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Original Research Article

Single-incision laparoscopic surgery versus conventional laparoscopic appendectomy

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ABSTRACT

Background: Single Incision Laparoscopic Surgery (SILS) is a new technique of minimally invasive surgery using a single incision to minimize all ports to one site, hence a single scar that can be strategically placed in the umbilicus for a perceived scar less abdomen.
Methods: We report this study evaluating the possible advantages of SILS versus conventional laparoscopic appendectomy through a randomized controlled trial. The study population includes patients diagnosed as acute appendicitis. A total of 50 patients underwent appendectomy, patients were randomly assigned to either SILS appendectomy or conventional appendectomy in 1:1 ratio. Primary end points were operative time, complication rate, postoperative pain, post-operative hospital stay and patient satisfaction.
Results: The pain scores measured at 48 hours were significantly lower in SILS group than conventional Lap appendectomy group. Patients had significant satisfaction score and lower pain score in SILS group than Lap appendectomy group measured at 6 weeks after appendectomy. However, the post-operative stay was similar in both the groups. There was no conversion to open appendectomy in both the groups. Patient satisfaction score in SILA was found to be higher than CLA. Operating times were similar and post-operative stay was apparently lower.
Conclusions: SIL appendectomy is as safe and effective as conventional lap appendectomy.

Keywords: Laparoscopic appendicectomy, Operative time, Patient satisfaction, SILS

INTRODUCTION

During the era of laparoscopic surgery common trend has been towards less invasive technique and a natural extension of the trend is to perform operations without scars. The most prominent techniques currently representing scar less surgery are trans umbilical Single incision laparoscopic surgery (SILS) and natural orifice transluminal endoscopic surgery (NOTES). As the latter is still struggling with some technical and equipmental difficulties, SILS seems to be readier for wider use in surgical community. This novel technique or approach may be placed between NOTES surgery and conventional laparoscopic surgery.[1] Acute appendicitis is one of the most common clinical presentations that requires emergent surgery with a lifetime incidence of about 8%.[1] First report of single-puncture laparoscopic appendicectomy technique was performed in 1992 and showed the new approach as a safe and effective alternative to the currently used multiple puncture method.[2] The new transumblical approach seems to reduce the trauma of surgical access with its improvement of post-operative pain and patient cosmesis compared to conventional laparoscopic approach.

However, other important issues must be critically analysed such as time consumed, complications and difficulties to perform this novel technique. For these reasons, in order to implement single incision laparosopic appendicectomy and know its difficulties, limitations or advantages, we conducted this study.

METHODS

The study was conducted at SMCH during May 2014 to May 2016. Institutional ethics committee approved the study protocol and informed consent was obtained from all study participants.

The patients with Alvarado score≥7 diagnosed as acute appendicitis on the basis of clinical evaluation, blood investigations and Ultrasound abdomen were included. Patients with appendicular abscess, perforation, peritonitis and patients with prior open laparotomy with incision through the umbilicus were excluded. Patients were assigned to either SILS appendicectomy or conventional appendicectomy in 1:1 ratio. A single surgeon performed the operations using either technique. Primary end points were operative time, complication rate, postoperative pain, post-operative hospital stay and patient satisfaction score.

Operative time was from the time of incision to time of wound dressing. Pain intensity was measured at 24 hours and 48 hours. All patients were given Inj. Tramadol 100mg slow iv 8th hourly for analgesia. Data from patients, who were discharged prior to 48 hours post operatively, was acquired through verbal communication.

Operating room setup

The operating room setup was similar in both the group. Patient placed in supine position. The operating surgeon positioned at the left lower end of the patient. The first assistant/camera holder to the right and slightly behind the surgeon. The laparoscopic trolley to the right of the patient. The scrub nurse at the right lower end of the patient. The anesthetist at the head end of the patient.

Surgical techniques

All patients underwent LA under general anesthesia, with pneumoperitoneum created with the closed method using a open Hassans cannula technique. The main laparoscopic instruments used included three metal trocars (one 10-mm trocar and two 5-mm trocar) as work channels, a 10- and 5-mm laparoscope, a Babcock clamp, an atraumatic bowel grasper, and biopolar grasper. The surgeon and first assistant positioned themselves on the left side facing the monitor, which was on the right side of the patient.For SILS vertical umbical incission given. Covidien port is introduced through the incision. Covidien port can accomidate one 10mm and two 5mm trocars. These three trocars are placed at three different depths. Ligation of appendix was performed by endoloop. Conventional laparoscopy instruments were used for both the groups.

Skin incisions

The sites of incision for trocar placement were as follows: for the three-incision LA, a 10-mm trocar was inserted through a supraumbilical incision with one 5-mm trocar placed in right iliac fossa and another 5mm trocar placed in left iliac fossa. For single incision laparoscopy two cm vertically placed umbilical incision following the grove of umbilicus.

Pain scores

The Numerical Rating Scale (NRS) was used for assessing postoperative pain in this study. The NRS has been validated, for assessing pain intensity, by several studies.[3] The Numeric Rating Scale is a simple reporting instrument that can help to quantify a patient's subjective pain. The Numeric Rating Scale is administered by asking the patient to verbally estimate his or her pain on a scale of 0 to 10, with 0 representing no pain and 10 representing the worst possible pain.

Pain satisfaction score

A Likerts 10-point scale was used for assessing patient satisfaction. Patients were put forth a set a question in view of their treatment and asked to mark their degree of satisfaction on a scale ranging from 0 to 10.[4]

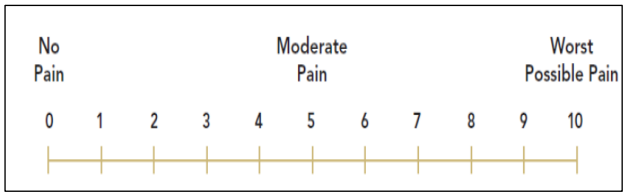

Figure 1: Numerical rating scale.

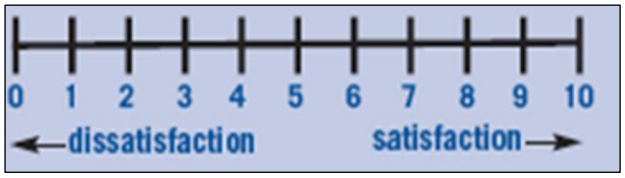

Figure 2: Patient satisfaction score.

Statistical analysis

The data was entered in Microsoft excel spread sheet 2007. Continuous data was expressed as mean±SD. And categorical was presented as actual numbers. Statistical analysis was performed by using SPSS-11.5. Student 't' test was used to study relationship between continuous variables Chi-square test was used for assessing categorical variables. P<0.05 was accepted as statistically significant.

RESULTS

A total of 50 patients underwent appendicectomy, 21 females and 29 males, were randomized into single incision laparoscopic appendicectomy (n = 25) and conventional laparoscopic appendicectomy (n=25). The age of patients who underwent CLA was significantly more than SILA group.

Table 1: Comparison between CLA and SILA.

Group statistics					
	Type	**N**	**Mean**	**Sd**	**P-value**
Age (yrs)	CLA	25	32.76	17.25	0.025
	SILA	25	23.52	10.10	
Pain scores 24 hrs	CLA	25	5.16	1.07	0.72
	SILA	25	5.04	1.27	
Pain scores 48 hrs	CLA	25	2.92	1.08	0.003
	SILA	25	2.08	0.76	
Operation time (min)	CLA	25	34.16	11.64	0.167
	SILA	25	39.01	12.75	
Patient satisfaction score (0-10)	CLA	25	8.04	0.95	0.0001
	SILA	25	9.08	0.51	
Post-operative stay (days)	CLA	25	2.04	0.68	0.245
	SILA	25	1.8	0.76	
Gender					
Type	**Female**	**Male**	**Total**	**P value**	
CLA	11	14	25	1	
SILA	10	15	25		
Total	21	29	50		

The pain scores measured at 24 hours were similar between two groups with p value 0.72 however the pain scores were significantly lower in SILA group than CLA group with p value of 0.003 (<0.05) which is statistically significant also the need for analgesics were significantly less in SILA group.

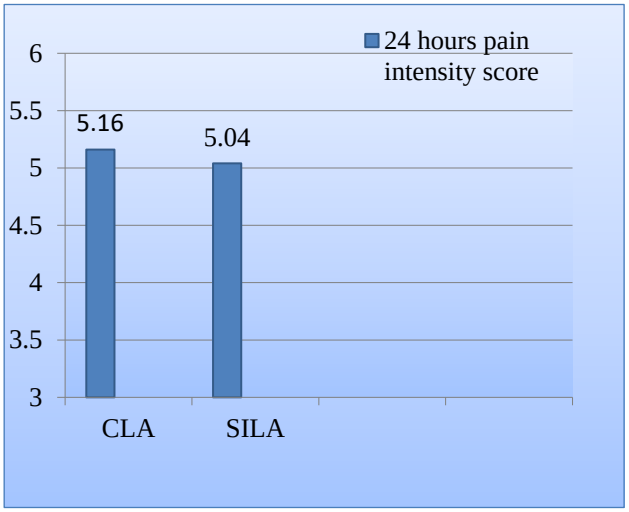

Figure 3: 24-hour pain intensity score.

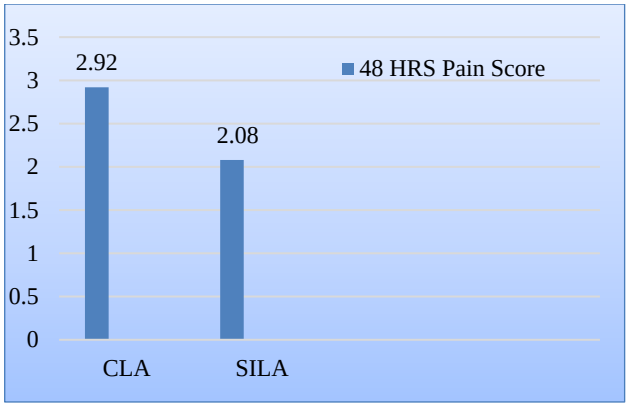

Figure 4: 48-hour pain intensity score.

Patients had significant satisfaction score in SILA group than CLA group measured at 6 weeks after appendicectomy.

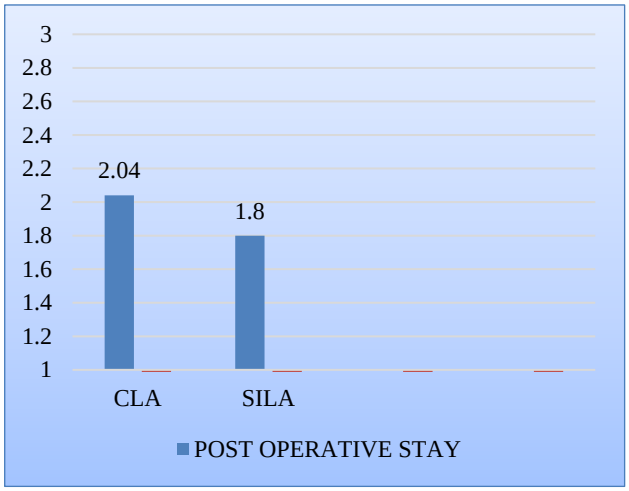

Figure 5: Post-operative hospital stay (in days).

However, the post-operative stay was similar in both the groups. There was no conversion to open appendicectomy was performed in both the groups with p value of 0.167 which is not statistically significant.

The mean operative time was almost similar as the p value was 0.16 which is not statistically significant. Three patients in SILS group and two in lap appendicectomy developed wound infection. There was no mortality associated with his procedure.

DISCUSSION

Since the first LA was successfully performed in 1983, the procedure has been adopted and modified to suit individual patient needs. Pelosi et al reported the first single-incision LA in 1992, although the technique did not attract much interest until recently, when several investigators began to report their own experiences with LESS procedures.[5] This prospective study compared the short-term results of single-incision versus conventional

three-incision LA in a cohort of patients with similar characteristics. Hong TH also states that transumblical single port surgery allows nearly scarless surgery.[6]

The laparoscopic hand instruments used in both techniques are similar, except for covidien port which was used for SILS. However, we have reused the covidien port following gas sterilization to reduce the cost and making it identical costs in the two groups.

Oltmann et al preferred single-incision laparoscopic surgery: through transumblicall port as an easier modality for pediatric uncomplicated appendectomies.[7]

The results of the present study are comparable with those of other series describing laparoscopic appendicectom.[8] A latest Cochrane review indicated that in most studies surgery time for appendicectomy varies from 35.7 to 86 minutes.[8-10] In our experience with SILS, surgery time was 34.6±11.64 minutes. With regard to postoperative pain, our mean pain score was a 2.08 out of 10 at 48 hours versus 2.9-3.6 reported in various published series and this pain scores were significantly lower in SILS group than conventional Lap appendicectomy group.[9,10] One of the possible reasons for such a less pain could be due to less number of incisions.

Regarding average hospital stay, there is great variability in published figures, but we believe that our patients' mean post-operative stay time of 1.8±0.76 conforms to the mean expected for this type of emergency acute appendicitis surgery. As reported in other studies, our patients started an oral diet within the first 24 hours.[11] Three patients had infection with SILS which was apparently similar in both the groups. one of the possible reasons being reusage of Covidien port. Sauerland S et al stated that laparoscopic appenedectomy seem to have various advantages over OA.[12] Van Dalen R et al emphasized on the utility of laparoscopy in the diagnosis of acute appendicitis in women of reproductive age as it can be also used as a tool for diagnosing other pelvic or intra-abdominal pathologies.[13] In this report, we have shown SILS for the management of acute appendicitis to be a safe and effective technique. To date, the apparent advantages of the SILS technique are primarily related to patient satisfaction.

However, Hellberg A et al claimed that conversion from laparoscopic to open appendectomy is always a possiblity and one of the major drawback of the laparoscopic technique.[14] Although significant patient satisfaction score has been well established for conventional laparoscopic appendicectomy, SILS seems to be better choice.

CONCLUSION

Reviewing the present reports that compared single incision laparoscopic surgery for appendicectomy with conventional 3-port laparoscopic appendicectomy, the former was found to reduce scars, in addition to having the advantages of a 3-port laparoscopic appendicectomy; thus, it is more advantageous in cosmetic improvement. SIL appendicectomy is as safe and effective as conventional lap appendicectomy.

Additionally, patient satisfaction score in SILA was found to be higher than CLA. The pain scores were significantly lower in SILS group than conventional Lap appendicectomy group. Operating times were similar and post-operative stay was apparently lower. Further work in the form of randomized controlled trials is needed to evaluate the potential benefits of this new technique before its use can be widely recommended.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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