

## Open and Laparoscopic Appendicectomy: A Comparative Study

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**Abstract: Background:** With its introduction Laparoscopic appendicectomy combines the advantages of diagnosis and treatment in one procedure with the least morbidity. Patients are likely to have less post operative pain, decreased wound infection, effective peritoneal toileting without the need for extending the incision, better cosmesis and to be discharged from hospital to return to activities of daily living sooner than those who have undergone open appendicectomy.

**Research question:** What are the advantages of the procedure Laparoscopic appendicectomy over the open appendicectomy?

**Objectives:** (1) to know the advantages of Laparoscopic appendicectomy when compared to open appendicectomy.

**Study Area:** Government General Hospital, Guntur.

**Study Period:** January 2013 to March 2014.

**Study Design:** A comparative observational study.

**Sample Size:** 100 cases (50 LA + 50 OA).

**Statistical Tools:** Percentages, Proportions and Chi-Square test.

**Results:** Maximum number of patients have less post operative pain score & required very short duration of analgesia (1.54 Mean days), Resumption of oral diet very quickly (1.36 days Mean), short usage of duration of antibiotics (Mean 2.28 days) and very short duration of hospital stay (Mean 1.41 days) among the pts underwent Laparoscopic appendicectomy when compared to open appendicectomy patients. And related to complications also very less incidence was observed among the Laparoscopic appendicectomy patients.

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### I. Introduction

It is a well-known adage that abdomen is a temple of surprises and a magic box as well. Since the abdomen accommodates innumerable viscera and other anatomical components, diseases of the abdomen constitute a topic full of clinical curiosity. A meticulous examination of abdomen is one of the most rewarding diagnostic procedures available to the doctor, especially the surgeon and plans an ideal treatment. As had been said by Bailey "A correct diagnosis is the hand maiden of successful operation". Despite the advancements in the fields of diagnosis the surprises never cease<sup>1</sup>. Acute appendicitis is one of the commonest causes of acute abdomen encountered in surgical practice, requiring emergency surgery. The life time rate of appendicectomy is 8.6% and 6.7% among males and females respectively, with approximately 7% of all people undergoing appendicectomy for acute appendicitis during their lifetime<sup>2</sup>. It has been observed that males had higher rates of appendicitis than females for all age groups with an overall ratio on 1.2 to 1.3:1.<sup>3</sup>

Even though modern diagnostic facilities, surgical skills, antibiotic therapy have brought down the mortality from 50% (before 1925) to less than 1/1,00,000 persons, still the morbidity is around 5-8% mainly due to delayed diagnosis & treatment, with the resultant complications<sup>4</sup>. In acute appendicitis however, a treatment delay of even a few hours may result in stormy complication. It has been said that nothing can be so simple nor yet so difficult as the diagnosis of acute appendicitis. With its introduction laparoscopic technique provided an opportunity to explore new methods of therapy in the management of the suspected cases of the acute appendicitis<sup>5</sup>. Laparoscopic appendicectomy combines the advantages of diagnosis and treatment in one procedure with the least morbidity<sup>6</sup>. Patients are likely to have less post operative pain and to be discharged from hospital and return to activities of daily living sooner than those who have undergone an open appendicectomy<sup>7</sup>. Other advantages include decreased wound infection, better cosmesis, ability to explore the entire peritoneal cavity for diagnosis of other conditions and effective peritoneal toileting without the need for extending the incision<sup>4</sup>. Obese patients have less pain and shorter hospital stays after laparoscopic versus open appendectomy. Patients with perforated appendicitis have lower rates of wound infections following laparoscopic removal of the appendix<sup>8</sup>. The modern era of laparoscopic surgery has evoked remarkable changes in the approach to surgical diseases. The trend towards minimally invasive surgery has prompted general surgeons to scrutinize nearly all surgical procedures for possibility of conversion to the laparoscopic technique<sup>8</sup>.

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## II. Materials and Methodology

From all the patients suffering from appendicectomy admitted in the department of surgery, Government General Hospital, Guntur during the period January 2013 to December 2013 about 100 cases (50 posted for Laparoscopic Appendicectomy + 50 posted for Open Appendicectomy) were selected randomly for study as study subjects. Matching justification was also done to these two groups and these cases were followed until discharge. Information pertaining to study variables like patient profiles, duration of analgesia, post-operative pain score, time until resumption of diet, duration of antibiotic usage, duration of hospital stay and post-operative complications etc was collected by a pre-tested proforma.

The data collected was analysed by using appropriate statistical methods like percentages, proportions, measures of central tendency and Chi-Square test etc. The observations were discussed in the light of published material of various authors. The conclusions and recommendations were made after detailed study of observations.

## III. Results

**Table: 1 Age Distribution**

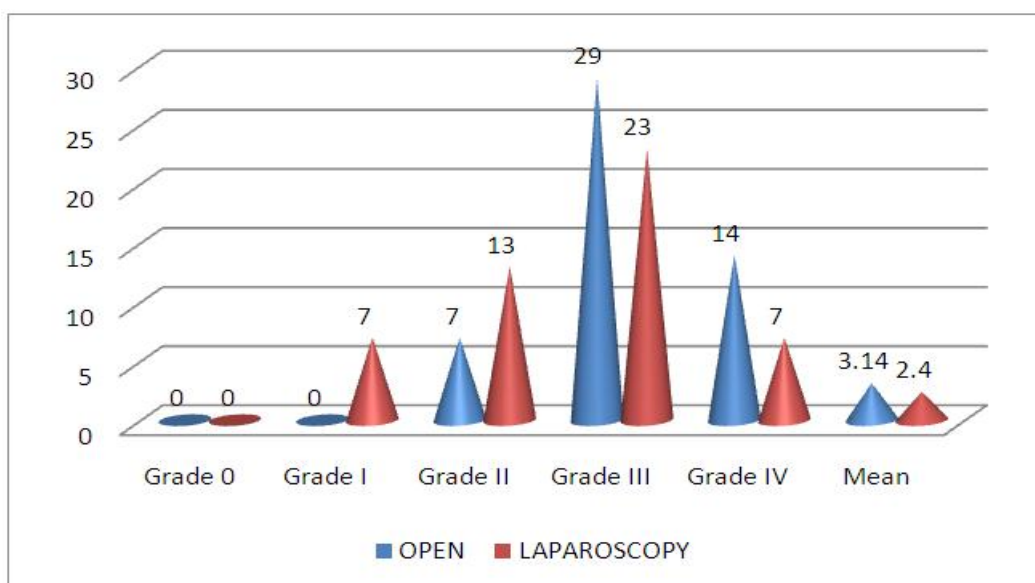
Age wise Patients Analysed	OPEN		LAPAROSCOPY	
	No.	%	No.	%
11-20 years	12	24	18	36
21-30 years	28	56	26	52
31-40 years	10	20	6	12
41-50 years	-	-	-	-
Mean	25.74		23.5	
+/- SD	+/- 6.13		+/- 5.24	

- Among both the groups maximum >50% of the patients were belong to 21 – 30 yrs of age group

**Table: 2 Post Operative Pain Score**

Pain Score	OPEN	LAPAROSCOPY
Grade 0	0	0
Grade I	0	7
Grade II	7	13
Grade III	29	23
Grade IV	14	7
Mean	3.14	2.4
+/- SD	+/- 0.639	+/- 0.903
P Value	<b>0.02* Significant</b>	

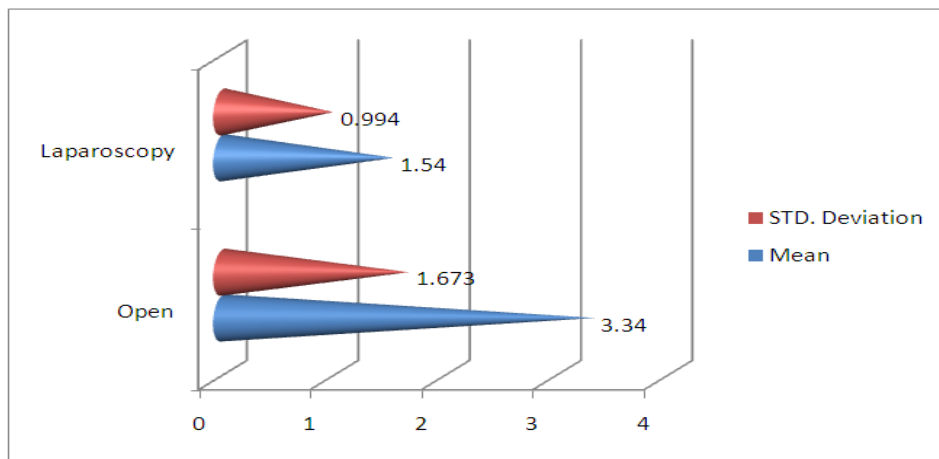
- In present study average pain score was 3.14 (+/- 0.6) in open group as compared to 2.4 (+/- 0.9) in laparoscopic group with  $p < 0.05$  which is significant



**Figure: 1 Post Operative Pain Score**

**Table: 3 Duration of Analgesia**

Indicators	Sample Size	Mean	SD
Open	50	3.34 days	1.673
Laparoscopy	50	1.54 days	0.994
<b>P Value</b>	<b>&lt;0.001* Significant</b>		



**Figure: 2 Duration of Analgesia**

- Duration of analgesics used parenteral and oral in days were on an average 3.4 (+/- 1.6) days and 1.54 (+/- 0.99) days for open and laparoscopic group respectively. Again this difference is significant ( $p < 0.001$ )

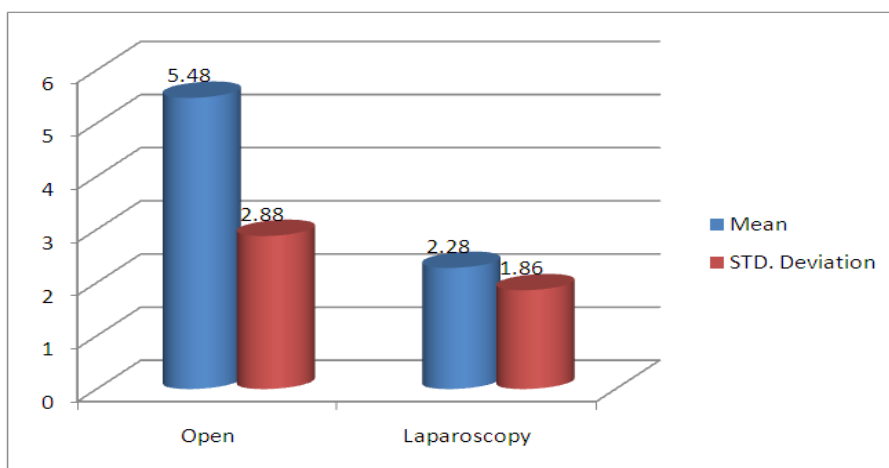
**Table 4: Resumption of Oral Diet**

Resumption of Oral Diet	OPEN	LAPAROSCOPY
Day 1	8	36
Day 2	28	10
Day 3	10	4
Day 4	4	0
Mean	2.18	1.36
+/- SD	+/- 0.873 days	+/- 0.631 days
<b>P Value</b>	<b>0.02* Significant</b>	

- In this study resumption of oral diet in open group is at a mean of 2.18 (+/- 0.8) days and in laparoscopic group is 1.36 (+/- 0.6) days with  $p < 0.05$  which is significant.

**Table: 5 Duration of Antibiotics**

Indicators	Sample Size	Mean	Std. Deviation
OPEN	50	5.48 days	2.88
LAPAROSCOPY	50	2.28 days	1.86
<b>P Value</b>	<b>0.002* Significant</b>		



**Figure: 3 Duration of Antibiotics**

- In this study mean duration of antibiotic use in open group is 5.4 (+/- 2.88) and 2.28 (+/- 1.86) for laparoscopic group with  $p < 0.01$  which is significant.

**Table: 6 Duration of Hospital Stay**

Indicators	Sample Size	Mean	Std. Deviation
OPEN	50	8.12 days	3.87
LAPAROSCOPY	50	3.66 days	1.41
<b>P Value</b>	<b>&lt; 0.001* Significant</b>		

- In present study mean duration of hospital stay for open group is 8.12 (+/- 3.87) days and 3.66 (+/- 1.41) days for laparoscopic group with  $p < 0.001$  which is significant. This shows a significant decrease in hospital stay for patients undergoing laparoscopic appendicectomy.

**Table: 7 Complications**

Patient Analysed/ Complications	OPEN 50		LAPAROSCOPY 50	
	No.	%	No.	%
Vomiting	12	24	6	12
Fever	15	30	6	12
Wound Infection	15	30	5	10

- Related to complications the incidence of vomiting was higher following open appendicectomy (24%) than laparoscopic (12%). Wound infection were more common after open 15 (30%) than laparoscopic 5 (10%).

#### IV. Discussion

The pending of the surgical opinion continues to swing with gradually decreasing sweep as the appropriate application of laparoscopy for the suspected case of the acute and recurrent appendicitis is popularizing.

The relative advantage and disadvantages of the laparoscopic and open appendicectomy are measured primarily in terms of duration of surgery, post operative pain score and duration of analgesic used in days, Post operative complication like ileus, fever, vomiting, wound infection, post operative recovery in the terms of post operative duration of hospital stay, returns to normal were assessed.

In our present study pain score was 3.14 +/- 0.639 for open group as compared to 2.4 +/- 0.903 in laparoscopic group ( $p < 0.05$ ) because of longer incision stretch of muscles and wound infection. Similar observations have also been reported by other authors<sup>9, 10</sup>. Thus the post operative analgesic required was more in open group as compared to laparoscopic group. Similar results have also been found in the following study<sup>11</sup>.

In present study analgesic use was 3.34 +/- 1.67 days for open group as compared to 1.54 +/- 0.99 ( $p < 0.01$ ). It is proved that laparoscopic procedures cause less postoperative pain than their conventional counterparts. The Postoperative narcotic use is less after laparoscopic appendicectomy. In one study done by Ortega et al<sup>12</sup>; linear analogue pain scores were recorded in 135 patients blinded to the procedure of operation by special dressing and pain score was very less in laparoscopic group compared to open.

Post operative complications like vomiting was lower in laparoscopic group with 12% as compared with 24% in open group. The similar studies done showed the incidence of emesis was lesser and post operative ileus lesser in laparoscopic group<sup>12</sup>.

In present study there is significant reduction in the incidence of post operative wound infection in laparoscopic group (10%) as compared to open group (30%). A similar study done by others has also shown a significant reduction in wound infection rate<sup>9, 12, 13, 14, 15</sup>.

Moreover, the small size of trocar incisions renders wound infections easier to manage, with prompt resolution than those following conventional appendicectomy. Similar results have also been found in the following study<sup>16</sup> M. Marzouk et al in 2003, showed laparoscopic appendicectomy significantly improved the postoperative wound infection rate. There was no wound infection in the laparoscopic group, whereas in open group the infection rate was 7.6%. This is because with the trocar wounds. Also, removal of the appendix was done completely within the trocar sheath, and there was no direct contact with the port opening.

Duration of post operative hospital stay was significantly low for laparoscopic group 3.66 +/- 1.41 as compared to open group 8.12 +/- 3.87. The longer hospital stay in open group compared to laparoscopic group also has been reported by others<sup>12, 17</sup>. In Nguyen N, Zainabadi K, Mavadadi S, Paya M, Stevens CM, Root J, et al, study stay was shorter for laparoscopic group ( $p < 0.04$ ) 45. Similar finding with 2.5 days versus 3.4 days were found for open and laparoscopic groups<sup>18</sup>.

In Chin J Dig Dis study reported the median length of stay was significantly shorter after laparoscopic appendicectomy (3 days versus 5 days,  $p < 0.0001$ ) than after open appendicectomy<sup>19</sup>. A young J L, Law W L,

Lo CY, Lam CM study reported the median hospital stay for patients in laparoscopic group and open group were 3.0 days (range, 1 to 47) and 4.0 days (range, 1 to 47), respectively which were comparable<sup>20</sup>.

Studies have shown that laparoscopic group patients can return to normal work earlier<sup>9,12,14,21</sup>. It has been shown that those patients who underwent successful laparoscopic appendicectomy have a better postoperative recovery. The reduced trauma to the abdominal wall is a very significant factor in postsurgical discomfort. The better mobility of the abdominal musculature and the earlier ambulation, reduce the risk of the early postoperative complications of pneumonia and embolism.

## V. Conclusions & Recommendations

In our study we observed that the Laparoscopic appendicectomy is a safe and feasible procedure. Patient acceptance and compliance are excellent factors that are essential in the prevailing socio-economic condition. The procedure allows adequate exposure with minimum invasiveness and the complications are minimal in experienced hands, provides ability to explore the entire peritoneal cavity for diagnosis of other conditions. Even though the mean operating time is little bit high than open appendicectomy, the postoperative pain is less, the recovery is faster and hence the mean hospital stay is reduced. Patient returns home and attends to his daily work much earlier compared to open appendicectomy. The incidence of wound infection is low, scar is minimal and hence the cosmetic demand of the patient is satisfied. The conversion rate can be reduced and good success rate can be achieved with more exposure and experience.

In conclusion, this study shows that in terms of patient comfort, complications and post-operative recovery, laparoscopic appendicectomy is superior to open appendicectomy ( $p = 0.01$ ) and we would recommend that laparoscopy be the procedure of choice in all patients with suspected appendicitis. And also if this sort of advanced technology in surgery is available in secondary level health facilities (FRUs), it might be more useful to the public who are dwelling in rural and semi urban areas.

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