

# Single Incision Laparoscopic Assisted Appendectomy: Experience of 82 Cases

ABHAY KUMAR<sup>1</sup>, ANANT NARAYAN SINHA<sup>2</sup>, DESH DEEPAK<sup>3</sup>, NK PANDEY<sup>4</sup>, NANDANI<sup>5</sup>

## ABSTRACT

**Introduction:** Single Incision Laparoscopic Surgery (SILS) is one of the most recent developments which have been made in the field of minimal access surgery. It has potential advantages of less postoperative pain and better cosmesis, but at the same time, this procedure is time consuming and it increases the cost of surgery.

**Aim:** In this study, we evaluated the feasibility, safety and potential advantages of single incision laparoscopic assisted appendectomy.

**Materials and Methods:** Single incision laparoscopic assisted appendectomy was done in 82 patients who were diagnosed with

acute or chronic appendicitis. A single 10mm incision made over right lower quadrant was used for placing two 5mm trocars and appendectomy was done as in open surgery, after delivering out the appendix from the incision.

**Results:** Mean operative time was  $32.56 \pm 15.5$  minutes. Mean post-operative pain scores as per visual analogue scale were 6.5, 4.2 and 1.2 on 12 hours day 1 and day 2 after surgery respectively. Mean length of hospital stay was  $1.4 \pm 1.2$  days.

**Conclusion:** Single incision laparoscopic appendectomy is safe and feasible.

**Keywords:** Acute appendicitis, Appendectomy, Laparoscopy

## INTRODUCTION

Acute appendicitis is the most common condition which leads to emergency abdominal surgeries in young adults. Claudius Amyand performed first appendectomy in 1735 for a perforated appendicitis in scrotal hernia. Kurt Semm, a gynaecologist, performed the first laparoscopic appendectomy (LA), 2 years before the first laparoscopic cholecystectomy was done [1].

Laparoscopic appendectomy (LA) has allowed surgeons to diagnose and to also treat appendicitis at the same time [2]. The advantages of LA include less postoperative pain and a faster return to work and normal activity [3]. The disadvantages of the laparoscopic procedure are a longer operating time [4] and greater costs [5,6]. Due to this, LA does not produce a similar impact as laparoscopic cholecystectomy produces. A technique done to reduce the operating room time and costs is a combination of the laparoscopic and open techniques, which is called the laparoscopic-assisted technique [7]. This technique allows surgeons to use the advantages of the laparoscopic method, which includes a visual diagnosis, less postoperative pain, and a quicker return to work.

In a classic LA or LAA, three to four incisions are required for the placement of multiple trocars. Driven by a quest towards less abdominal trauma, improved cosmesis, reductions in postoperative pain and hospital stay, technique of Single Incision Laparoscopic Surgery (SILS) has been developed.

SILS is one of the recent advances made in the field of Minimal Access Surgery (MAS). Again, SILS appendectomy includes disadvantages of laparoscopic appendectomy. To combine the advantages of SILS and LAA and to reduce their disadvantages, Single Incision Laparoscopic Assisted Appendectomy (SILAA) has been introduced. Most of the authors have described SILS assisted appendectomies done with umbilical approaches in children. Aim of this prospective study was to test the feasibility, safety and potential advantages of SILAA.

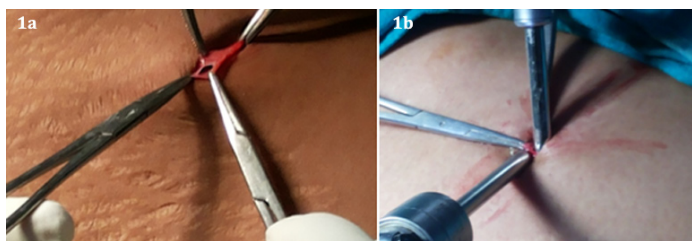
## MATERIALS AND METHODS

We performed 82 SILAAs on patients who were diagnosed with acute or chronic appendicitis between February 2011 and February 2013, in the Department of Surgery in VCSGGMS and RI, Srinagar, Uttarakhand. Obese patients ( $BMI \geq 35$  kg/m<sup>2</sup>) and patients with suspected appendicular perforations or appendicular lumps were excluded from the study. Demographic and clinical data were collected on printed proformas and SILAA was performed by using conventional laparoscopic instruments.

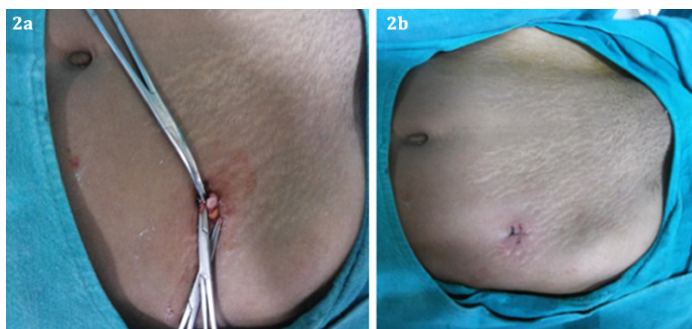
In this laparoscopic-assisted procedure, an intra-peritoneal assess was made by making a single transverse incision of 10mm over right lower quadrant. Muscle fibres were separated by using a pair of artery forceps. Peritoneum was dissected and it was held by using artery forceps. A small incision of 5 mm was made on medial side, for placement of a 5 mm trocar and for creating a pneumoperitoneum [Table/Fig-1a,b].

Another separate, small incision was made laterally in peritoneum, for placing a second 5 mm trocar. The medial trocar which was used for placing a 5 mm 30 degree camera and the lateral trocar which was used for placing a Babcock grasper, were crossed in a chopstick manner. The abdomen was inspected and the appendix was visualized by manipulating the caecum and terminal ileal loops. The Babcock grasper was used to hold the appendix, that was then pulled out after deflating the abdomen and after dividing small intact peritoneum between two trocars. An appendectomy was done as it was done in open technique. Skin was closed with a single suture after closure aponeurosis [Table/Fig-2a,b].

This technique was evaluated for operative time, post-operative pain, post-operative length of stay and complication rate. Post-operative pain was evaluated at 12 hrs, day 1 and day 2 post-operatively by using a visual analogue scale (VAS) which ranged from 0 to 10.



**[Table/Fig-1a,b]:** Insertion of ports through peritoneal holes right lower quadrant. Peritoneal dissection and creation of hole placement of ports through separate peritoneal holes



**[Table/Fig-2a,b]:** Open appendectomy and skin closure with a single stitch

## RESULTS

Demographic data and findings have been summarized in [Table/Fig-3]. One or two additional ports were required to be placed in eight patients in whom either a retrocecal appendix or a significant omental adhesion were found. Two patient's were converted to open surgery as they had perforated appendicitis with pyoperitoneum. Wound infections with purulent discharges were noted in 12 patients, all of whom were treated with proper antibiotics.

Variables	Values
Mean age ( $\pm$ SD)	32.56 $\pm$ 15.5 years
Male	58.53% (n=48)
Female	41.46% (n=34)
<b>Mean post-operative pain</b>	
After 12 hrs.	6.5
Day 1	4.2
Day 2	1.2
Hospital stay after surgery	1.4 $\pm$ 1.2 days

**[Table/Fig-3]:** Demographic and clinical details.

## DISCUSSION

The introduction of laparoscopic surgery has made a great impact on many areas of general surgery. The greatest influence has been made on gallbladder surgery. Laparoscopic cholecystectomy was quickly adopted, with the benefits of a shorter operating time, lesser post-operative pain, and a shorter hospital stay as compared to those seen in the traditional open technique. Laparoscopic appendectomy has not been accepted by surgeons as quickly, because of the longer operating time and greater cost of the laparoscopic technique as compared to the open technique. However, patients suffer less post-operative pain and they have shorter hospital stays with the laparoscopic technique as compared to the open technique [8]. Thus, in an era of cost-conscious medicine, the choice of technique must be weighed carefully.

Single Incision Laparoscopic Surgery (SILS) is a new technique that is now being utilized at many centres for doing appendectomies. The major difficulty faced with this new technique is the sacrifice that has

to be made in terms of comfort and ergonomics. As all instruments and camera are inserted through the same incision, the ability to triangulate the instruments around the target is lost. Although this can be partially rectified by the use of rotator instruments, surgeon ends up working with his/her hands held very close together, and he/she often find himself/herself being impeded by the laparoscope and the assistant. Similarly, the surgeon's right hand will control the left-sided instrument on the screen and his/her left hand will control the right-sided instrument on screen. These technical difficulties do make SILS a more demanding procedure on the operating surgeon than normal laparoscopic techniques. In our experience, this led to an initial significant increase in the operation time. However, with increasing exposure to this technique, operating time has been reduced significantly, and it is now very similar to the average time which is taken for a standard laparoscopic appendectomy.

Our technique of single incision laparoscopic assisted appendectomy was based on maximizing the advantages by combining the ease and simplicity of open surgery with clinical benefits of SILS. Operative time in our technique of SILAA was less than that associated with conventional LA or intracorporeal single incision laparoscopic appendectomy done in other studies [8]. Our operative time was similar to that of multiport LAA, which also combines laparoscopy with open techniques [8]. One meta-analysis has shown a longer post-operative time in SIL-A than that which was associated with open or conventional LA [9]. But our technique was quicker to perform, due to combination of SILS and open techniques. Post-operative pain also seemed to be less than that seen in open or conventional laparoscopic appendectomies. This may be due to a single small incision of 10 mm and muscle spitting technique which were used for trocar placement. Post-operative hospital stay was 1.4  $\pm$  1.2 days, which was lower than that associated with conventional LA or open appendectomy, as has been shown in other studies [10,11]. There was no remarkable complication.

## CONCLUSION

In this unique technique, there is an amalgamation of SILS and open surgery. It combines the benefits of SILS, like a better cosmesis, lesser post-operative pain and a quicker return to work, with advantages of open surgery, like lesser operative time and lower cost of surgery. Single incision laparoscopic assisted appendectomy is safe and feasible. To establish SILAA as an alternative to conventional laparoscopic appendectomy, further prospective randomized control trials are required.

## REFERENCES

- [1] Meljnikov I, Radojic B, Grebeldinger S, Radojic N. History of surgical treatment of appendicitis. *Med Pregl*. 2009;62(9-10):489-92.
- [2] Laine S, Rantala A, Gullichsen R, Ovaska J. Laparoscopic appendectomy - is it worthwhile: a prospective randomized study in young women. *Surg Endosc*. 1997;11(2):95-97.
- [3] Garbutt JM, Soper NJ, Shannon WD, Botero A, Littenberg B. Meta-analysis of randomized controlled trials comparing laparoscopic and open appendectomy. *Surg Laparosc Endosc*. 1999;9(1):17-26.
- [4] Fallahzadeh H. Should a laparoscopic appendectomy be done? *Am Surg*. 1998;64(3):231-33.
- [5] Kald A, Kullman E, Anderberg B, et al. Cost-minimisation analysis of laparoscopic and open appendectomy. *Eur J Surg*. 1999;165(6):579-82.
- [6] Katkhouda N, Mason RJ, Mavor E, et al. Laparoscopic finger-assisted technique (Fingeroscopy) for treatment of complicated appendicitis. *J Am Coll Surg*. 1999;189(1):131-33.
- [7] Konstadoulakis M, Gomatos P, Antonakis PT, Manouras A, Albanopoulos K, Nikiteas N, et al. Two-trocar laparoscopic-assisted appendectomy versus conventional laparoscopic appendectomy in patients with acute appendicitis. *J Laparoendosc Adv Surg Tech A*. 2006;16(1):27-32.
- [8] Nicholson T, Tiruchelvam V. Comparison of Laparoscopic-Assisted Appendectomy with Intracorporeal Laparoscopic Appendectomy and Open Appendectomy. *JSLSV*. 2001;5(1): 47-51.

- [9] Li P, Chen ZH, Wang DR. Safety and efficacy of single-incision laparoscopic surgery for appendectomies: A meta-analysis. *World J Gastroenterol.* 2013; 19(25): 4072–82.
- [10] Nazzal M, Ali MA, Turfah F, et al. Laparoscopic appendectomy: a viable alternative approach. *J Laparoendosc Adv Surg Tech A.* 1997;7(1):1–6.
- [11] Anderson DG, Edelman DS. Laparoscopic appendectomy versus open appendectomy: a single institution study. *J Soc Laparoendosc Surg.* 1997; 1(4):323–24.

**PARTICULARS OF CONTRIBUTORS:**

1. Assistant Professor, Department of Surgery, Veer Chandra Singh Garwali Government Medical science and Research Institute, Sringer, Uttarakhand, India.
2. Assistant Professor, Department of Physiology, Veer Chandra Singh Garwali Government Medical Science and Research Institute, Sringer, Uttarakhand, India.
3. Professor and Head, Department of Physiology, Veer Chandra Singh Gadhwal Government Medical College and Research Institute, Sringer, Uttarakhand, India.
4. Professor and Head, Department of Anatomy, KMC, Katihar, Bihar, India.
5. Post Graduate Student, Department of Biochemistry, KMC, Katihar, Bihar, India.

**NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Abhay Kumar,  
Base Hospital Campus, Srikote, Srinagar, Uttarakhand, India.  
E-mail: aabhaaykumaar@rediffmail.com

**FINANCIAL OR OTHER COMPETING INTERESTS:** None.

Date of Submission: **Dec 28, 2013**

Date of Peer Review: **Mar 03, 2014**

Date of Acceptance: **Mar 25, 2014**

Date of Publishing: **May 01, 2016**