

# Single-incision Multiport Laparoscopic Appendectomy versus Conventional Laparoscopic Appendectomy: A Single-center Randomized Control Study

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## Abstract

**Background:** Acute appendicitis is the most common surgical emergency and early surgical intervention improves outcome. Laparoscopic Appendectomy has become the mainstay of surgical management of appendicitis. Single incision surgery, a recent offshoot of Laparoscopy is slowly going momentum.

**Objective:** This study aims to compare the standard conventional Laparoscopic Appendectomy with Single Incision Laparoscopy as regards pain, operating time, wound infection, scar satisfaction, postoperative hospital stay and time to return to work.

**Materials and Methods:** A randomised control study was done by alternation with sample size of 100 which divided into two groups(study group 50 and control group 50). After obtaining consent, the patients are taken up for conventional laparoscopic or Single incision laparoscopic surgery according to the randomization. Post operatively, the following parameter are monitored: Post operative pain, Duration of the procedure, Surgical site infection and Patient satisfaction regarding scar

**Results:** In our study, there was no difference in the duration of surgery between the two groups. Pain scoring was higher in the conventional laparoscopy group at 6 and 12 hours after surgery. There was no significant difference in the infection rates between the two groups. Patient satisfaction regarding the scar was higher in the single incision group. There was no significant difference in the duration of hospital stay and time taken to return to work.

**Conclusion:** With these above findings our conclusion is that the Single Incision Multiport Laparoscopic Appendectomy has as many benefits as Conventional Laparoscopic Appendectomy and can be treated as a safe and viable option for a patient with Appendicitis

**Key words:** Acute appendicitis, Laparoscopic appendectomy, Single incision multiport laparoscopic appendectomy

## INTRODUCTION

Recent advances in laparoscopic instrumentations have made it possible to perform intra-abdominal surgery through a small incision that can be hidden within the umbilicus, which provides better cosmetic results, decreased stay in hospital, and better satisfaction to the patients.

Single-incision laparoscopic surgery (SILS) is a variant of minimally invasive surgery, involving access to the abdomen through a specialized port or by an incision which appears single externally but fascially has multiple punctures, as compared to the traditional four to five small incisions. All surgical instruments are placed through this small incision usually located in the umbilicus. In general, single-incision laparoscopy takes about the same amount of time as traditional laparoscopic surgeries. However, it is recognized as more complicated because it involves manipulating three articulating instruments through one access port.<sup>1-5</sup>

Obesity, severe adhesions, or scarring from previous surgeries are a few of the factors that would prohibit patients from

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getting the surgery. Single-incision surgery has been given a panoply of acronyms and names, including SILS, single-port access surgery, laparoscopic, endoscopic single-site surgery, single-laparoscopic incision transabdominal surgery, one-port umbilical surgery, natural orifice transumbilical surgery, and embryonic natural orifice transumbilical endoscopic surgery.

The necessary close proximity of the trocars in a fixed position is among the disadvantages of this technique. The movement of the hands is restricted, causing clashing between instruments, and the fixed entry in the umbilicus creates an extended distance toward the surgical site. This is contradictory toward the traditional triangulation of instruments in laparoscopy, creating a steep learning curve. Thus, the lack of triangulation, pneumoperitoneum leaks, and instrument clashing are disadvantages of the procedure. Furthermore, there is not any long-term data that show morbidity of SILS. Multiple, closely placed fascial punctures may lead to hernia, and wide skin flaps may lead to seroma formation. Still many surgical treatments have been performed safely using these techniques, and variations have been described. As new instruments are developed to accommodate the new paradigm of SILS, chances are that technical difficulties are going to be minimized. Prospective comparisons of the single-incision and conventional laparoscopy are lacking. The purpose of this study is to ascertain if single-incision laparoscopy is as feasible as conventional laparoscopy.<sup>5-7</sup>

### Aims and Objectives

This study aims to compare the outcome of single-incision multiport laparoscopic appendectomy versus conventional laparoscopic appendectomy in terms of:

- Patient recovery time
- Post-operative pain
- Wound complications
- Duration of the procedure
- Patient satisfaction as regards cosmesis.

## MATERIALS AND METHODS

A randomized control study was done by alternation with a sample size of 100 which divided into two groups (study group 50 and control group 50) and study period is from April 2014 to September 2016.

### Inclusion Criteria

All patients with acute appendicitis diagnosed on the basis of clinical examination, radiological correlation, and leukocytosis, presenting at our hospital above the age of 18.

### Exclusion Criteria

Patient with phlegmon, mass, peri-appendicular abscess, diffuse peritonitis, age <18, pregnancy.

Patients diagnosed with acute and recurrent appendicitis planned for surgery are randomized into study group or control group by alternation. After obtaining consent, the patients are taken up for conventional laparoscopic or SILS surgery according to the randomization. Postoperatively, the following parameters are monitored.

1. Post-operative pain
2. Duration of the procedure
3. Surgical site infection
4. Patient satisfaction regarding scar.

Post-discharge, the patients were followed up with a questionnaire which are shown in Table 1.

## RESULTS

The duration of the procedure (Table 2) was calculated from the time of incision to the time of the last skin stitch. It was found that the average times taken were 24.08 min for conventional surgery and 33.06 min for single-incision laparoscopy. The p value was not significant.

Pain scoring was done by using the standard visual analog scale at 6, 12, and 24 h after surgery (Table 3). It was found that the average pain score was higher in the conventional laparoscopy group than the single-incision group at both 6 and 12 h after surgery. There was no significant difference at 24 h after surgery.

Surgical site infection (Table 4) according to our study was delineated as the presence of redness, warmth, and discharge with or without positive microbes being identified by culture. There were no cases of SSI in the conventional group while the single-incision group had one case of pus,

**Table 1: Follow-up questionnaire**

Name:	
Age:	Date of Surgery:
Are you having any pain for the past 1 month?	Y/N
Are you having swelling in the area of the scar or scars?	Y/N
Are you having any discharge from the scar or scars?	Y/N
On a scale of 0-10, how satisfied are you with the scar	
0,1,2: Unhappy/unsatisfactory	
3,4,5,6: Somewhat happy/satisfactory	
7,8,9,10: Happy/good	
Time to return to work (number of days)	

**Table 2: Duration of procedure**

Group	N	Mean time±Standard deviation	Standard error mean	P value
Single incision	50	33.06±0.476	5.999	0.000
Conventional	50	24.08±0.510	5.204	0.000

skin gaping with necrosis and culture revealed *Escherichia coli*. The statistical difference was insignificant.

Patient satisfaction regarding the final scar (Table 5) was done by again using the visual analog scale. 54% of the single-incision group were happy with their scar, as compared to 42% in the conventional group. 44% in the single-incision group were satisfied with their scar while 46% were satisfied in the conventional group. Only one patient in 50 was unhappy with the scar in the single-incision group while six patients (12%) in the conventional group were unhappy with the scar.

Table 6 reveals the difference in the duration of hospital stay. It was found that the mean stay of patients in the single-incision group was 1.24 days compared to 1.50 days in the conventional group.

**Table 3: Pain scoring**

Pain score	Group	N	Mean±Standard deviation	Standard error mean	P value
At 6 h	Single incision	50	1.00±0.000	0.000	0.038
	Conventional	50	1.16±0.374	0.374	0.043
At 12 h	Single incision	50	1.36±0.490	0.098	0.001
	Conventional	50	1.88±0.332	0.066	0.001
At 24 h	Single incision	50	1.00±0.000	0.000	0.000
	Conventional	50	1.00±0.000	0.000	0.000

**Table 4: Surgical site infection**

Surgical site infection	Single-incision appendectomy (50)	Conventional appendectomy (50)	Total (100)
Absent	49	50	99
Present	1	0	1

**Table 5: Patient satisfaction regarding scar**

Cosmetic grade	Single incision (%)	Conventional (%)	Total
Good	27 (54)	21 (42)	48
Satisfactory	22 (44)	23 (46)	45
Not satisfactory	1 (2)	6 (12)	7

**Table 6: Duration of hospital stay**

Group	N	Mean±Standard deviation	Standard error mean
Single incision	50	1.24±0.431	0.61
Conventional	50	1.50±0.505	0.71

**Table 7: Return to normal work**

Group	N	Mean
Single incision	50	4.5
Conventional	50	5.1

In Table 7, we calculated the average time taken for the patient to return to normal work. It was found that it was 4.5 days in the single-incision group versus 5.1 days in the conventional group.

## DISCUSSION

In our study, it was observed that there was less post-operative pain in the first 6 and 12 h after the procedure in single-incision laparoscopy group than conventional laparoscopy group. However, no significant difference was noted after 24 h. Frutos *et al.*<sup>1</sup> say that significant difference was observed for post-operative pain with less pain reported in single-incision group. Ding *et al.*<sup>2</sup> say that single-incision laparoscopy surgery has the advantage of less post-operative pain when compared with conventional laparoscopy group. Kye *et al.*<sup>3</sup> say that pain score on the visual analog scale on post-operative day 1 was significantly lower in the single-incision group than in the three-port group.

There was no significant difference noted in the duration of the procedure; Lee *et al.*<sup>4</sup> say that no significant difference noted for mean operative time for single-incision laparoscopy group and conventional laparoscopy group. A study done by Pan *et al.*<sup>5</sup> says that study did not show any difference with operative time.

One patient in single-incision laparoscopy group had wound infection which was treated with antibiotics and re-admission was not required. Dolores *et al.*<sup>1</sup> say that three patients in the single-port group had an asymptomatic periumbilical hematoma which did not require admission and resolve spontaneously. In conventional laparoscopy group, 2 patients had a hematoma around the surgical wound in the lower left quadrant, which did not require intervention. A study done by Pan *et al.*<sup>5</sup> says that one patient in single-incision laparoscopy group had incisional hernia on follow-up.

Patient in the single-incision laparoscopy group is very happy regarding post-operative scar when compared with conventional laparoscopy group. Gasior *et al.*<sup>6</sup> say that single-incision laparoscopy surgery expresses superior scar assessment. Buckley *et al.*<sup>7</sup> say that patients are more happy regarding post-operative scar when compared with conventional laparoscopy group.

## CONCLUSION

- Patient in single-incision laparoscopy group show less post-operative pain in the first 6 and 12 h compared to the conventional laparoscopy group, but no difference

was noticed between the two groups after 24 h

- No significant difference in operating times was noted between the procedures
- One patient in 50 who underwent single-incision laparoscopy had wound infection, but no wound complications were noted in the conventional appendectomy group
- Patients underwent single-incision laparoscopy are more happy with scar when compared with conventional laparoscopy group
- No difference noted in the duration of post-operative hospital stay
- Time to return to normal work in both groups were similar
- With these above findings, our conclusion is that the single-incision multiport laparoscopic appendectomy has as many benefits as conventional laparoscopic appendectomy and can be treated as a safe and viable option for a patient with appendicitis.

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