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## A comparative study of Appendicectomy: open and laparoscopic

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### ABSTRACT

**Background:** Laparoscopic method for the surgical treatment of acute appendicitis is now-a-days becoming popular. The main advantage of the Laparoscopic abdominal surgery is related to the avoidance of Laparotomy wound. **Materials and methods:** The total number of patients admitted by various surgical units during this study period was 580, out of which 126 case of appendicitis were admitted and operated in department of general surgery. 60 patients underwent appendicectomy by the conventional Open method and the remaining 66 patients underwent surgery by Laparoscopic method. **Results:** In total of 580 surgical cases admitted out of which 126 cases were operated for appendicitis, has incidence of 21.7%, number of days of parenteral usage of antibiotics to be more in the Open appendicectomy group. Oral feeds were resumed on an average in about one day in Laparoscopic surgery, while it took about 1 ½ days in open surgery. Duration of hospital stay was one day more in Open surgery group than in Laparoscopic surgery group. This difference was statistically significant. All the patients who underwent Laparoscopic surgery were able to return to normal activity, on an average, 5 days earlier than patients who underwent Open surgery. (P=0.001). There was a significant difference (P=0.02) in the wound infection rate which was around 8 % in the Open group while none in the Laparoscopic group. 89% of the patients undergoing Laparoscopic appendicectomy felt that they had an excellent cosmetic end result while only 2% of Open group felt the same. **Conclusion:** Laparoscopic appendicectomy was better than Open appendicectomy with regard to pain, wound infection, co-existing pathology, duration of hospital stay, earlier return to normal activity, excellent cosmetic end result, lesser use of antibiotics, and earlier resumption of oral cosmetic end result, feeds. It indicates that Laparoscopic appendicectomy has better results and will become the standard of care.

**Keywords:** Laparoscopy, Acute appendicitis, Laparotomy wound.

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### Introduction

Appendicitis is one of the commonest surgical emergency. It can occur in any age, but rare under 5 years. The treatment is straight forward in most of the cases and depends upon the stage of the disease. In early appendicitis cases, appendicectomy is the treatment of choice. It can be done by Open or Laparoscopic methods. Minimal invasive surgery had a considerable impact on common surgical techniques and the Laparoscopic method for surgical treatment of acute appendicitis is now-a-days becoming popular. The main advantage of the Laparoscope in abdominal surgery is related to the avoidance of laparotomy wound. In most of the patients, the wound required for an Open appendicectomy is not much larger than the

wounds for Laparoscopic appendicectomy and thus the advantage of the Laparoscopic appendicectomy is not obvious. The role of Laparoscopic appendicectomy remains controversial as many researchers have suggested that over all morbidity is primarily severity of the appendicitis rather than the Open / Laparoscopic method. Several independent studies and meta-analysis of those studies have been done.

### Aim and objectives

The aim of the present study is to have a comparative study of Open appendicectomy and Laparoscopic appendicectomy. Comparison is done in the time taken for surgery, blood loss during surgery, antibiotic prophylaxis, usage of analgesics, duration of hospital stay, complications in each type of surgery, time taken to resume normal activity, cost effectiveness, patient's satisfaction and cosmetic result.

### Materials and methods

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The total number of 580 patients were admitted in surgical units of Government General Hospital/ Government Medical College, Nizamabad ,during November,2012 to September,2014 , out of which 126 cases were diagnosed as suffering from appendicitis , were admitted and operated . 60 Patients had undergone appendectomy by the conventional Open method and the remaining 66 patients underwent surgery by the Laparoscopic method.

#### Inclusion criteria

Pain and with clinical features simulating acute appendicitis, Patients scheduled for interval appendectomy. The patients preoperative diagnosis had to be firm enough so that the surgeon would have done a right lower quadrant incision Open appendectomy in the absence of Laparoscopic technology.

**Exclusion criteria** All patients who presented with an appendicular mass and / or features generalized peritonitis were excluded. Once a case fit into this criterion, depending on the patient's option, either Open or Laparoscopic surgery was performed. Either the technique for appendectomy, Open or Laparoscopic, was left to the surgeon's discretion. There was no specifically defined criterion for discharge from hospital after appendectomy. This is left to the discretion of the surgeon. Data was collected on a program basis; clinical examination preoperative findings as well as postoperative recovery and follow up was done by the respective units. Patient's age, sex, race, height, weight, history of previous abdominal surgery, concomitant illness, chronic medication usage,

and ASA class (American Society of Anesthesiologist's risk classification) were recorded. Preoperative temperature, leucocytosis, right lower quadrant pain, right lower quadrant tenderness, nausea, vomiting and anorexia were recorded. The duration of preoperative symptoms, final pathologic finding of appendix, how the stump of the appendix was technically handled, duration of operation, complications, period of post operative analgesics administration, time until resumption of regular diet, and length of postoperative hospital stay were recorded. Time until return to work or normal activities was determined during postoperative follow-up interview after one month, where patients were also asked to grade their perception to the cosmetic result on a scale of one to five (Gr.I being the worst and Gr.V being the best). Qualitative data was summarized in terms of-percentage and the quantitative data was summarized through mean values. The standard deviation was also computed to measure the variability. Results in the two groups were compared using appropriate statistical techniques.

#### Result

In the present series, the patients who presented with acute symptoms during November 2012 to September 2014, pre-operatively diagnosed to have acute appendicitis were admitted, operated and were studied. The total number 580 patients were admitted by surgical units during this study period, out of which 126 cases of appendicitis were admitted and operated in department of general surgery. Appendicitis has an incidence of 21.7% of surgical unit admissions.

**Table 1: Demographic details in study**

Characteristic	Appendectomy		P Value
	Open	Laparoscopic	
Patients analysed	60	66	
Sex			
Males	34	26	0.08(NS)
Females	26	40	
Age ( Years )			
Below 30	43	46	
30-49	14	18	
50 & Above	3	2	
Mean Age	28 yrs	27yrs	>0.2(NS)

NS – Not Statistically significant.

The total number 580 patients were admitted in surgical units during this study period, out of which 126 cases of appendicitis were admitted and operated.

**Table 2: Personal history of patients in study**

Complaint	Appendicectomy		P Value
	Open	Laparoscopic	
Abdominal pain	60	66	
Vomiting	55	63	0.06 (NS)
Fever	53	64	0.09 (NS)
Loss of appetite	40	59	< 0.01 (S)
<b>Associated co- morbidity</b>			
Diabetes Mellitus	4	5	> 0.2 (NS)
Heart disease	1	0	> 0.2 (NS)
Episodes of pain	6	6	> 0.2 (NS)
<b>Habits</b>			
Alcoholism	4	3	> 0.2 (NS)
Smoking	8	2	0.05 (S)
Vegetarian	12	14	> 0.2 (NS)

All the patients complained of abdominal pain in both the groups. The other complaints were vomiting, fever and loss of appetite. Descriptions of past history of the patients like diabetes mellitus, heart disease, previous episodes of similar pain were detailed. Both the groups

were similar with respect to percentage of patients consuming alcohol. 13% of the patients who were on open group and 3% on the Laparoscopic group were smokers. About one fifth of the patients were vegetarian in both the groups.

**Table 3: Result of Open and Laparoscopic Appendicectomy**

Details	Appendicectomy		P Value
	Open	Laparoscopic	
<b>Blood loss</b>			
Below 50 ml	56	65	
50-100 ml	4	1	0.2 (NS)
Adj. Organ Injury No	60	65	> 0.2 (NS)
Duration of surgery	64 ± 30	73 ± 26	0.07 (NS)
Operation (min)	(15to150)	(30 to 135)	0.07(NS)
Co-existing pathology negative	<b>60</b>	<b>6</b>	<b>0.2(NS)</b>
<b>HPE</b>			
Acute Appendicitis	48	47	> 0.2 (NS)
Reactive Lymphatic Hyperplasia	12	19	

There was a significant difference (P=0.02) in the wound infection rate which was around 8 % in the Open group while none of the patients in the Laparoscopic group.

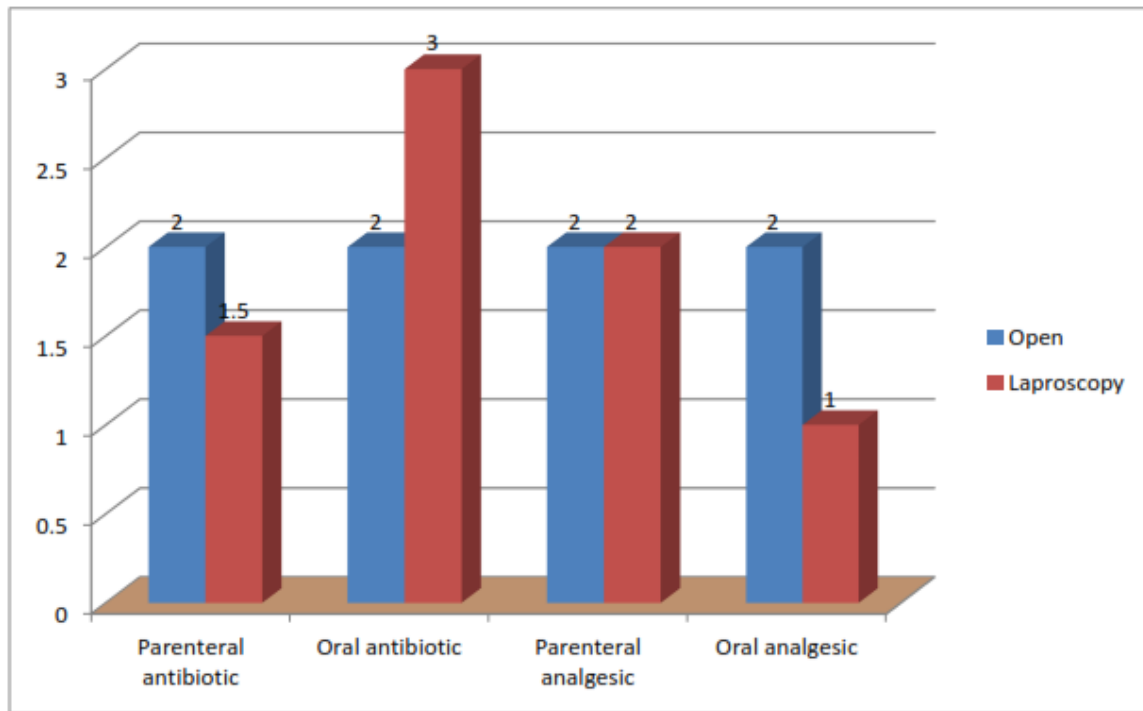


Figure 1: Post Operative Care

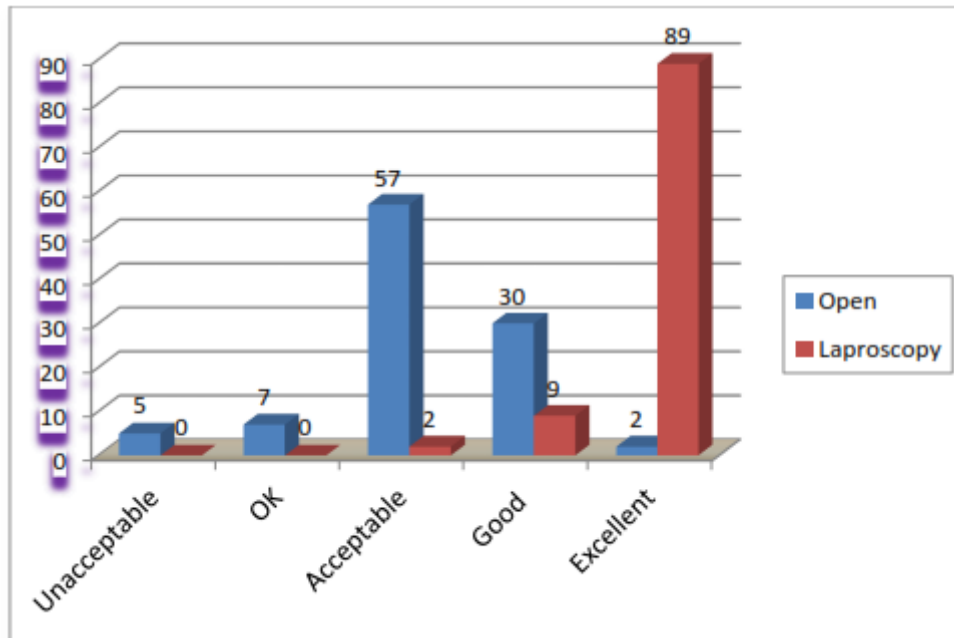
It was observed that the number of days of usage of parenteral antibiotics was more in the Open appendicectomy group.

Table 4: Post-Operative course

Details	Appendicectomy		P Value
	Open	Laparoscopic	
Time to resumption of oral feeds (days)	1.6 + 0.8 (1 to 4)	1.1 + 0.3 ( 1 to 2 )	< 0.001 (S)
Duration of hospital stay (days)	3 + 1.5 (1 to 8)	2 + 0.6 ( 1 to 4 )	< 0.001 (S)
Time to return to normal duties	13 + 1	9 + 2	0.001

Oral feeds were resumed on an average in about one day in Laparoscopic surgery group, while it took about 1 ½ days in Open surgery group. But, whether this confers any significant benefit to the patient remains to be same. Duration of hospital stay was one day more in Open surgery group than in Laparoscopic surgery

group. This difference was statistically significant. Most importantly, all the patients who underwent Laparoscopic surgery were able to return to normal activity, on an average, 5 days earlier than patients who underwent Open surgery. (P=0.001).



**Figure 2: Patients perception about cosmetic end result.**

89% of the patients underwent Laparoscopic appendicectomy felt an excellent cosmetic end result while only 2% of Open group felt the same. It appeared that in our hospital the patients decided, whether to undergo Laparoscopy or open surgery and this was bound to have bias in their perception about the cosmesis achieved. Only 57% of the patients perceived that they had an acceptable scar in the Open group.

### Discussion

The total number of 580 patients were admitted by various surgical units during this study period, out of which 126 cases of appendicitis were admitted and operated has incidence 21.7% of all general surgical admissions. In present study Diclofenac was the analgesic of choice and no significant difference was noticed in both the groups. Even though, it did not find a difference in the total days of usage of antibiotics. But, the number of days of parenteral usage of antibiotics was more in the Open appendicectomy group. Oral feeds were resumed on an average in about one day in Laparoscopic appendicectomy group, while it took about 1 ½ days in Open surgery. Duration of hospital stay was one day more in Open surgery than in Laparoscopic surgery. This difference was statistically significant. Most importantly, all the patients who underwent Laparoscopic appendicectomy were able to return to normal activity, on an average, 5 days earlier than patients who underwent Open appendicectomy. (P=0.001). There was a significant difference (P=0.02) in the wound infection rate which was around 8 % in

the Open group while none of the patients in the Laparoscopic group. 89% of the patients undergoing Laparoscopic appendicectomy felt an excellent cosmetic end result while only 2% of Open group felt the same. Only 57% of the patients perceived that they had an acceptable scar in the Open group. J.J. Tate *et al* [2] in their study took 155 consecutive cases with suspected acute appendicitis compared and concluded that the proposed benefits of Laparoscopic surgery – reduction in pain, less chances of wound infection, patient's better satisfaction, less duration of hospital stay and early return to work were all realized in their study, but the operative time was significantly elevated in Laparoscopic appendicectomy group. Cost and cosmesis were not accessed. Ortega *et al* [3] in their study concluded along the usual lines in that they showed that Laparoscopic appendicectomy to be beneficial in terms of pain reduction, early discharge and early return to work with an increase in wound infection. L.K.Me Cahill *et al* [4] in their study "A clinical outcome and cost analysis of Laparoscopic

versus Open appendicectomy” in contrast to the other studies reviewed, have shown that Laparoscopic appendicectomy had no demonstrable benefit of decrease in hospital stay and complications, rather substantial increase in the cost was observed. They cautioned that Laparoscopic appendicectomy should not be used until and unless a significant benefit is shown and until then should only be limited to clinical trials. C.K.Kum *et al* [5] in their study conducted in Singapore in 1993 concluded that a reduction in the incidence of wound infection and earlier return to work were the two most important advances of Laparoscopic appendicectomy. Excellent cosmetic result was an added advantage. No change in the operative time or analgesics used was found. The main point against Laparoscopic appendicectomy was the increase in the cost. Another perceived theoretical advantage is the reduction in long term complications like adhesions. Abe .Kingerhut *et al*[6] in their meta-analysis of most of the randomized controlled trials were done till now have cited methodological flaws in most of the studies which prevented them from generalization of results. S. Chung *et al* in their article have concluded that Laparoscopic appendicectomy offered significant advantages in reduced post-operative pain and wound infection rate [7]. The Laparoscopic operation allowed for a faster convalescence rate, although the effect size is only marginally significant hospital stay and complications. The single disadvantage of Laparoscopic appendicectomy was significantly increased operating time which caused higher costs. Larissa K.F.Temple, MD *et al* [8] in their study showed the results from their meta-analysis suggest that Laparoscopic appendicectomy can be performed safely although operative time was increased. Hospital stay was similar with either procedure but return to normal activity may be shorter after Laparoscopic appendicectomy. At present, therefore the decision whether to perform appendicectomy Open or Laparoscopic may depend on local expertise and the availability of operative and hospital resources. There is a real need for further trials before adopting or disregarding Laparoscopic appendicectomy because of the methodological concerns of the published trials. As well, the Laparoscopic expertise of most surgeons has increased. Future trials should be performed by experienced Laparoscopic surgeons. Future trials may also probably incorporate patient-preferences, quality of life assessments and an economic analysis. Merhoff AM[9] in their study found that Laparoscopic appendicectomy was more expensive than Open appendicectomy but did not reduce hospital stay or change in time to return to work. However wound complications were less common. The advocacy for

Laparoscopic appendicectomy is slowly gaining ground and this fact can be gauged from trials that go on to say that in children Laparoscopic appendicectomy does not carry a greater risk of intra or post-operative complications and therefore safely can be established as a standard procedure. Another trial was done in a backward European country comparable to the third world found that Laparoscopic appendicectomy is associated with a shorter hospital stay, with few post-operative complications, and better diagnostic accuracy, and it was recommended as the procedure of choice for the diagnosis and management of acute appendicitis[10]. Some also have analyzed the complication rate in both Open and Laparoscopic surgery and their observation in the meta-analysis, was reassuring to all surgeons performing Laparoscopic surgery. The overall risk of complications was less and the risk of major complications was almost equal in Open and Laparoscopic procedures. Proper precautions and care to assure safe entry into the abdomen should help and prevent many of the major complications. Knowledge of the vascular anatomy of the anterior abdominal wall and retro peritoneum as well as proper selection of entry techniques based on prior surgical procedures, help to minimize complications. The surgeon who does not encounter complications is the one who is not operating. All procedures have their risks, complications can occur even in the best hands, thus it is vital that these complications are recognized promptly and addressed promptly. A patient should progressively improve after a Laparoscopic procedure, if not a complication must be ruled out. Initial randomized trials uniformly support the use of Laparoscopic appendicectomy rather than traditional approaches. The operation time is almost the same for both groups. The duration of hospital stay, the requirement of analgesics and the period of disability are all shortened in the Laparoscopic groups[12]. Moreover, in one randomized trial the number of complications, particularly wound infections is more in the Open group. In a retrospective audit, the total hospital cost for Laparoscopic appendicectomy was not more from that of Open appendicectomy.

### Conclusion

While analyzing the various data that Laparoscopic appendicectomy is similar to Open appendicectomy in the parameters like blood loss, adjacent organ injury. Laparoscopic appendicectomy was better than Open appendicectomy with regard to pain, wound infection, co-existing pathology, duration of hospital stay, lesser use of antibiotics, and earlier resumption of oral feeds, earlier return to normal activity, excellent cosmetic end

result, All the above mentioned advantages are at the cost of slightly increase duration of surgery and higher overall cost. All available informations advocate that Laparoscopic appendicectomy has better results and will become the standard of care.

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