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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI: 10.21474/IJAR01/15734

DOI URL: <http://dx.doi.org/10.21474/IJAR01/15734>



RESEARCH ARTICLE

A PROSPECTIVE COMPARATIVESTUDY OF OPEN VERSUS LAPAROSCOPIC APPENDECTOMY: A SINGLE UNIT STUDY

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Manuscript Info

Manuscript History

Received: 20 September 2022

Final Accepted: 24 October 2022

Published: November 2022

Key words:-

Acute Appendicitis, Open Appendectomy, Laparoscopic Appendectomy, Postoperative Pain, Wound Infection

Abstract

Introduction: Acute appendicitis is the most common general surgical emergency. Appendectomy is the treatment of choice for acute appendicitis and the most commonly performed emergency abdominal operation. Open appendectomy is found safe and effective operation with low morbidity but found to be associated with post operative pain, wound infection and complications like intestinal obstruction which may delay recovery. Laparoscopic appendectomy emerged as a good option for treatment of appendicitis. The purpose of this study was to compare the laparoscopic versus open approach among patients with appendicitis in our centre.

Materials And Methods: This study was a prospective study of 100 patients with clinically diagnosed as appendicitis admitted in the department of General Surgery, Unit II, Zoram Medical College for a period of two years during November 2019 to October 2021. They were divided into two groups - Open Appendectomy (OA) group and Laparoscopic Appendectomy (LA) group of 50 patients each. Age ranges from 10yrs to 75yrs. Exclusion criteria were pregnant female, chronic medical problems, haemodynamically unstable or psychiatric illness, cirrhosis, coagulation disorders, patients on steroid, immuno-compromised patients, patients on chemotherapy for malignancy and those who are not willing to participate. OA was performed through standard Mc Burney incision. LA was performed through a standard 3 ports technique.

Results: The most common presentation of appendicitis is abdominal pain followed by nausea/vomiting and common in younger age group of 10-20 years. Laparoscopic Appendectomy was found as safe and effective as Open Appendectomy. LA has more acceptable cosmetic result, shorter hospital stay and less postoperative pain. The pain score was significantly reduced in LA group (3.2+1.4) and in OA (4.1+1.8).

Conclusion: LA was found as safe and effective as OA. LA has more acceptable cosmetic result, shorter hospital stay and less postoperative pain.

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Introduction:-

Acute Appendicitis is among the most common causes of acute abdominal pain which require surgery, and the probability of having this condition in lifetime is approximately 7%¹. The diagnosis of this condition is considerably difficult, especially due to subtle early symptoms and clinical conditions². Negative appendectomy is observed in 15-30% of cases, where a decision for surgery is made based on the clinical symptoms and findings³. Early surgery leads to inadequate evaluation of acute abdominal pain and negative appendectomy, whereas delayed surgery leads to appendicitis perforation complications⁴. Delayed diagnosis leads to various complications, including perforation, peri-appendicular abscess, wound infection, and intra-abdominal adhesion⁵.

In 21st century, the greater consideration is given to patient's comfort; this choice is because of the acquisition of recent technology and skills for the better mode of surgery⁶. Appendectomy is the most common operation performed by the general surgeons. The diagnosis of acute appendicitis is often difficult and challenging. An accepted negative appendectomy rate for presumed appendicitis ranges from 15%-20%, even higher in women of child bearing are ranging from 20-30%⁷. The laparoscopic appendectomy was first performed by Semm K, German Gynecologist. It has gained acceptance with the technological advantages of the past two to three decades as a diagnostic and treatment method for acute appendicitis. From that time, this procedure has been used widely. In spite of its wide acceptance, there remains a continuing debate in the literature related to the most appropriate way of removing the inflamed appendix⁸.

However, Laparoscopic Appendectomy is still not considered as gold standard for acute appendicitis as laparoscopic cholecystectomy has become for cholelithiasis due to the emergency nature of disease often operated by junior staff in odd hours when laparoscopic equipments, trained staffs and supervision may not be available in the hospital⁹. Various studies have shown better outcomes clinically with the help of laparoscopic approach¹⁰. Some authors have challenges these clinical findings that supported no significant difference in the outcome between the two procedures and moreover noted higher costs with laparoscopic appendectomy. This modern time of laparoscopic surgery has revealed remarkable changes in surgical disease. General surgeons have changed the trend towards minimally invasive surgery to analyze every operation possible to convert into laparoscopic techniques¹¹. Hence the aim of this study was to compare the open with laparoscopic appendectomy in patients with acute appendicitis.

Materials And Methods:-

The study was conducted in the department of General Surgery, Unit II, State Referral Hospital of Zoram Medical College, Falkawn, Mizoram, India, during the period of two years starting from November 2019 October 2021. Before taking up the study, approval for carrying out the research work was obtained from the Institute Ethical Committee. Confidentiality and privacy was maintained. It is an observational prospective study of 100 patients with acute appendicitis who underwent Open Appendectomy and Laparoscopic Appendectomy. Patients of more than 12 years attending hospital with a clinical diagnosis of acute appendicitis and undergoing appendectomy, those who are willing to participate were included. Exclusion criteria were pregnant female, patients on steroid, immunocompromised patients, patients on chemotherapy for malignancy, chronic medical problems, haemodynamically unstable or psychiatric illness, cirrhosis, coagulation disorders and those who are not willing to participate.

Informed Consent was collected using the questionnaire / proforma. The primary data for this study was the blood investigations of the patient viz. Routine blood investigations (i.e. complete blood count, platelet count, random blood sugar, urea, creatinine etc.), Urine examination (routine & microscopy). Data collected included age, sex, operation time, intra operative findings (acute, gangrenous, perforated), time to liquids/soft diet, postoperative hospital stay, postoperative pain score, requirement of analgesics and complications. Clinical diagnosis was confirmed by histopathology.

According to the preference and experience of the surgeon on duty, the decision about the type of operation was made. Diagnosis was made clinically with the history of right lower abdominal pain, nausea and vomiting, physical examination of tenderness or guarding in the right iliac fossa. The patients were divided into two groups: Open appendectomy and Laparoscopic Appendectomy group of 50 patients each.

OA was done with the help of standard Mc Burney incision, peritoneum was accessed and opened to deliver the appendix, mesoappendix was ligated and cut, base of appendix was ligated and cut, and appendix was removed in usual manner. LA was done using a standard 3 ports technique. After creating pneumoperitoneum of pressure 10-

12mmHg of CO₂ via a verres needle supraumbilical site, the table was tilted to the left in trendelenburg position. The mesoappendix was cut using Harmonic scalpel; base of appendix was ligated using pre-tied endoloop, the distal part is cut and removed via 10mm port.

Clinical and investigative data was compiled, analyzed and observed. All the data was entered in a proforma and data analysis was performed using SPSS software 21 version (IBM Corp., Armonk, NY, United States). Statistical analyses was performed with Student's t-test and the chi square test, data was presented as mean and standard deviation. Ap-value of 0.05 or less was considered significant.

Results And Observation:-

Age distribution: In this study, majority of the cases, 38% were from age group 10-20yrs in Open appendectomy and 48% in Laparoscopic appendectomy group as shown in the table I.

Table I:- Age distribution in both groups.

Age group	Open (OA group)	Lap (LA group)
10-20years	19 (38%)	24(48%)
21-30years	11(22%)	12(24%)
31-40years	10(20%)	9(18%)
41-50years	4(8%)	3(6%)
51-60years	6(3%)	2(4%)

Graph I:- Age distribution in both groups.

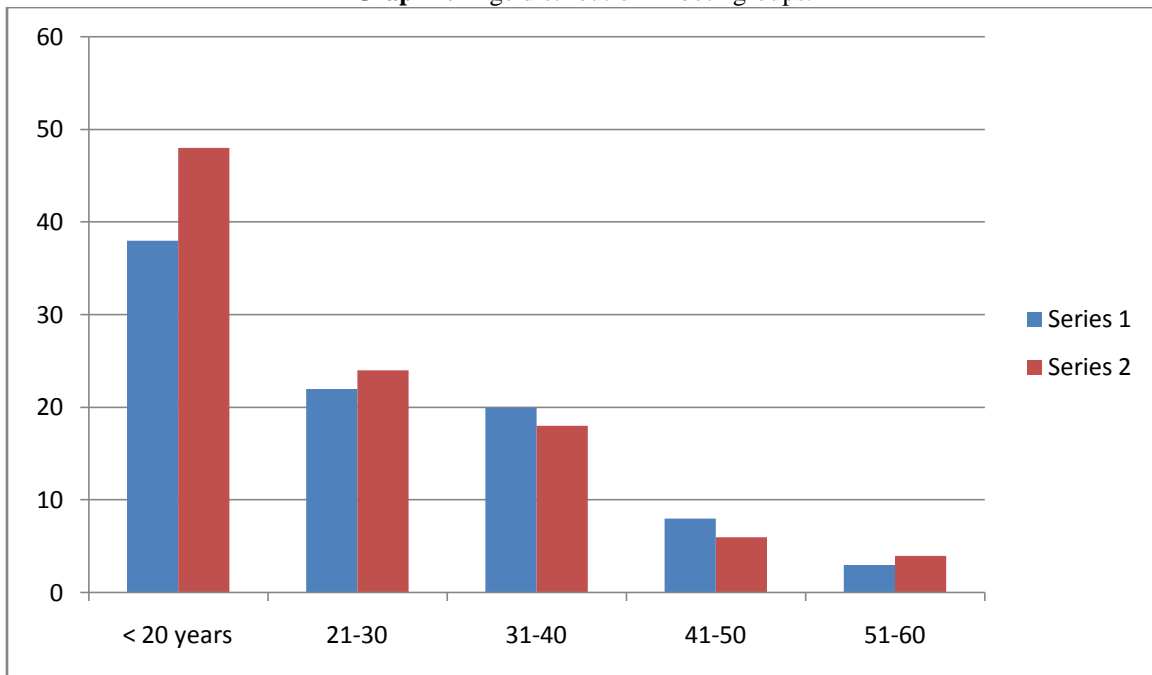


Table II:- Sex distribution shows that 38% are male and 62% are female in Open group whereas 40% are male and 60 are female in Lap group.

Age group	Open (OA group)		Lap (LA group)	
	Male	Female	Male	Female
10-20	7	12	10	14
21-30	4	7	4	8
31-40	4	6	4	5
41-50	2	2	1	2
51-60	2	4	1	1
Total	19	31	20	30

Percentage	38%	62%	40%	60%
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Graph II:- showing distribution of sex in both groups.

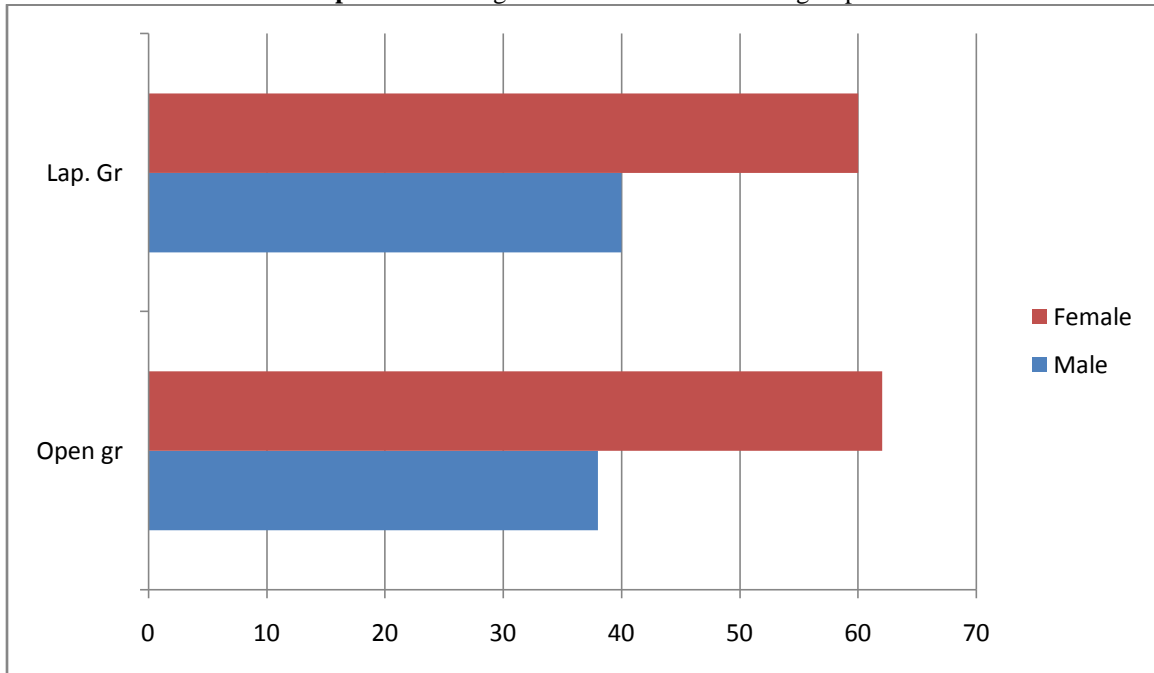


Table III showing distribution of data based on symptoms/signs and Histopathological (HPE) findings in both groups.

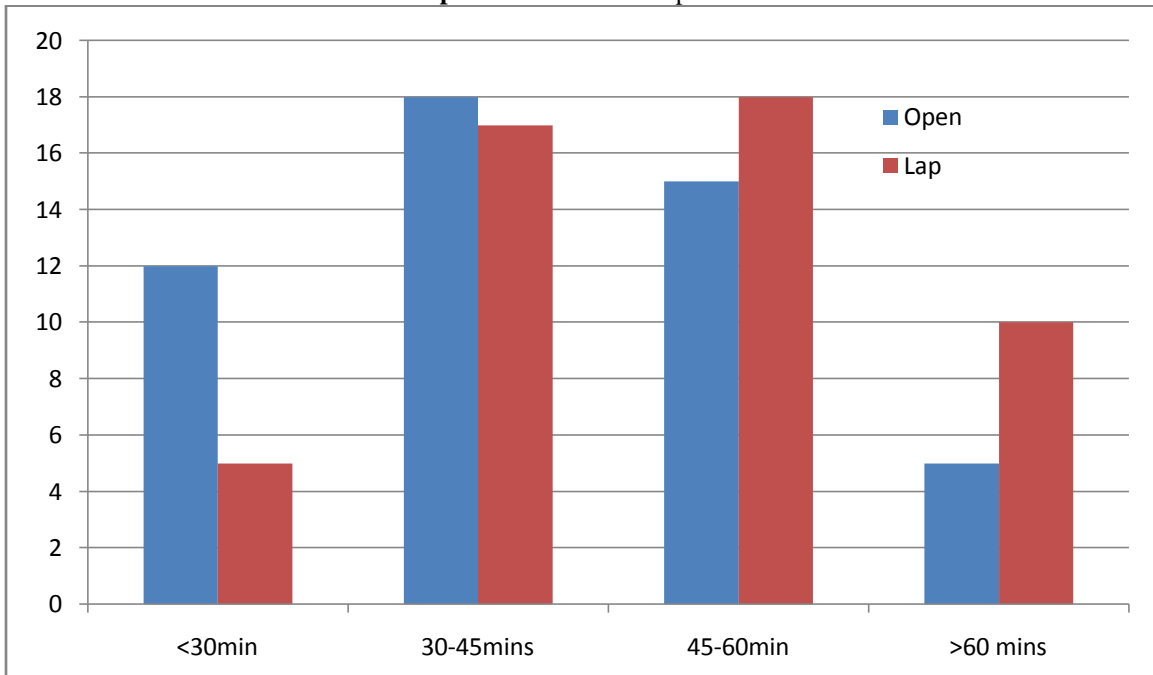
Symptoms/Signs	Open (OA group)		Lap (LA group)	
	No	%	No	%
Abdominal pain	50	100	50	100
Nausea/vomiting	40	80	45	90
Fever	21	42	16	32
Tender RIF	50	100	50	100
Guarding/rigidity	30	60	32	64
HPE normal	4	8	6	12
HPE confirm	46	92	44	88

This table shows that all the patient complaints of abdominal pain (100%) and most of the patients had nausea/vomiting (80% vs 90%) and less than half of them had fever (42% vs 32%). All patients had tenderness RIF and about one third had guarding/rigidity (60% vs 64%). The biopsy report (HPE report) was normal (negative appendectomy) in 8% and 12% of OA & LA group respectively.

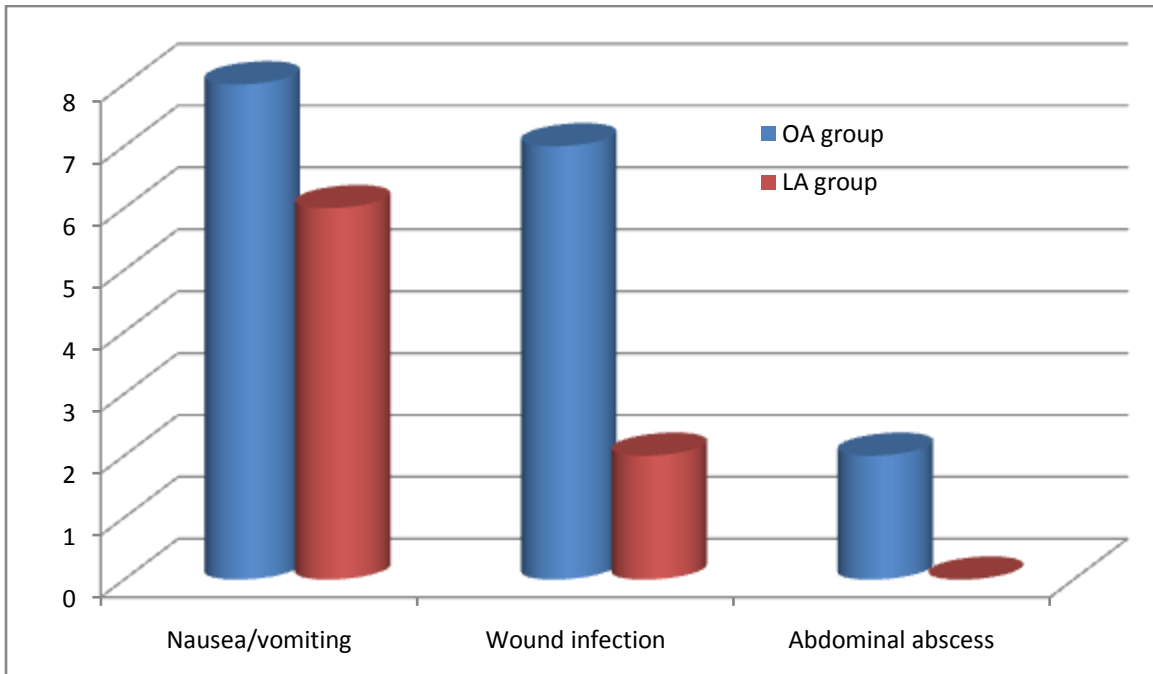
Table IV:- Showing Distribution of data based on pain score and duration of Analgesic used in two groups. The pain score and duration of analgesic used was significantly reduced in LA group.

Postoperative pain	Open(OA group)	Lap (LA group)	t-value	p-value
Pain score (0-4)	4.1+-1.8	3.2+-1.4	7.38	<0.05
Duration of Analgesic used	10.12+-3.9	4.79+-4.1	9.38	<0.05

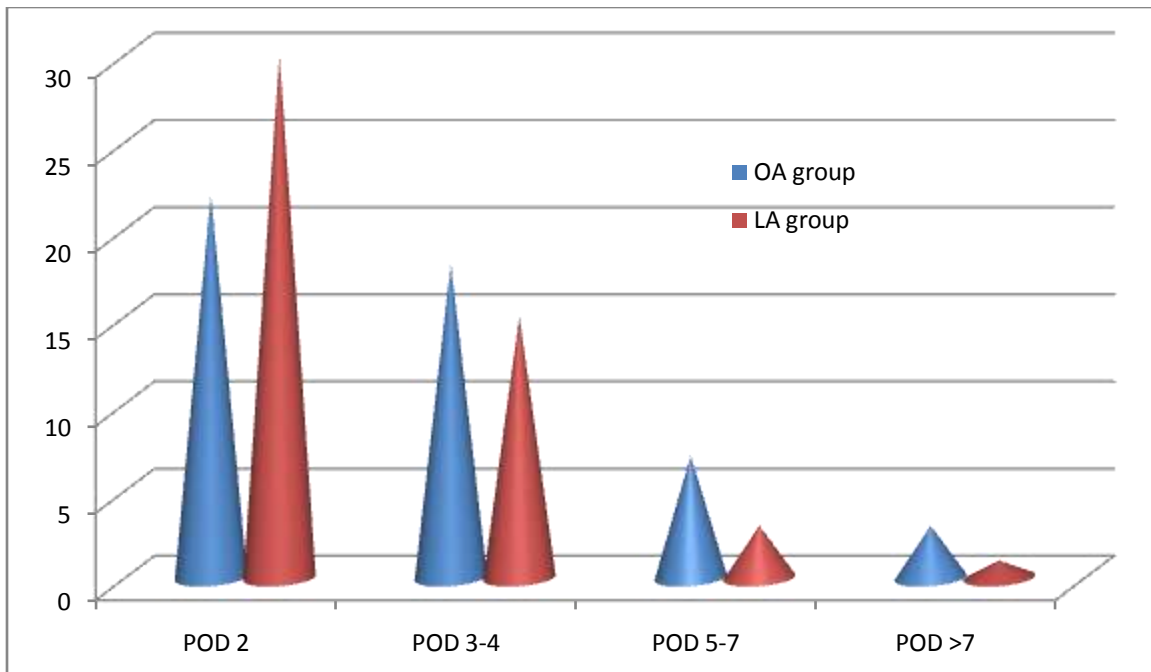
Graph III:- Duration of operation.



Graph III showing the distribution of data based on duration of surgery among the two groups.



Graph IV showing distribution of data based on post operative complications in two groups. This graph shows that the most common complication was vomiting followed by wound infection which was seen more in open than laparoscopic procedure.



Graph V showing Post-Operative Days (POD) of hospital stay

This graph shows the duration of hospital stay after operation. Maximum number of patients in LA group stayed in Hospital 2 days after surgery whereas 3-4 days in Open group.

Discussion:-

The age group in this study was in comparable to several other studies where appendicitis is more common in younger adults. Laparoscopy appendectomy results in a faster recovery and early return to normal activities with fewer complications, hospital stay was reduced leading to earlier feeding and discharge from hospital which is in agreement with various studies^{12,13,14}. The severity of postoperative pain was assessed by Visual Analog Score (VAS) which have a score ranging from 0 to 10, 0 being no pain and 10 being maximum pain and was recorded. VAS was recorded immediately after the surgery, then every hour for 4 hours, at 8 hours and 24 hours after surgery. Pain score and duration of Analgesic used were found to be less in Laparoscopic group i.e. (3.2+-1.4) & (4.79+-4.1) and (4.1+-1.8) & (10.12+-3.9) in open group respectively and this difference was found to be statistically significant at $p < 0.05$ which is in agreement with other study¹⁵.

In this study, the post operative days of hospital stay were found to be slightly more in open than laparoscopic group which is in agreement with the study by Hellberget al¹⁶ and also other randomized clinical trials and meta-analysis¹⁷. Wound infection is occasionally seen among complicated appendicitis more in open group than laparoscopic approach. The presence of nausea, vomiting was also seen in both the groups and few intra-abdominal abscess was seen in open group postoperative but not in lap group. The similar study done showed the incidence of vomiting lesser in lap group¹⁸.

The pain score in this study was higher in open (10.12+-3.9) than in laparoscopic (4.79+-4.1) which was due to longer incision stretches of the muscles and wound infection and this was found to be statistically significant at p -value less than 0.05. Although classic open appendectomy is simple and effective, it has some drawback including wound sepsis, delayed recovery and the possibility of unnecessary appendectomies¹⁹. In this study, Laparoscopy significantly improved the postoperative wound infection rate which is in concordance with the study done by Marzouk M et al²⁰.

The retrieval of appendix specimen was done inside the 10mm trocar cannula sheath and there was no direct contact with the port site. When appendix was too large to pass inside cannula sheath, plastic bag was used. The periappendiceal fluid collection was aspirated laparoscopically if necessary and did not soil the port opening. 10mm port was closed using single port closure vicryl suture to prevent port site herniation. This is in contrast to open

approach where multiple sutures are required to close the incisions which may invite collection of hematoma and infection²¹.

Conclusion:-

We concluded that Laparoscopic Appendectomy is a safe and effective procedure in the treatment of appendicitis. It has more acceptable cosmetic result, shorter hospital stay and significantly less postoperative pain than Open Appendectomy. And it also reduces the rate of postoperative wound infection as compared with open appendectomy. But the timing of operation in odd hours and cost effectiveness of laparoscopic procedure needs to be considered.

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