

ORIGINAL RESEARCH

Evaluation of Effects of Delaying Appendectomy for Acute Appendicitis for 72 hours: An Institutional Based Study

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ABSTRACT

Introduction: Acute appendicitis is one of the most common acute conditions that needs an emergency surgical intervention. It is widely acceptable that delay in diagnosis and treatment significantly contribute to increased incidences of perforated appendicitis, which eventually results in increased chances of patient morbidity. It has accepted generally that an appendectomy should be performed within a few hours of diagnosis and that a delay in the operation may lead to a greater incidence in the morbidity.

Methodology: In this study, we took an effort to assess whether appendectomy for acute appendicitis can be safely delayed for 72 hours after the initial diagnosis in our hospital. We included patients who underwent appendectomies after a preoperative diagnosis of acute appendicitis that was confirmed after pathological examination. There are some patients who were younger than 15 years, patients who underwent negative appendectomies, incidental appendectomies, or interval appendectomies were excluded from the study. Patients who were included in the study were divided into 2 groups mainly. The early group comprised patients who underwent appendectomies within 72 hours after presentation to the emergency department. The late group comprised patients who underwent appendectomies 72 hours after presentation. There were several reasons for the delay in the operation: the time between admission to the emergency department and surgical consultation, the lack of operating room availability, a delay in the diagnosis owing to an atypical presentation, and the surgeon's decision to delay the surgical procedure. Oral intake was stopped for patients in both groups for the preparation of surgical intervention. The t - test and Fisher exact test were used to analyse the statistical difference between these 2 groups. We calculated a sample size of 152 patients in each group to detect an increase of 10% in the rate of advanced appendicitis, with a power of 80%.4 A P value of <0.05 was considered statistically significant.

Results: Three hundred and eleven patients were included in the study. Out of which were 166 men and 145 women. The average age was calculated to be 28 years (age range, 15-40 years). There were 233 patients in the early group and 76 patients in the late group. The mean \pm SD time between presenting to the emergency department and surgery was 6.7 ± 2.7 hours for the early group and 16.7 ± 3.6 hours for the late group. Both groups were comparable with respect to age, sex, white blood cell count, and temperature. There were no statistically significant differences between the 2 groups in the length of stay (P=0.17), average operative time (P=.93 for laparoscopic surgery;

P=0.14 for open surgery), rate of advanced appendicitis (P=0.56), and complication rate (P=.74) (In comparing the time of presentation to the emergency department and the time of operation, 54% of patients were admitted to the emergency department during the day hours (7 AM–7 PM) vs 46% during the evening and night hours (7 PM–7 AM). This percentage was reversed slightly when observing the time of operation: 57% during the evening and night hours vs 43% during the day hours.

Conclusion: A successful approach in the treatment of acute appendicitis includes the early administration of intravenous antibiotics and fluid hydration followed by the appendectomy procedure during the day hours does not increase the rate of complications and it does not significantly increase the length of stay or rate of advanced appendicitis. In addition, this practice pattern decreases the need for operating during the late-night hours or the interruption of the regular operating room schedule. Finally, it aids in focusing resources and operating room availability to life-threatening emergencies.

Keywords: Delayed Appendectomy, Nonperforated Appendicitis, Acute Appendicitis.

INTRODUCTION

Acute appendicitis is one of the most common acute conditions that needs an emergency surgical intervention. It is widely acceptable that delay in diagnosis and treatment significantly contribute to increased incidences of perforated appendicitis, which eventually results in increased chances of patient morbidity.¹ Appendectomy for acute appendicitis is the most common nonelective surgical procedure mostly performed by general surgeons nowadays.² It has been generally accepted that an appendectomy should be performed within a few hours of diagnosis and that a delay in the operation may lead to a greater incidence in the morbidity.³⁻⁵ Nevertheless, in few cases, the appropriate delay in the surgical procedure because of various reasons such as lack of fasting time for general anaesthesia, unavailability of operating rooms, and overscheduling of operating teams. Recently, some studies have established the impact of these delays and standard of care with appendectomy by suggesting that acute appendicitis can either be treated medically^{6,7} or surgically operated on electively without increasing morbidity.³

METHODOLOGY

In this study, we took an effort to assess whether appendectomy for acute appendicitis can be safely delayed for 72 hours after the initial diagnosis in our hospital. We included patients who underwent appendectomies after a preoperative diagnosis of acute appendicitis that was confirmed after pathological examination. There are some patients who were younger than 18 years, patients who underwent negative appendectomies, incidental appendectomies, or interval appendectomies were excluded from the study.

Patients who were included in the study were divided into 2 groups mainly. The early group comprised patients who underwent appendectomies within 72 hours after presentation to the emergency department. The late group comprised patients who underwent appendectomies 72 hours after presentation. There were several reasons for the delay in the operation: the time between admission to the emergency department and surgical consultation, the lack of operating room availability, a delay in the diagnosis owing to an atypical presentation, and the surgeon's decision to delay the surgical procedure. Oral intake was stopped for patients in both groups for the preparation of surgical intervention. Intravenous hydration using crystalloid fluids and intravenous antibiotics were administered at the time of diagnosis. The medical records of patients from both groups were observed for their age, white blood cell counts and temperature on presentation as well as length of stay, operative time, and pathological diagnosis. We demarcated between nonadvanced appendicitis and advanced

appendicitis (gangrenous or perforated). The rate of complications was also recorded promptly.

The t - test and Fisher exact test were used to analyse the statistical difference between these 2 groups. We calculated a sample size of 152 patients in each group to detect an increase of 10% in the rate of advanced appendicitis, with a power of 80%. A P value of <0.05 was considered statistically significant.

RESULTS

Three hundred and eleven patients were included in the study. Out of which were 166 men and 145 women. The average age was calculated to be 28 years (age range, 15-40 years). There were 233 patients in the early group and 76 patients in the late group. The mean±SD time between presenting to the emergency department and surgery was 6.7±2.7 hours for the early group and 16.7±3.6 hours for the late group. Both groups were comparable with respect to age, sex, white blood cell count, and temperature as given in Table 1.

There were no statistically significant differences between the 2 groups in the length of stay (P=.17), average operative time (P=.93 for laparoscopic surgery; P=.14 for open surgery), rate of advanced appendicitis (P=.56), and complication rate (P=.74) (Table 2).

In comparing the time of presentation to the emergency department and the time of operation, 54% of patients were admitted to the emergency department during the day hours (7 AM–7 PM) vs 46% during the evening and night hours (7 PM–7 AM). This percentage was reversed slightly when observing the time of operation: 57% during the evening and night hours vs 43% during the day hours.

Table 1: Comparisons in Age, Sex, White Blood Cell Count, and Temperature

Characteristic	Early group (n=233)	Late group (n=78)	P - value
Age, mean ± SD, y	28.6 ± 5.9	29.2 ± 5.3	0.86
Sex, No.			
Male	130	36	0.22
Female	105	40	
WBC count, mean ± SD, per μ L	13.6 ± 3.9	37.3 ± 0.5	0.33
Temperature, mean ± SD, °C	37.3 ± 0.5	37.4 ± 0.6	0.79

Table 2: Endpoints Between the Early and Late Groups

End point	Early group	Late group	P value
Time to surgery, mean ± SD, h	6.7 ± 2.7	16.7 ± 3.6	
Length of stay, mean ± SD, d	2.5 ± 2.3	2.9 ± 1.8	0.17
Advanced appendicitis, No. (%)	76(33)	28(36)	0.56
Operative time, mean ± SD, min			
Laparoscopic surgery	81.0 ± 31.0	81.5 ± 31.0	0.93
Open surgery	81.5 ± 31.0	86.0 ± 33.0	0.14
Complications			
Abscess	6(2)	1(1)	0.74
Wound infection	2(<1)	1(1)	

DISCUSSION

Acute appendicitis, the term that we use today and the pathophysiological abnormality we understand in the 21st century, is majorly attributed to Reginald H. Fitz⁸. The adoption of his conclusions by surgeons in the following 15 years led to a decrease in the mortality and morbidity of acute appendicitis from 50% to 15%.⁹ Recently, appendectomy for acute

appendicitis is the most common nonelective surgical procedure performed in the world.² It is typically done within hours of diagnosis to prevent the complications of gangrene and perforations.³

The use of antibiotics has become standard in the treatment of surgical infections, changing that would otherwise have needed an emergent operation to that with the option of an elective operation.³ Historic improvement in the quality of radiological studies have been greatly relinquished in the last 2 decades. Computed tomographic scans and ultrasonography are readily available in most of the hospitals in the world and we are more able today than ever in the past to achieve a more accurate preoperative diagnosis of several surgical entities, including some acute conditions like appendicitis.¹⁰

Surana et al⁵ studied the prompt effects of delaying an appendectomy for the patients in acute appendicitis. They found no statistical difference in the rate of complications between children who underwent appendectomies within 6 hours of diagnosis and those who underwent delayed appendectomies between 6 and 18 hours of diagnosis (2.3% to 4.2%, respectively; $P=0.28$). A similar study by Yardeni et al³ observed on the effects of delaying appendectomies by 6 to 24 hours in children showed no significant increase in the rate perforation, operative time, or complications when compared with children who underwent the early appendectomies within 6 hours. Furthermore, some studies suggest that the rate of perforation is due to a delay in patient presentation rather than to a delay in surgical procedure.^{11,12} In this study, the early and late groups had similar clinical outcomes. The late group had a slightly longer length of stay than the early group (2.9 days vs 2.5 days, respectively), but that included the average delay of 10 hours (0.4 day). The difference in the rate of advanced appendicitis was not statistically significant in the late group compared with the early group (37% vs 32%, respectively). Both groups had a similar rate of complications, including intra-abdominal abscesses and wound infections which ranges less than 1% to 2%. Our study was inconclusive when considering an increase of 10% in the rate of advanced appendicitis. However, on a post hoc analysis, our sample sizes were enough to detect an increase of 10% in the rate of complications, with a study power of 80%.

CONCLUSION

A successful approach in the treatment of acute appendicitis includes the early administration of intravenous antibiotics and fluid hydration followed by the appendectomy procedure during the day hours does not increase the rate of complications and it does not significantly increase the length of stay or rate of advanced appendicitis. In addition, this practice pattern decreases the need for operating during the late-night hours or the interruption of the regular operating room schedule. Finally, it aids in focusing resources and operating room availability to life-threatening emergencies.

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