

# Two-Port Laparoscopic Appendectomy

M Husain, S Sahu, P Sachan

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## Abstract

**Background:** Acute appendicitis is one of the most common surgical emergencies encountered by a general surgeon. Open appendectomy has been the surgical procedure of choice. Nowadays laparoscopic appendectomy is becoming popular because of its advantages like less pain, decreased hospital stay and assisting the diagnosis. The two disadvantages are that it takes more time and involves more cost. **Method:** The aim of this study was to compare the outcome of two-port with three-port laparoscopic appendectomy. This is a prospective study of 75 laparoscopic appendectomies out of which two-port appendectomies were done in 24 patients. Outcomes of both groups of patients were analyzed in relation to length of hospital stay, surgical time, wound infection and intra-abdominal abscess. **Results:** The length of hospital stay, incidence of wound infection and intra-abdominal abscess were almost equal in both the groups. However, the operative time and procedure cost were significantly reduced in two-port appendectomy. **Conclusion:** Two-port appendectomies have all the advantages of conventional laparoscopic appendectomy with significantly reduced operative time and cost. This can be considered as best procedure for interval appendectomy and selective cases of acute appendicitis.

## INTRODUCTION

Acute appendicitis is one of the most common surgical emergencies encountered by a general surgeon. Open appendectomy has been the surgical procedure of choice. The first successful appendectomy for acute appendicitis was performed in 1848 by Henry Hancock in England. The widespread use of laparoscopic techniques by general surgeons, however, is changing the surgical approach. Laparoscopic operations for biliary tract disease, GERD, splenic & adrenal pathologies are now becoming the gold standard. This is because of the obvious advantage of decreased postoperative pain, shorter hospital stay, shorter duration of convalescence and rapid return to normal daily activities. Other laparoscopic procedures such as colon resection, hernia repair and gastrectomy have not gained such widespread acceptance because the benefits of laparoscopic approach are not immediately self-evident. Laparoscopic appendectomy can be included in this group because its indications are still not very clear. It has all the advantages of a minimally invasive procedure but with a disadvantage of more operative time and cost.<sup>1, 2, 3</sup>

Two port laparoscopic appendectomies have combined the advantages of both open and laparoscopic appendectomy by reducing the operative time significantly. Here we have

compared the conventional three-port and two-port laparoscopic appendectomies.

## MATERIAL AND METHOD

This is a prospective study carried out at the Department of Surgery, Himalayan Institute of Medical Sciences, Dehradun, India over a period of one and a half year from January 2007 to April 2008. A total of 75 patients were included into the study that underwent laparoscopic appendectomy. Patients were divided into two groups, Group I had conventional three-port appendectomy and Group II had two-port appendectomies. These groups were assigned according to the predefined indications. The indications of two-port appendectomy in our study were: 1. Patients admitted for interval appendectomy 2. Recurrent appendicitis. 3. Acute appendicitis presented within 24 hours. All other patients of acute appendicitis were operated with the conventional three-port appendectomy.

Patients who underwent open appendectomy or have been converted to open appendectomy were not included in this study. Those patients in whom the third port was required because of adhesions or difficult appendix were included in group I.

The diagnosis of acute appendicitis was based mainly on

clinical examination, complete haemogram and ultrasound. None of patients required CT scan in our study. Diagnosis of recurrent appendicitis was made when a patient was having two or more episodes of suspected appendicitis. After the proper work-up and resuscitation the patients were assigned to two groups according to the previously mentioned indications.

**Two-port appendectomy:** Two 10mm ports were made, one at the umbilicus and the other at Mc Burney's point. After putting the scope through the 10mm umbilical port the whole abdominal cavity was inspected and assessment of position of the appendix was made. A 2<sup>nd</sup> 10mm trocar was placed at Mc Burney's point and the appendix along with the mesoappendix was grasped with the help of a grasper. The appendix was pulled into the 2<sup>nd</sup> port and the abdomen deflated slowly. The appendix was delivered and grasped with Babcock's forceps. Appendectomy was then done in a conventional manner after tying the mesoappendix. The appendicular stump was inspected once again by creating a minimum pneumoperitonium.

**Conventional three-port appendectomy** was done with all three ports in the midline, which includes umbilical (10mm), suprapubic (5 mm) and in between these two ports (5mm).

All the patients were allowed oral intake on the evening of surgery and were discharged on the very next day. The patients who underwent internal appendectomy were given 3 doses of third-generation cephalosporin and metronidazole while acute appendicitis patients were given the same antibiotics for 5 days.

## RESULTS

A total of 75 patients underwent laparoscopic appendectomy. Conventional three-port appendectomy was done in 51 patients who were assigned to group I. Two-port appendectomy was tried in 29 patients but could be successfully completed in 24 patients only, who were then assigned to group II. All those 5 patients in whom the third-port was required were having episodes of acute appendicitis. Three of them had dense adhesions around the appendix and the appendix could not be freed from the surrounding structures. Two patients were having a short and thickened appendix which could not be delivered extra-abdominally.

The mean age of the patients in group I was 26 years (range 14-62 years), while it was 30 years in group II (range 17-56 years). Male-to-female ratio in group I was 3.2:1 and in

group II it was 3:1.

The length of hospital stay, incidence of wound infection and intra-abdominal abscess were almost equal in both groups. However, the operative time and procedure cost were significantly reduced in two-port appendectomy. Mean surgical time in conventional technique was 47 minutes (range 40-67min), while it was 21 minutes (range 18-25min) in two-port technique. (TABLE 1)

**Figure 1**

Table 1

	GROUP I	GROUP II
Operative time (min)	47	21
Wound infection	4% (2)	4% (1)
Intra-abdominal abscess	6% (3)	4% (1)
Hospital stay (mean)	1.8 days	1.3 days

We could not compare the operative cost because no standardization of the cost of the procedure could be made, especially in three-port appendectomy as a variety of material was used like endoloop and harmonic scalpel. Harmonic scalpel was used in difficult cases and no conversion to open appendectomy was required in any of the patients selected in this study. All these extra aids were not used in two-port appendectomy and time for surgery was also much shorter as compared to three-port appendectomy. This clearly shows that the procedure cost would have been much lower though it has not been calculated.

## DISCUSSION

Laparoscopic appendectomy is now being used widely for the management of appendicitis because of its various advantages over open appendectomy. Various studies showed that it is associated with less post operative pain, shorter hospital stay and decreased incidence of wound infection. It has two drawbacks: longer operative time and higher cost.<sup>2, 3, 4, 5</sup>

We have modified the procedure to avoid the two drawbacks of conventional laparoscopic appendectomy. Two ports were used, but appendectomy was done extra-abdominally through one of the ports. The age group of patients in both groups was comparable. The mean ages of group I and II were 26 and 30 years, respectively, which was comparable to what is shown in others studies like the one by Kurtz and Heimann. In our study, males were much more in number

with a ratio of 3:1, which is contradictory to other studies that showed either almost equal incidence of appendicitis in both sexes or sometimes female preponderance.<sup>4,5</sup>

Mean operative time in conventional laparoscopic appendectomy was 47 minutes while it was only 21 minutes in two-port appendectomy. We have not found any study actually comparing the two methods. Other studies showed that in laparoscopic appendectomy mean operating time was 67 and 55 minutes, respectively. Fazil demonstrated two-port appendectomies and showed that their mean operative time was 35 minutes.<sup>4,5,6</sup>

The operative time is significantly reduced if we combine open and laparoscopic technique by using two ports and performing appendectomy extra-abdominally after delivering the appendix. This technique helps the patient to recover fast and it also decreases the operative time and cost.

The most common complications of appendicitis are intra-abdominal abscesses and wound infections. Multiple studies have described decreased rates of wound infections and wound complications with laparoscopic procedures. The incidence of wound infections was 4% in both groups I & II while the incidence of intra-abdominal abscess in group I was 6% (3) and 4% (1) in group II. This shows that there is not much difference in the complication rate between two-port and conventional three-port appendectomy. Kwok et al. showed a wound infection rate of 0.6 % while the incidence of intra-abdominal abscess was 5.7%. Fazil showed an infection rate of 4.6% in two-port appendectomy. All the intra-abdominal collections and wound infections in our study group were managed conservatively with the help of antibiotics. No intervention was needed in any of these patients.<sup>6,7,8</sup>

Most of our patients were discharged on the next day in both groups. Mean hospital stay in group II was 1.3 days while it was 1.8 days in group I, which is much shorter as compared to other series that showed the length of hospital stay ranging from 3-5 days. This shorter hospital stay was due to the fact that the majority of patients underwent elective appendectomy.<sup>4,5,6</sup>

We could not standardize the cost of procedure because of the variety of material used in three-port appendectomies

according to the patient's financial status and availability. For some patients endoloops were used while the harmonic scalpel was used in many of the difficult cases. All these extra aids were not used in two-port appendectomy and time for surgery was also much shorter as compared to three-port appendectomy. This clearly shows that the procedure cost would have been much lower although it could not be estimated.

Two-port laparoscopic appendectomy has the same or a lower incidence of wound infections and intra-abdominal abscesses, and requires less operative time, cost and hospital stay. All this shows it to be a superior procedure as compared to three-port appendectomy but it cannot be done in all the cases and careful selection of cases is required.

## CONCLUSION

Two-port appendectomies have all the advantages of conventional laparoscopic appendectomy with significantly reduced operative time and cost. The only drawback is that it is difficult to do if there are adhesions or very thickened and short appendix. This can be considered as best procedure for interval appendectomy and selective cases of acute appendicitis.

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**Author Information**

**Musharraf Husain, MS, MNAMS, MRCSEd.**

Assistant Professor, Department of General Surgery, Himalayan Institute of Medical Sciences

**Shantanu Kumar Sahu, MS, FAIS, FMAS, FIAGES.**

Associate Professor, Department of General Surgery, Himalayan Institute of Medical Sciences

**Praveendra Kumar Sachan, MS**

Professor and Head, Department of General Surgery, Himalayan Institute of Medical Sciences