



A Study of Single Incision Laparoscopic Appendectomy: 30 Cases

Authors

Abdul Haque M Quraishi, Ankit Maheshwari

Abstract

Single-incision laparoscopic appendectomy is an innovative laparoscopic technique which aims to reduce the number of traditional multiple port entries. However, this is a technically challenging surgery which requires perfect ergonomics, an experienced surgeon and a good technique. A study of single incision laparoscopic appendectomy was conducted with conventional laparoscopic instruments with respect to outcome parameters. This was a prospective study carried out at tertiary care teaching institute from June 2010 to nov 2012. In this study, 30 patients of appendicitis were treated by Single Incision laparoscopic Appendectomy. Mean operative time required for first 15 cases on an average was 121.78 min. However, it was reduced for next 15 cases to 73.73 min. Mean age of patients undergoing Single Incision Laparoscopic Appendectomy was 26.2 years. Out of 30 cases, 16 cases were completed by using Single incision with 3 ports. In 6 cases a prolene loop was inserted with the help of epidural needle in right iliac fossa to suspend the appendix. In one case a 2 mm alligator grasper was used through suprapubic region to suspend the appendix. In 6 cases an additional 5mm/3mm port was used during the procedure. In One case Single incision Laparoscopic appendectomy was converted to open appendectomy due to non visualization of appendix. The mean average of hospital stay was 2.83 days. Mean follow-up period was 8 months. Average pain score was 4.33.

We conclude that it is feasible and safe to use conventional instruments for a SILS procedure for appendectomy.

Keywords: Appendectomy. Single-Incision Laparoscopic Surgery (SILS). Ergonomics. Multiport Appendectomy.

Introduction

Appendicitis is a common abdominal emergency and has to be treated surgically. Laparoscopy is being used more and more frequently as it has advantages over open surgery. Minimally invasive surgical techniques have developed during recent decades: NOTES (natural orifice transluminal endoscopic surgery), SILS (single incision laparoscopic surgery), is an attempt to improve on traditional laparoscopic surgery results. SILS involves performing laparoscopic surgery with a

single transumbilical incision, in order to achieve better results than those from conventional laparoscopic surgery.

Different methods for port access to perform LESS (Laparo-endoscopic Single Site Surgery) include multiple fascial punctures through one skin incision, the introduction of membrane-based umbilical devices, the use of additional transabdominal sutures to stabilize the target organ, and others. To further overcome the technical challenges of LESS, different

instruments that provide angulations and small-profile trocars are being developed. The purpose of this study was to present our initial experience with this surgery using a single incision laparoscopic appendectomy using conventional instruments.

Material and Methods

This prospective study was carried out in the General Surgery department of a tertiary care from June 2010-november-2012. In the present study, 30 patients of acute appendicitis treated with SILS appendectomy were included.

Inclusion Criteria

1. All Patients of uncomplicated acute appendicitis.
2. All Patients for interval appendectomy

Exclusion Criteria

1. Appendicular perforation
2. Appendicular abscess
3. Non consenting patients
- 4.

Mode of intervention

Emergency SILS Appendectomy

Elective interval SILS appendectomy

Approval from institutional ethics committee was taken before commencing the study. After informed and written consent, patients were operated as per the defined procedures.

Laparoscopic Instruments Required

- 0 or 30 degree telescope with 5 and 10 mm diameter
- Electrosurgical unit with mono-polar and bipolar current
- Suction irrigation cannula
- High flow insufflators
- Video camera either single or three chip
- Single monitor
- Good light source – halogen 150 watts or xenon light source
- Trocars (10, 5 and 3mm)
- Reduction/ extraction cannula (10 mm to 5 mm)
- Maryland dissector (5mm and 3mm)
- Grasper 5 mm

- Clip applicator 5/ 10 mm
- Babcocks forceps 5 mm
- Micro scissor (5 and 3 mm)
- Endogenously made prolene loop using epidural needle
- 2mm alligator forceps
- Extra corporeal roeders knot using vicryl 1-0 suture

Procedure

All patients were administered general anaesthesia. A prophylactic dose of antibiotics (ciprofloxacin 200mg and metronidazole 500mg iv) was given at induction.

The operating surgeon stood on the left side of the patient. A vertical incision around 1.5 – 2cm was made through umbilicus, incision was deepened and peritoneum opened under direct vision (Hassons technique). A 10 mm port was introduced. CO₂ insufflation was done and pneumoperitoneum was created (12-14 mm hg). A right sided 5 mm and a left sided 3 mm working port were introduced through the same incision on either side of optical port (Mickey Mouse Technique). Ports were placed at different levels to maximize the working space and instrument range of motion. Table was now placed in trendelenburg position with left sided tilt. Mesoappendix was cauterised using bipolar cautery. Two roeders knot were applied at the base of appendix and one above it and appendix was cut in between 2nd and 3rd roeders knot.

Lateral peritoneal dissection with caecal mobilisation was done in case of non visualisation of appendix. Appendicular base was dissected first in case of non visualisation of appendicular tip in some cases. Epidural needle was inserted in right iliac fossa and prolene loop was made and inserted to suspend the appendix (puppeteer technique) when required. Appendix was removed from the 10mm port after hemostasis was confirmed. Suction and Irrigation was done when required to clear the remaining debris and collection. Ports were removed, subcutaneous layer closed with port closure vicryl and skin was closed with nylon

3-0. All port sites were infiltrated with 5cc of 0.25% Bupivacaine, just before closure of port sites. All patients received an intra-operative dose of 75 mg Diclofenac. Cleaning and dressing was done.

Results

This study was carried out in Department of Surgery, of our institute. In this study, 30 patients of appendicitis were treated by Single Incision laparoscopic Appendectomy. Following are the observations.

Age Incidence

Table No. 1 Distribution of patients according to age group

AGE in years	No of Patients	Percentage
10-19	9	30%
20-29	9	30%
30-39	10	33.33%
>39	2	6.6%

In our study, most of the patients undergoing Single Incision Laparoscopic Appendectomy were in the age group 30-39 years (33.33%), Mean age of patients undergoing Single Incision Laparoscopic Appendectomy is 26.2 years.

Sex Distribution

Table No. 2 Distribution of patients according to Sex

Sex	Total number of patient
Male	4
Female	26

Indication

In this study Single Incision Laparoscopic Appendectomy was performed for Acute Appendicitis in 2 patients. Interval Appendectomy was performed in 28 patients.

Operative Time

Table No. 3 Table showing the Operative time

No of cases	Time in minutes
In first 15 cases	121.78
In next 15 cases	73.73

Overall average time in 30 cases 96.86

Operative time required for first 15 cases in an average was 121.78 min. However, it was reduced

for next 15 cases was 73.73 min. overall time required in an average was 96.86 minutes. The minimum time required to perform SILS was 40 minutes and maximum time was 175 minutes.

Intra Operative Procedure Details

Table No. 5 Table showing Intra operative Procedure Details

Procedure Details Number Of Cases

PROCEDURE DETAILS	NUMBER OF CASES
Completed by using SILS	16
Additional rescue port 6	6
Usage of Prolene loop	6
Usage of 2 mm Alligator forceps	1
Conversion to open	1

Out of 30 cases, 16 cases were completed by using Single incision with 3 ports. In 6 cases a prolene loop was inserted with the help of epidural needle in right iliac fossa to suspend the appendix. In one case a 2 mm alligator grasper was used through suprapubic region to suspend the appendix. In 6 cases an additional 5mm/3mm port was used during the procedure. In One case Single incision Laparoscopic appendectomy was converted to open appendectomy due to non visualization of appendix. Out of 30 cases, The Procedure was completed with Single Incision Laparoscopic Appendectomy in 23 Patients i.e. 76.6 %.

Technical Aspects of the Procedure

1. Details of Ports

In the initial cases we started with two 5 mm and one 10mm port. To reduce crowding we replaced the 5 mm port to 3mm port. The 10 mm port was also replaced by 5 mm in the last few cases. The 10 mm just being finally used only for retrieval. This solved the problem of crowding at the umbilicus. However it was observed that it was difficult to hold a turgid appendix with 3 mm instrument.

2. Lateral peritoneal dissection with caecal mobilization was done in case the appendix was not visualized. In 16 cases appendix was retrocaecal in position.

3. Dissection of Meso Appendix:-

Meso appendix was dissected with bipolar cautery in most cases .10 mm and 5mm clips were used in few cases.

4.Retrieval of Appendix:-

In cases where an initial 10 mm port was used for dissection Appendix was retrieved from the 10 mm port. In cases where 10 mm port was not used to begin with, one 5mm port was replaced by 10 mm port at the end and appendix was retrieved from this port. We used in couple of cases, a technique where the long end of vicryl of the third Roeders knot stays out of 5mm port and a thread is passed through 10mm port blindly and the free end of the thread is railroaded through the 5 mm port and tied and brought out of 10 mm port hence the specimen can be brought out from 10mm port. This obviates the need of 5mm telescope.

Post Operative Complications

Table No. 5 Table showing Post operative complication details

Post Operative Complications No of Patients

Post Operative Complications	No of Patients
Wound Infection	5
Peritonitis	1

Out of 30 cases 5 Patients had Post Operative wound Infection. One Patient had post operative Peritonitis for which laparoscopic re-exploration was done on post operative day 2 and peritoneal suction and irrigation was done.

Hospital Stay

Table No. 6 Table showing Hospital stay of the Patients

No of days	No of patients	No of patients	Percentage%
2 days	18	60	
3 days	9	30	
4 days	2	6.66	
> 4 days	1	3.34	

Out of 30 Patients, 18 patients were discharged on Day 2 which accounts for 60% of total patients. 9 patients were discharged on day 3 while 2 patients were discharged on day 4. One patient was discharged on day 14. The mean average of hospital stay is 2.83 days.

Post Operative Pain

Table No. 7 Table showing Post operative Pain of the Patients

Pain score(1-10)	No of Patients
2	1
3	6
4	10
5	10
>6	3

Average pain score was 4.33. Pain was measured at the end of 6 hours post operative time by using 0-10 Numerical pain rating scale.

Discussion

Appendicitis is one of the commonest abdominal emergencies in surgical practice and occurs in up to 7 % of the general population ¹.

In 1736, Claudius Amyand performed the first appendectomy in an 11 year old male patient with right sided scrotal hernia accompanied with fistula within the scrotum. Appendix was ligated and all or more likely a part of appendix was removed with post-operative recovery of the patient. ²

With the advent of general anaesthesia, surgeons started operating the patients for various disease pathologies and then the interest in operating the patients for the treatment of a disease began. The recognition of 'acute appendicitis' as a clinical entity is attributed to Reginold Fitz, who presented a paper to the first meeting of the Association of the American Physicians in 1886, entitled 'Perforating inflammation of vermiform appendix³'.

In 1889 Charles McBurney presented a report on early operative intervention in acutem Appendicitis and described McBurney's incision ⁴.

In 1983 Kurt Semm introduced laparoscopy as a method for the removal of a non-diseased appendix as part of other Gynecologic procedures⁵ Pier A, Gotz F, Bacher C., published the first large series of laparoscopic appendicectomies for acute appendicitis and demonstrated that the procedure could be applied to most cases of appendicitis with a high degree of success, a low complication rate, and operative speed comparable to traditional open appendicectomy ⁶

In 1998 Schier reduced the number of ports used for the procedure to two (one for grasping

forceps and one for scope⁷.

Study	Present study	Hyung jin kim	Connie G	Parveen Bhatia	Maria dolores frutos
Mean Age (years)	26.2	31	44	25.5	29
Number of patients	30	43	26	17	73
Sex					
No.of males	4	23	16	12	30
No.of females	26	20	10	5	43
Operative time	96.86	61.3	58	63	40
Post operative complications					
-surgical site infection	5	3	0	0	
-peritonitis					
-periumbilical haematoma	1				2
Mean Post operative hospital stay(days)	2.83	3.6	1.2(non perforated) 2.7(perforated)		<1 day
-1 day					
-2 days				12	
-3 days	18				
-4 days	9			4	
>4 days	2			1	
	1				

Age of the patients participating in this study was studied. In this study, mean age for Single Incision Laparoscopic Appendectomy was 26.2 years. In this study out of 30 patients participated 26 patients were female and remaining 4 were male. In a study by Hyung jin Kim et al 23, 43 patients participated out of which 23 were men and 20 were female, mean age being 31 years⁸. Connie G. Chiu et al studied 26 patients out of which 10 patients were female and 16 patients were male with mean age 44 years⁹. In Parveen Bhatia et al studied 17 patients out of which 12 patients were male and 5 were female with mean age being 25.5 years¹⁰. María Dolores Frutos et studied 73 patients out of which 43 patients were female and remaining 30 patients were male, average age being 29 years¹¹. In our study the mean operative time for 30 patients is 96.86 minutes. In first 15 cases the mean operative time was 121.78 min however in next 15 cases it has come down to 73.73 min. This has been mainly attributed to the learning curve for Single incision laparoscopic procedure .range (40-175 min). In a study by Hyung Jin Kim et al, mean operative time was 61 .3 min(range 24-120 min)⁸. For

Connie G. Chiu et al, The mean operative time was 58 min (33-107 min)⁹. For María Dolores Frutos et al, The mean operative time was 40 min(16-80 min)¹¹. For Parveen Bhatia et al, The mean operative time was 63 min (43-83 min)¹⁰. In our study out of 30 cases 5 Patients had Post Operative wound Infection. One Patient had post operative Peritonitis for which re-exploration was done on post operative day 2 and abdominal wash was given. In a study by Hyung Jin Kim et al, 23 out of 43 cases only one patient required readmission due to pericecal inflammation and pain, and another patient needed a percutaneous drainage of fluid collection. Three minor umbilical wound complications were controlled conservatively⁸. In our study, Out of 30 Patients, 18 patients were discharged on Day 2 which accounts for 60% of total patients. 9 patients were discharged on day 3 while 2 patients were discharged on day 4. One patient was discharged on day 14. The mean average of hospital stay is 2.83 days. For Hyung Jin Kim et al 23, the mean total hospital stay was 3.6 days (range 2–12 days)⁸.

Intra Operative Procedure Details

In our study, out of 30 cases, 16 cases were completed by using 3 ports. In 6 cases a prolene loop was inserted with the help of epidural needle in right iliac fossa to suspend the appendix. In one case a 2 mm alligator was used through suprapubic region to suspend the appendix. In 6 cases an additional 5mm/3mm port was used during the procedure. In One case Single incision Laparoscopic appendectomy was converted to open appendectomy due to non visualization of appendix. Out of 30 cases, The Procedure was completed with Single Incision Laparoscopic Appendectomy in 23 Patients i.e. 76.6 %.

Post operative pain

Out of 30 Patients one patient had a pain score of 2 while 6 patients had a pain score of 3. 10 patients had a pain score of 4; Other 10 patients had a pain score of 5 while 3 patients had a Pain score of more than 6. Average pain score was 4.33.

Summary and Conclusion

This study was done over a period of 2 years 6 months, in which 30 cases of SILS Appendectomy were performed. Most of the patients were satisfied with the cosmetic results of the procedure. The difficulties of crowding at the umbilicus can be reduced considerably by using lesser size ports. Innovative retrieval methods like use of 10mm port for retrieval helps in the above objective. The operating difficulties and operating time were less when the appendix was visualized initially. However a retrocaecal and adherent appendix required caecal mobilization and use of puppeter technique at times thus adding to the operating difficulties and increasing the operative time. At times additional rescue ports were required. There is a need for long term comparative studies between conventional and SILS appendectomy to address the issues of post operative pain and cosmesis.

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