



1. MBBS, FCPS
Assistant Professor Surgery
Madinah Teaching Hospital
Faisalabad.
2. MBBS, FCPS, FRCS
Associate Professor Surgery
Madinah Teaching Hospital
Faisalabad.
3. MBBS, FCPS
Senior Registrar Surgery
Madinah Teaching Hospital
Faisalabad.
4. MBBS, FCPS
Associate Professor Surgery
Madinah Teaching Hospital
Faisalabad.
5. MBBS, FCPS
Assistant Professor Surgery
Aziz Fatima Medical College
Faisalabad.
6. MBBS, FCPS
Professor Surgery
Madinah Teaching Hospital
Faisalabad.
7. MBBS, FCPS
Professor Surgery
Madinah Teaching Hospital
Faisalabad.

Correspondence Address:
Dr. Farhan Javed
Assistant Professor of Surgery
Madinah Teaching Hospital
Faisalabad.
farhan_javed7@hotmail.com

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EARLY VERSUS DELAYED APPENDECTOMY FOR UNCOMPLICATED ACUTE APPENDICITIS.

Farhan Javed¹, Saira Saleem², Ayesha Rehman³, Nazim Hayat⁴, Zakariya Rashid⁵, Tanvir Ahmad⁶, Irshad Ahmad⁷

ABSTRACT: Objective: To establish the pros and cons of performing appendectomy as a semi elective procedure in cases of uncomplicated acute appendicitis. **Study Design:** Cross Sectional study. **Setting:** Madina Teaching Hospital Faisalabad. **Period:** July 2018 to June 2019. **Material & Methods:** A sample of 107 patients was selected using non-probability purposive sampling out of all the patients presenting with acute appendicitis. Study population was divided into Groups A and B, former undergoing appendectomy within 8 hours of admission and later undergoing surgery more than 8 hours after admission. Spinal and general anesthesia was used and both Laparoscopic and open surgical techniques were employed. **Results:** Out of total 107 patients, 62 (57.94%) were placed in group A and 45 (42.06%) in group B. Age and gender related distribution in both groups were similar. 5 patients in group A had perforated appendix and 3 patients in Group B were found to have perforated appendix. The difference between incidence of perforation between the two groups was not statistically significant. **Conclusion:** In-hospital delay before appendectomy does not significantly increase the risk of perforation in uncomplicated acute appendicitis.

Key words: Appendectomy, Complications, Delayed, Early, Perforation.

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INTRODUCTION

Appendectomy is one of the most common surgical procedures done worldwide.¹ Laparoscopic and open approach both can be used to perform this surgery with some studies favoring the laparoscopic approach as it is associated with less complications.¹ The optimal timing of appendectomy has traditionally been considered to be within the first few hours of admission.² Perforation, generalized peritonitis, portal pyemia are some of the life threatening complications associated with acute appendicitis (AA). In addition to these, surgical site infections, mass formation and iatrogenic trauma to surrounding structures during adhesionolysis are also common.^{1,3} These complications become more pronounced in extremes of ages.⁴ In recent years the trends in management of AA are shifting towards a more conservative approach. The advent of better and more potent antibiotics and

an overall improvement in hospital care has led to the idea that an un-necessary rush to operate may not truly be required.⁵ Multiple studies have shown that performing appendectomy 8 to 12 hours after admission does not increase the risk of perforation nor increases the duration of surgery or post-operative hospital stay and is not associated with increased morbidity and mortality.^{2,6} If intravenous broad spectrum antibiotics are started at appropriate time, it slows or halts the progression of disease and incidence of complications is not significantly increased.⁵ One way to confirm presence or absence of complications is to perform an abdominal CT scan. This may also assist in deciding the timing of surgery.⁷ However, some studies have shown that the risk of perforation of appendix, duration of post-operative hospital stay and overall cost are considerably changed by delaying appendectomy, resulting in increase

in morbidity.^{4,8} With our study we tried to establish the pros and cons of performing appendectomy as a semi elective procedure in cases of uncomplicated AA.

MATERIALS AND METHODOLOGY

It was a Cross sectional study carried out at Madina Teaching Hospital which is a tertiary care hospital affiliated with University Medical and Dental College Faisalabad between July 2018 to June 2019.

All patients presenting to surgical OPD and Emergency ward diagnosed as AA were included in the study. Non-probability purposive sampling technique was used. Diagnosis was based on clinical assessment, findings of ultrasonography and white cell count. Where necessary, further investigations were carried out. CT scan abdomen was not routinely used, reserved only for patients who presented diagnostic difficulty.

Patients were admitted from OPD and emergency and started on intravenous third generation cephalosporins 12 hourly and metronidazole 8 hourly. They were kept nil per mouth and given IV fluids. Analgesics were withheld till confirmation of diagnosis could be done. All surgeries were performed by consultant general surgeons. General or spinal anesthesia was used to perform these surgeries. In our study we used laparoscopic and open surgical techniques to perform appendectomy. The decision of surgical technique was made by the operating surgeon. If needed, laparoscopic procedure was converted to open. Patients whose appendix was found to be normal at the time of surgery, i.e. "Negative appendectomies" were excluded from the study.

A questionnaire was designed to collect data from the patients. This questionnaire included personal information and contact details along with information about delay time before surgery, type of anesthesia, surgical approach, operative findings and complications. All questionnaires were filled by medical officers.

Statistical analysis for p-values of numerical data was done using SPSS version 20. Quantitative

variables like age, in-hospital delay in hours and leucocyte count were presented by calculating mean and standard deviation. Qualitative variables like gender, surgical technique, type of anesthesia, presence or absence of perforation were chosen for calculating frequency and percentage. Student's t-test was used to compare the outcomes in both groups. Data was stratified according to age. Chi square test T-test was applied to compare outcomes in stratified data.

RESULTS

A total of 116 patients were diagnosed as acute appendicitis during the 1 year period of data collection. 5 patients had signs and symptoms of perforation at the time of presentation and were not included in the study to avoid undue morbidity to the patient and bias in results. 4 patients had negative appendectomies i.e, appendix was found to be normal at the time of surgery. Out of these, 2 had ovarian cysts (1 ruptured and 1 uncomplicated), 1 had pelvic inflammatory disease and 1 had no clinically detectable cause of abdominal pain. Remaining 107 patients were included in our study. The age of patients ranged from 10 years to 60 years, average age being 23.05 ± 11.16 years. In our study population, 71 patients were female and 36 were male, female to male ratio being 1.97:1. Mean leucocyte count in our study population was $10.03 \pm 3.05 \times 10^3$ per ml. Our patients underwent surgery minimum 1 hour after admission and maximum 91 hours, mean in-hospital delay being 13.46 ± 14.23 hours. We used both open and laparoscopic appendectomy techniques in our patients. 80 patients underwent open appendectomy and 27 had laparoscopic appendectomy, 1 patient being started as laparoscopic and later converted to open procedure. The decision to perform laparoscopic or open procedure was based on availability of equipment, surgeon's skill level and personal preference. Most of these surgeries were done under general anesthesia i.e. 68.22% and the rest under spinal anesthesia. A total of 8 patients had perforated appendix, the chances of finding perforated appendix being 16.67% in males and 2.82% in females.

Age related distribution of sample

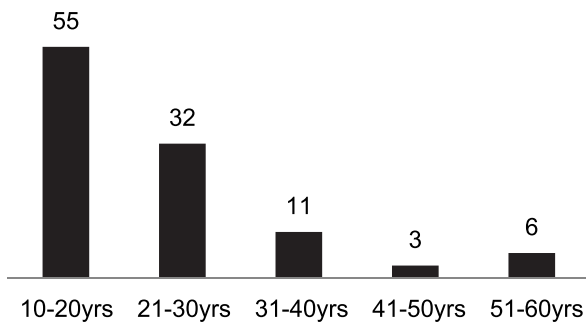


Figure-1

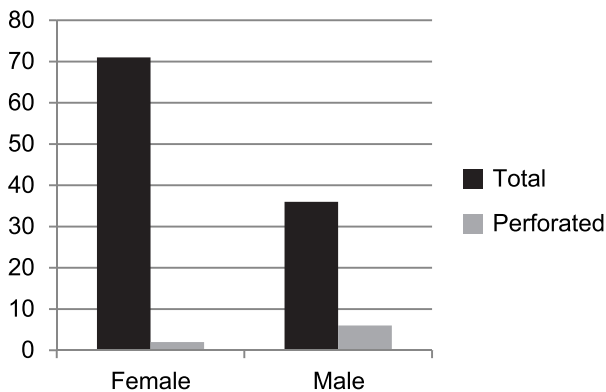


Figure-2

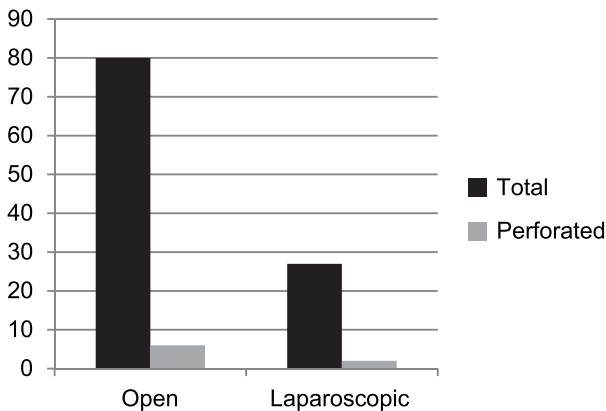


Figure-3

Group A

Appendectomy was performed within 8 hours of admission for 62 patients (57.94%). Among these, 36 were female and 26 were male patients. Ages ranged from 10 years to 60 years and average age was 22.71 ± 11.52 years. In this group, leucocyte count varied between 4.8×10^3 to 19.6

$\times 10^3$ per ml, average being $10.34 \pm 3.26 \times 10^3$ per ml. The average delay before surgery was 5.16 ± 1.70 hours. Out of these only 6 had laparoscopic appendectomy and rest were operated through open procedure. Our surgical findings were that 6 (9.68%) of these patients had perforated appendix with or without abscess formation and the remaining 56 patients had acutely inflamed appendix.

Group B

This group had 45 patients in total (42.06%), out of which 35 were female and 10 were male. Age range in this group was 13 years to 55 years average being 23.51 ± 10.75 years. Leucocyte count varied between 5.3×10^3 pr ml to a maximum of 17.6×10^3 per ml, averaging at $9.61 \pm 2.70 \times 10^3$ per ml. The average time between admission and surgery remained 24.89 ± 15.91 hours. In this group, we performed 21 laparoscopic appendectomies and 24 open procedures. Only 3 patients (6.67%) in this group had perforated appendix and the rest had mildly or moderately inflamed appendix.

Age related distribution in Groups A and B is shown in Table-I. The difference between the two groups is statistically insignificant (p value = 0.198).

The patient with maximum delay initially presented in gynecology department and remained admitted there for 2 days before being shifted to surgery. She presented diagnostic difficulty and underwent complete investigative workup including contrast enhanced CT scan. Her surgery was carried out under spinal anesthesia through open technique and she was found to have moderately inflamed subcecal appendicitis. Her recovery went uneventful.

Comparison between incidences of perforated appendix is shown in Table-II. T-test was applied to compare outcomes in both groups which came out to be 9.704 and p-value was calculated to be 1.94. As calculated, p-value is greater than 0.05. Hence the difference between the two groups is statistically insignificant.

Age (Years)	Group A		Group B	
	Number	%age	Number	%age
10-20	32	51.6	23	51.1
21-30	20	32.3	12	26.7
31-40	5	8.06	6	13.3
41-50	1	1.61	2	4.4
51-60	4	6.5	2	4.4
Total	62	100	45	100

Table-I
(P-Value=0.198)

	Inflamed %	Perforated %	Total %
Group A	57 (91.94%)	5 (8.06%)	62 (57.94%)
Group B	42 (93.33%)	3 (6.67%)	45 (42.06%)
Total	99 (92.52%)	8 (7.47%)	107 (100%)

Table-II.
(p-value= 1.94, $\chi^2 = 2.589$)

DISCUSSION

AA is a common surgical emergency having a universal distribution and equal gender distribution.⁴ Commonly patients presenting with appendicitis have a short history of pain starting from around the umbilicus which then shifts to the right lower abdomen associated with nausea and loss of appetite. There is usually associated leucocytosis and an ultrasound may show fluid collection in the right iliac fossa.⁹ An appendicular mass is most commonly associated with acute inflammation, however a small percentage may also be malignant.¹⁰ There are two distinct types of AA, obstructive and catarrhal. In the former type, there is some sort of obstruction in the appendiceal lumen, most common cause being a fecolith.¹¹ This type usually has an acute and rapid course. Appendix may perforate at the site of impaction of the obstructing lesion due to pressure necrosis. Urgent surgical intervention therefore becomes imperative to prevent increasingly poor outcome.¹⁰

The second type is catarrhal in which the appendiceal wall is inflamed without any obstruction to the lumen. This type has a relatively less aggressive course, gradually developing over time and in some instances being resolved conservatively with broad spectrum antibiotics. Patients suffering from this type may present

with recurrent episodes of pain in right iliac fossa before being diagnosed and operated. In a few cases, the appendix may become fibrosed due to repeated episodes of infection and the patient may not need appendectomy.¹²

Various different parameters help the clinicians diagnose patient of appendicitis. These parameters are often combined in the form of ALVRADO or RIPASA scoring systems.¹³ A normal or raised total leucocyte count (TLC) alone may not be enough to confirm presence or absence of complications and other parameters such as neutrophil to lymphocyte ratio, platelet to lymphocyte ratio, percentage lymphocyte and percentage neutrophils may be more reliable in diagnosing a complicated case.¹⁴ As in our study, average TLC in both groups was near the upper end of the normal range. We did not consider the other parameters as discussed by Virmani S et al.¹⁴

As pointed out by Jeon B G et al⁷, CT abdomen is the gold standard investigation for diagnosing AA. It also helps differentiate between above mentioned two different types and can also confirm presence of a perforation or abscess. In our socioeconomic setup, the main limitation to use of CT scan is its cost. Although it has become widely available but the time taken to perform CT

scan and its reporting by a radiologist may also unnecessarily delay the diagnosis and treatment. In addition, it exposes the patient to high dose of harmful radiation which is especially of concern in younger patients and it can be avoided if other diagnostic algorithms are followed.¹⁵ Our primary diagnostic criterion was clinical examination as supported by the work of Bal A et al.¹⁶ Laboratory investigations and ultrasound were done to assist diagnosis. We performed CT scan in only 2 patients where diagnostic uncertainty still existed.

Another important feature when considering patients of AA is the variable presentation. Obese, pregnant or old age individuals may not have the typical clinical appearance and present difficulty in definitive diagnosis.¹⁷ Also, these patients may present to departments other than surgery. As in our study, the patient who had the maximum delay from admission to surgery was initially admitted in gynecology department for 2 days.

Work done in Turkey by Avci V et al suggests that AA is more common in male population and the chances of finding perforated appendix is more in female patients.¹⁸ Contrary to these findings, most of our study population comprised of female patients, almost twice the number of male patients. However, the risk of finding a perforated appendix was more in male patients, the male to female ratio being 3:1.

The timing of surgery is topic of debate considering the success of conservative treatment with antibiotic cover in a number of patients. Conventionally, in-hospital delay of more than 12 hours has been associated with increased risk of perioperative complications and this has led to urgency in diagnosing and operating.¹⁹ The fear of perforation, abscess formation, localized or generalized peritonitis is usually the stimulus for early intervention.⁴ The rates of complications is calculated to be around 10% in most of the studies⁶ and not more than 14% even when surgery is delayed for up to 72 hours.¹ Many studies now suggest that pre-hospital delay is more significant and once the patient is admitted, delay less than 24 hours does not significantly increase the risk of perforation.² Open and laparoscopic procedures

have both been widely practiced and compared, with laparoscopic surgery proving to produce more favorable results.²⁰

In a small group of patients who have signs and symptoms suggestive of perforation at the time of presentation, such as localized tenderness, rebound tenderness and guarding along with greatly elevated TLC count, surgery should not be delayed.¹⁹ Confirmation of complication may be done using CT scan. In complicated patients delay is associated with a documented increase in morbidity and mortality rate as proven by Bonadio W et al.²¹ However, in cases where disease course is relatively mild, or the absence of perforation and abscess has been confirmed by CT scan, appendectomy may be done as a semi-elective procedure. Multiple factors may contribute to delay in surgery, some of these being non-availability of Operation Theater, equipment or staff related restrictions. The time of day is also to be taken into consideration, surgeries being done at night having a greater rate of operative complications.²² Eventually, it is the surgeon's decision to decide about the urgency of surgery or the delay that may be safe for the patient.²² Moreover, the newer broad spectrum antibiotics have proven to be highly effective in limiting local and systemic spread of infection. In our hospital, we routinely use intravenous third generation cephalosporin's and metronidazole same as Salminen P et al.⁵

As in our study, more than half of the patients were categorized as Group A and operated within first 8 hours after admission. In these patients the rate of finding perforated appendix was 8.06%. Group B had perforation in 6.67% of patients. The difference of results between the two groups was statistically insignificant. Seudeal et al also found similar results in their study proving that a delay in surgery for uncomplicated appendicitis does not increase the risk of perioperative complication rate, length of hospital stay, rate of readmission or mortality.⁶ These results are also supported by works of Alore E et al¹ and Kim HK et al.²

CONCLUSION

Although, the majority of patients of AA are

operated early keeping in line with the conventional concepts, a delay of few hours after hospital admission and initiation of antibiotic treatment is not associated with statistically increased risk of perforation.


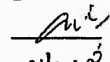
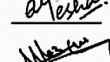
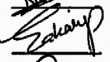
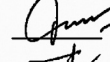
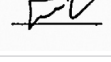
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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author(s) Full Name	Contribution to the paper	Author(s) Signature
1	Farhan Javed	1st Author	
2	Saira Saleem	2nd Author	
3	Ayesha Rehman	3rd Author	
4	Nazim Hayat	4th Author	
5	Zakariya Rashid	5th Author	
6	Tanvir Ahmad	6th Author	
7	Irshad Ahmad	7th Author	