars and three transabdominal gallbladder stay sutures.¹² The objective of this study was to compare the conventional four port laparoscopic cholecystectomy with the single incision laparoscopic cholecystectomy.

METHODOLOGY:

This study was conducted in surgical ward 03, Jinnah Postgraduate Medical Centre, Karachi from October 2009 to March 2010. This was a randomized controlled trial. Sixty patients of symptomatic gall stones were included in this study. Patient with acute attacks of cholecystitis were excluded. Patients were informed about the SILS technique and written consent was obtained.

Patients were divided into two groups using sealed opaque envelops. Patients in a group I (n=30) were treated by four port laparoscopic cholecystectomy and patients of group II (n=30) were treated by single incision laparoscopic cholecystectomy. Patients were evaluated for postoperative pain, operative time, wound infection and hospital stay. Means with standard deviations were obtained for numerical variables. Comparison was made using student t test. Pain was measured as continuous variable using VAS scale (0-10 cm scale).

The surgery in both the groups was performed by a general surgeon having more than 5 years of experience. In group I four ports were placed, 10mm infraumbilical for camera, 10mm epigastric port for dissection and two 5mm ports right laterally for retraction. After identification of Calot's triangle the cystic duct and artery were separated, clipped and divided. The gall bladder was separated from the liver by hook electrocautery and hemostasis secured. Hepatobiliary area was washed with normal saline and gall bladder removed from infra-umbilical port. Infra-umbilical port was closed with 2/0 interrupted polyglycolic suture and skin of all the four ports with polyglycolic Rapide 3/0 (Ethicon).

In group II, single intra-umbilical 15mm incision was made by pulling out the umbilicus. After exposing the fascia, a SILS TM port was introduced. Three trocars introduced through the SILS port one for camera, second for articulating grasper to hold the neck of gall bladder and third for dissection. An additional 2/0 polypropylene suture on straight needle was introduced through the abdominal wall to retract the fundus of gall bladder. After appropriate exposure of Calot's triangle, the cystic duct and artery were separated, clipped and divided. The gall bladder was separated from the liver by hook electrocautery. Just before completion of liver dissection, hemostasis of liver bed was secured and the hepatobiliary area irrigated with normal saline. The gall bladder was removed with single port device and sent for histopathology. Abdominal wall was closed with interrupted polyglycolic 2/0 and umbilicus was sutured with 3/0.

RESULTS:

Out of total of 60 patients included in the study 54 were females. There were 26 (86.7%) and 28 (93.3%) females in group I and II respectively, while only 4 (13.3%) males were in group I and 2 (6.7%) in group II. This was not significant variable between the groups (p 0.67). The mean age of the patients was 42.67 ± 9.05 years and 44.42 ± 8.59 years in group I and group II respectively.

Operative time was 38.50 ± 8.92 minutes and 80.17 ± 30.16 minutes in group I and II respectively. There was significantly higher mean operative time in group II than group I (p value 0.0001). The mean VAS score was also found higher in group II than group I (p value 0.0001). It was 2.93 ± 0.98 in group I and 5.23 ± 1.52 in group II. There was no case of wound infection in group I whereas in group II there were 2(6.66%) cases of wound infection, which was statistically insignificant difference between the groups (p=0.492). Mean hospital stay was also significantly higher in group II than group I (1.00 ± 0.00 days and 1.70 ± 0.79 days, p<0.0001) as shown in table-I.

DISCUSSION:

Laparoscopic surgery is a well-established alternative to open surgery across disciplines. Although the magnitude of impact varies by procedure, generally the benefits of laparoscopy on postoperative pain, cosmetics, hospital stay, and convalescence are recognized widely. Many surgeons have attempted to reduce the number and size of ports in laparoscopic surgery to decrease abdominal trauma and improve cosmetic results, and recently two innovations have been developed:

Table I: Outcome of Single Versus Multiple Ports (n=60)

Variables	Group I (n=30)	Group II (n=30)	p-value
Operative Time (Minutes)	38.50±8.92	80.17±30.16	0.0001
Postoperative Pain	2.93±0.98	5.23±1.52	0.0001
Wound Infection (Number)	No infection	2(6.66)	0.492
Hospital Stay (Days)	1.00±0.00	1.70±0.79	0.0001

NOTES, which removes transabdominal incisions completely and SILS, which completes laparoscopic procedures by trocars located at one umbilical incision.⁶

The laparoscopic surgeons are developing and using a number of different techniques all over the world. Ng WT described laparoscopic cholecystectomy using a single, supra-umbilical incision; however, the single wound is, in fact, merely the result of combining the camera and adjacent 10-mm working ports.¹³ Preliminary results with this system have been reported with successful performance of laparoscopic renal surgery.¹⁴ Laparoscopic extended stapled appendectomy¹⁵, laparoscopic sigmoidectomy¹⁶ and laparoscopic cholecystectomy¹⁷ have been performed successfully by single port access.

The average age of the patients in our study was 42.67±9.05 years in group I and 44.42±8.59 years in group II, which is almost similar to Hirano Y.⁶ The operative time from initial incision to closure of wound was 38.50±8.92 minutes in group I and 80.17±30.16 minutes in group II. The studies conducted in earlier phase of laparoscopic surgery showed longer time. When the surgeons acquired this new surgical skill with new technology the time gradually reduced. Similarly operative time decreased considerably from 180 minutes to less than 60 minutes after the 10th SILS cholecystectomy and then remained stabilized between 50 – 75 minutes. Patient who was operated for gall bladder lump took 180 minutes and it was the maximum time in this study. Majority of the procedures in group II took more time, which may only be justified in patients who have a special cosmetic interest until the surgeons are well trained and with learning curve operative time shall decrease.

Pain and wound infection are two major problems with any surgery. Surgeons try their best to reduce the both. Trichak S¹⁸ and Leung KF¹⁹ conducted studies which showed that by reducing the number of ports the severity of pain reduced but in this study pain was the major problem in group II like in

Merchant AM series.²⁰ The reason for that is the placement of a big SILS port causing more tissue trauma and the longer operative time with abdominal muscle stretching. The other possible reason may be the limited mobility of the instruments causing more damage to the abdominal wall.

Two (6.6%) patients had wound infection in this series. Hospital stay in group II was longer because of pain. In addition surgeons discharged their patients late and observed until they were symptom free.

This report documents the feasibility of single-incision laparoscopic cholecystectomy. The major advantage of this method is improved cosmetics, without any visible abdominal scars. Disadvantages of SILS include the conflict between the operative instruments, and the camera and the smaller degree of instrument triangulation compared to that of conventional laparoscopic surgery.

CONCLUSIONS

SILS is a promising alternate method to conventional four port laparoscopic surgery. The major advantage of this was cosmesis but in this series more pain, prolonged hospital stay and wound infection were major limitations.

REFERENCES:

1. Ramachandran CS, Arora V. Two-port laparoscopic cholecystectomy: an innovative new method for gall bladder removal. *J Laparoendosc Adv Surg Tech* 1998; 8: 303-8.
2. Cugura J F, Jankovic J, Kulic T, Kivac I, Beslin MB. Single incision laparoscopic surgery (SILS) cholecystectomy; where are we? *Acta Clin Croat* 2008; 47:245-8.
3. Erbella JJ, Bunch G M. Single incision laparoscopic cholecystectomy: the first 100 out patients. *Surg Endosc* 2010. DOI 10.1007/s00464-010-0886-4, 29.

-
4. Poon C M, Chan KW, Lee DWH, Chan KC, Ko CW, Cheung HY, Lee KW. Two-port vs four port laparoscopic cholecystectomy: A prospective randomized controlled trial. *Surg Endosc* 2003;17:1624-7.
5. Waqar SH, Zahid MA. Two-port laparoscopic cholecystectomy: An early experience *J Surg Pakistan* 2009;14:179-81.
6. Hirano Y, Watanabe T, Uchida T, Yoshida S, Tawaraya K, Kato H, Hosokawa O. Single-incision laparoscopic cholecystectomy: single institution experience and literature review. *World J Gastroenterol* 2010; 16:270-4.
7. Asakuma M, Perretta S, Allemann P, Cahill R, Con SA, Solano C, Pasupathy S, Mutter D, Dallemagne B, Marescaux J. Challenges and lessons learned from NOTES cholecystectomy initial experience: a stepwise approach from the laboratory to clinical application. *J Hepatobiliary Pancreat Surg* 2009;16:249-54.
8. Bessler M, Stevens PD, Milone L, Parikh M, Fowler D. Transvaginal laparoscopically assisted endoscopic cholecystectomy: a hybrid approach to natural orifice surgery. *Gastrointest Endosc* 2007;66:1243-5.
9. Reddy N, Rao P. Per oral transgastric endoscopic appendectomy in human. Abstract presented at 45th Annual Conference of the Society of Gastrointestinal Endoscopy of India; 2004.
10. Marescaux J, Dallemagne B, Perretta S, Wattiez A, Mutter D, Coumaros D. Surgery without scars: report of transluminal cholecystectomy in a human being. *Arch Surg* 2007; 142: 823-6.
11. Pelosi MA, Pelosi MA. Laparoscopic appendectomy using a single umbilical puncture (minilaparoscopy). *J Reprod Med* 1992; 37:588-94.
12. Navarra G, Pozza E, Occhionorelli S, Carcoforo P, Donini I. One-wound laparoscopic cholecystectomy. *Br J Surg* 1997; 84:695.
13. Ng WT, Kong CK, Wong YT. One-wound laparoscopic cholecystectomy. *Br J Surg* 1997; 84:1627.
14. Kaouk JH, Palmer JS. Single-port laparoscopic surgery: initial experience in children for varicocelectomy. *Br J Urol Int* 2008; 102:97-9.
15. Nguyen NT, Reavis KM, Hinojosa MW, Smith BR, Stamos MJ. A single-port technique for laparoscopic extended stapled appendectomy. *Surg Innovation* 2009; 6:78-81.
16. Leroy J, Cahill RA, Asakuma M, Dallemagne B, Marescaux J. Single-access Laparoscopic sigmoidectomy as definitive surgical management of prior diverticulitis in a human patient. *Arch Surg* 2009;144:173-9.
17. Romanelli JR, Mark L, Omotosho PA. Singleport laparoscopic cholecystectomy with the triport system. *Surg Innovations* 2008; 15:223-8.
18. Richak S. Three-port versus standard four-port laparoscopic cholecystectomy. *Surg Endos* 2003; 17:1434-6.
19. Leung KF, Lee KW, Cheung TY, Leung LC, Lau KW. Laparoscopic cholecystectomy: Two port technique. *Endoscopy* 1996; 28:505-7.
20. Merchant AM, Cook MW, White BC, Davis SS, Sweaney JF, Lin E. Transumbilical gelport access technique for performing single incision laparoscopic surgery (SILS) *J Gastrointest surg* 2009;13:159-62.