



## Laparoscopic or Open Appendectomy: A Surgical Dilemma

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### Abstract

*Appendectomy is one of the most common surgical problems encountered in emergency with peak incidence between ages of 10 and 30 years. It is dealt nowadays with both laparoscopic and open approach. Because of lack of consensus about the best suitable technique, we aimed to compare the laparoscopic appendectomy with conventional open appendectomy in treatment of appendicitis. This prospective study was carried out in our department from May 2010 to April 2013. Total 184 patients of age group ranging from 14-60 years with features of acute appendicitis were divided into laparoscopic appendectomy and open appendectomy group. Laparoscopic surgery was done with 3 ports technique by creating pneumoperitoneum with CO<sub>2</sub> and open appendectomy was done by McBurney's incision. Data was analysed by student t-test and chi-square tests. Laparoscopic appendectomy though was little lengthy in intraoperative duration but resulted in shorter hospital stay, reduced analgesic usage, minimal general wound and related complications with early return to normal activity.*

*In future, with wider availability of laparoscopic equipments and experienced surgeons, laparoscopy will get more space amongst budding young surgeons for treatment of acute appendicitis.*

### Introduction

Appendectomy is one the most common surgical procedure done in emergency. Laparoscopic appendectomy was first performed by Kurt Semm<sup>1</sup> of Switzerland in 1983 and he introduced it as an alternative method of surgery in place of open appendectomy. This method could not gain much popularity till in the 1980s when laparoscopic cholecystectomy gained wide acceptance. In spite of a wide available literature, there has not been an unanimous consensus over the best approach for appendectomy whether laparoscopic or open due to inconclusive data. In a study performed by Sauerland,<sup>2</sup> laparoscopy should be preferably done only in young women

and obese persons. Till date laparoscopic appendectomy could not gain the gold standard tag which laparoscopic cholecystectomy has achieved.

Open appendectomy<sup>3</sup> has been the main treatment modality for acute appendicitis, which had been popularised since inception due to its simplicity and standardization along with low learning curve amongst surgeons. It was first introduced by McBurney,<sup>4</sup> who operated by a small incision in right lower quadrant. Even in this era of minimally invasive surgery, surgeons are still facing a dilemma - how to operate appendicitis specially, whether by open or laparoscopic method.

### Aims

Hence, we designed a study in our centre keeping following aims in mind:

- To evaluate the usefulness of the technique of laparoscopic appendectomy in comparison to conventional open appendectomy in terms of morbidity and mortality, intraoperative time, complications, mean duration of hospital stay and wound infection.

### Material and Methods

This prospective study was carried out in Department of Surgery, G.R. Medical College, Gwalior from May 2010 to April 2013. 184 patients of age in the range of 14-60 years with features of acute appendicitis were considered for trial. The patients who had generalized peritonitis due to appendiceal perforation, appendicular lump, appendicular abscess and co-morbid conditions like pregnancy, malignancy, diabetes mellitus, cardiac and chest problems were excluded. These patients were assigned to laparoscopic appendectomy (LA) and open appendectomy (OA) groups after taking informed and written consent randomly. After giving single dose of IV antibiotic (1 gm of ceftriaxone) at the time of induction of anaesthesia, all patients were operated under general anaesthesia. All the procedures were done by incharge consultant surgeons, who had enough expertise in both open and laparoscopic surgeries. To reduce the selection bias and to increase comparability between two groups, computer generated random numbers were used to assign the type of surgery groups (LA or OA) which were written on a card sealed in a completely opaque envelope.

Operative duration along with findings were noted. Exact duration of surgery meant time from skin incision to skin closure. Antibiotic and analgesic usage along with duration of hospital stay with any intra or postoperative complication were also recorded.

Patients were evaluated after 2 weeks of discharge in follow up OPD regarding their general

condition and time duration taken to return to normal day to day activities were noted. Operative site was examined for evaluation of scar, any local tenderness and wound infection. The patients were followed up to 3-4 months for any long term complications.

### Procedure

*Open appendectomy (OA):* It was performed by using a right lower quadrant oblique muscle splitting incision 1.5 to 2 inches in length at McBurney's point. A double ligation of the stump was performed using vicryl 2.0 round body suture. Residual stump was not buried. The distal ileum was explored in every case to rule out Meckel's diverticulum. Abdomen and pelvis was adequately lavaged with normal saline. The skin was closed with Nylon 3-0 reverse cutting suture.

*Laparoscopy appendectomy (LA):* was done using 3 ports-positioned at umbilicus, right and left lower quadrants. Laproscope was positioned at umbilicus. The abdominal cavity was explored to locate appendix and rule out any other possible diagnosis. Appendix is identified at base of caecum. The appendix and the mesoappendix were divided with staples (ethicon). The right lower quadrant and right colic gutter was irrigated with normal saline and suctioned. The appendix was removed in laproscopic endo bag. Fascial defects in the port sites were closed using '0' vicryl suture. The skin incisions were closed in every case with 3-0 nylon RC suture.

**Post operative Course:** Patients were kept under strict vigilance for starting oral feed. Vitals along with bowel sounds were checked twice morning (8am) and evening (8pm). Once bowel sounds appeared, liquids orally was allowed. Patients were shifted to soft diet once they passed flatus. Patients were discharged when they tolerated regular diet.

### Results

There were no significant differences with respect to age and associated co morbidities. In this study, 184 patients were operated for acute appendicitis

from May 2010 to April 2013. The peak incidence of age was noted in 2nd decade (40.21%). Mean age of the patients undergoing appendectomy including both sexes was 27.11±11.88. Individually females had mean age group of 23.62±11.48 and males had 29.19±11.60 yrs. In this present study, the majority of cases were males (60.32%) with female to male ratio of 1:1.04 as depicted in Table 1.

**Table 1:** Total cases with distribution among the type of procedure and gender

Type of appendectomy	Male	Female
Open appendectomy (OA)	54	38
Laparoscopic appendectomy (LA)	40	52

Laparoscopic appendectomy was done in 92 patients (50%). Mean duration of surgery in LA (successfully done) was 57.8±16 minutes while that for those who had open appendectomy was 37±7.5 minute (p<0.0001). 6 patients were converted into open appendectomy (6.5%) due to difficulty in locating appendix and dense interloop bowel adhesions. The LA group required fewer doses of parenteral and oral analgesics in operative and postoperative periods compared with open appendectomy as shown in Table 2 (p<0.0001). The bowel sounds appeared on the 1st postoperative day in 93% in LA group and 69% in the OA group (p<0.001). Hence, 86% in LA group and 64% in open appendectomy group were allowed liquids orally (p<0.001). All patients who underwent LA returned to full normal activity within 3 to 4 days with a mean of 2.82 days in comparison to 4 to 5 days for LA with a mean of 4.86 days. The hospital stay was significantly shorter in the LA group with a mean±SD of 1.4±0.6 days as compared to 2.7±2.5 of the OA gap (p=0.015).

In this study, the main complications noted were pain (47.05% in LA vs 89.13% in OA), vomiting (47.05% in LA to 47.82% in OA), fever (29.41% in LA vs 45.65% in OA), constipation (10.76% in LA vs 26.08% in OA) and paralytic ileus (5.88% in LA vs 28.26% in OA) with a mean

complication rate of 15.13% less in LA group (p=0.527) than OA group as shown in Table 3.

**Table 2**

Analgesics	OA (Mean)	LA (Mean)	p value
Oral	2	1.86	<0.001
Parenteral	1.5	1	<0.001

**Table 3** Comparison of complication among two groups

Symptoms	OA	LA	p value
Pain	47.05%	89.13%	0.026
Vomiting	47.05%	47.82%	0.065
Fever	29.41%	45.65%	0.002
Paralytic ileus	5.88%	28.26%	0.131
Constipation	10.76%	26.08%	0.385

Maximum patients who were operated for LA was discharged on 3<sup>rd</sup> post op day (52.94%) with mean length of hospital stay of 2.52 days & majority of patients undergoing OA was discharged on 5<sup>th</sup> post operative day or beyond (58.69%) with mean length of hospital stay 4.61 days. Thus mean length of hospital stay after surgery in LA group was 2.09 days less (p value 0.001) than that in OA group. Wound related complications were also significant in OA group in comparison to LA group as mentioned in Table 4.

**Table 4** Differences in wound infection & wound dehiscence were significant (p<0.001)

Wound related Post Operative Complications	OA	LA	p value
Wound infection	23%	2%	<0.001
Wound dehiscence	13%	0%	<0.001

**Discussion**

Acute appendicitis is one of the most common intraabdominal condition requiring emergency surgery. Semm<sup>1</sup>, A gynaecologist in 1983 performed 1<sup>st</sup> Laparoscopic appendectomy, but still today is the conventional technique? Many authors foresees Laparoscopic surgery as a reliable future tool for intraabdominal surgical pathologies in order to provide less invasiveness with maximum comfort and outcomes<sup>6,7</sup>. Several studies<sup>8-15</sup> have shown that laparoscopic appendectomy is safe with faster recovery and least wound complication.

Total operative duration in this study was significantly longer in LA group ( $P < 0.0001$ ). It may be due to initial learning curve of laparoscopy. Hospital stay in this study was significantly short in LA group with early acceptance of feeding and discharge from hospital. We find these findings in agreement with several other studies which had demonstrated a shorter stay in laparoscopic appendectomy<sup>2,13,14,16,17</sup>.

In our series, we found statistically significant less analgesic requirement in LA group than OA group ( $p < 0.001$ ), which is in agreement to other studies.<sup>18-20</sup>

Wound infection was significantly high in OA than LA which affected the quality of life of patients. The lower rate of wound infection in LA group may be due to placement of detached appendix in an endobag before removing from abdominal cavity thus minimizing contamination.

### Conclusion

Our results suggested the advantages of laparoscopic cholecystectomy over open cholecystectomy in terms of shorter duration of hospital stay,<sup>21</sup> decreased analgesic requirement during intra and postoperative period, early food tolerance with decreased wound related complications, against only marginally longer operative duration.

Hence laparoscopic cholecystectomy is very safe and provides less postoperative morbidity in experienced hands. The learning curve for young surgeons is day by day decreasing due to wider availability of instruments and experienced teachers.

The scars of laparoscopic appendectomy were better than those observed after open appendectomy which have been also reported in many studies<sup>22</sup>. Patients of laparoscopic appendectomy expressed higher postoperative satisfaction with a better sense of well being.<sup>23</sup>

Only hindrances in laparoscopic surgeries are unavailability of equipments everywhere, requires general anesthesia and more expensive and hence

is not much widely accepted<sup>2</sup> like laparoscopic cholecystectomy. Hence laparoscopic appendectomy is a relatively recent more innovative technique having more advantages over open appendectomy.

In a nutshell from our study, it is evident that laparoscopic appendectomy has better results than open appendectomy, while it did had marginally lengthy intraoperative duration with almost same incidence of vomiting, but certainly scored over open appendectomy in other areas like reduced hospital stay, more comfort and less complications.

Hence laparoscopic appendectomy appears to be a more safe approach in managing the patient with a confirmed or suspicious diagnosis of acute appendicitis. As time passes by, certainly it will gain more acceptance and will occupy centre stage with more and more young budding surgeons training in laparoscopy with a probable future shorter learning curve.

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