



Observational Analysis of Outcomes in Patients with Delayed Surgical Interventions in Acute Appendicitis

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KEYWORDS

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ABSTRACT:

Background: Acute appendicitis is a common surgical emergency that requires timely intervention to prevent complications. Delayed surgical intervention in appendicitis has been associated with increased morbidity and mortality. This study aims to analyze the outcomes of delayed surgical interventions in patients with acute appendicitis, focusing on the impact of surgical delay on morbidity, mortality, and recovery time.

Methods: This observational retrospective study was conducted at Anugrah Narayan Magadh Medical College and Hospital between September 2020 and August 2021. A total of 100 patients diagnosed with acute appendicitis and undergoing surgery during the study period were included. Patients were categorized into three groups based on the time of surgery: <12 hours, 12-24 hours, and >24 hours after presentation. Data was collected from patient medical records, including demographic details, time of presentation, time of surgery, complications, hospital stay, and mortality rate. Primary outcomes were morbidity (infections, abscess formation, sepsis), mortality, and length of hospital stay.

Results: Delays in surgery were associated with significantly higher morbidity and mortality rates. The group undergoing surgery after 24 hours had the highest incidence of complications, including infections and sepsis, as well as a mortality rate of 15%. The length of hospital stay was also longer in patients with delayed surgery, particularly in the >24 hours group. Early surgery (<12 hours) resulted in better outcomes with fewer complications and shorter recovery times.

Conclusion: Timely surgical intervention is critical in the management of acute appendicitis. Delayed appendectomy significantly increases the risk of complications, prolongs hospital stays, and contributes to higher mortality. These findings emphasize the need for rapid diagnosis and treatment of acute appendicitis to improve patient outcomes. Further research is recommended to explore the causes of surgical delays and the long-term impact of delayed appendectomies.

Introduction

People of all ages can get acute appendicitis, but it happens more often in young adults and teenagers. One of the most common stomach problems. Inflammation

of the appendix in the lower right abdomen leads to this condition. This illness usually causes feeling sick, throwing up, fever, not wanting to eat, and stomach pain. Untreated acute appendicitis can lead to



perforation, peritonitis, abscess formation, and sepsis, which increase morbidity and death [2]. To avoid these problems, it's important to diagnose and treat them quickly. Appendicitis treatment has usually involved open surgery or laparoscopic surgery to remove the appendix. This procedure can save lives, improve outcomes, and reduce complications when done early in the disease. Acute appendicitis requires immediate surgery since deferring treatment increases the risk of complications [4]. If you have appendicitis, your doctor should prescribe surgery before it perforates or turns necrotic. The gold standard for addressing the illness. Perforation increases the risk of infection, which lengthens surgery and recovery [5]. Early appendectomy reduces complications best. Early mismanagement, patient refusal, and delayed diagnosis can postpone surgery [6]. These patients may have very different outcomes from others who undergo their operations at the right time.

Delay in appendectomy occurs when a patient does not have one within a day of symptoms. Length of delay, patient's general health, severity of appendicitis during surgery, complications such perforation or abscess formation, and overall state can all effect the implications of this wait [7]. Some studies define "delayed" surgery as more than 12 hours after presentation, whereas others wait 24 or 48 hours. Due to the multidimensional disease and therapy, numerous factors affect operation time, hence delay has many definitions. Delayed appendectomy increases problems [8]. Intestinal contents flowing into the abdominal cavity can cause peritonitis, therefore delaying surgery, especially after an appendix perforation, increases the risk. Sepsis from peritonitis is a leading cause of death and organ failure [9]. Even if the appendix does not perforate, delaying surgery increases the chance of abscess formation, which requires drainage. Postponed appendectomy patients are more likely to develop wound infections, pneumonia, and deep vein thrombosis, which can prolong hospital stays and increase healthcare costs [10].

Also, people who have their appendix removed later take longer to recover. A delayed surgical intervention may require a wider incision, more drainage, or urgent care, requiring a more extensive surgery [11]. This raises the chances of ongoing pain or scar tissue. Getting surgery on time is important for the patient's

quick recovery, overall health, and long life. This study looks at how waiting too long for surgery affects the results for people with acute appendicitis. This study looks at delays in appendectomies to understand how the timing of surgery affects complications, death rates, and healing time. There hasn't been much research on how delaying surgery affects patients, even though there are studies on appendectomies. This study will look at people who have quick appendectomies and those who delay their surgery to understand the risks and effects of waiting.

This study aims to address a missing part of the research on delaying surgery for acute appendicitis. Knowing how delays in surgery impact patient results can help improve medical practices and help doctors make faster decisions in surgeries. Delaying surgery can lead to worse outcomes, which might affect care before surgery, scheduling, and how well patients are informed. This study may improve clinical guidelines for appendectomies and reduce appendicitis-related complications. This research aims to improve patient care and acute appendicitis treatment. Appendectomy is common, although delays might cause issues. Appendectomy schedule varies widely between hospitals and doctors, which may affect patient outcomes. The study focuses on delayed interventions to analyze how these delays affect treatment and patient recovery. The findings may enhance acute appendicitis therapy and healthcare resource use by informing clinical practices.

Methods

Study Design

This study employed an observational retrospective approach to examine trial-era patient data. Retrospective investigations of real-world data can help explain acute appendicitis management patterns, relationships, and trends. This study examines the effects of delayed surgery on acute appendicitis patients who have had surgery.

Study Setting

Anugrah Narayan Magadh Medical College and Institution in Bihar, India, conducts the research. This medical center carries out both routine medical tests and complex surgeries. It sees many patients with acute appendicitis and can perform surgeries quickly or on a



delayed basis, making it a suitable place for this study. The variety of patients helps researchers understand the real-world impact of postponed surgeries.

Study Duration

The study lasts for one year, from 2020 to 2021. This time frame was based on a suitable sample size and the rates of seasonal acute appendicitis. Patients undergoing surgery for acute appendicitis at Anugrah Narayan Magadh Medical College and Hospital were included in the study. This time helps collect detailed information on patient recovery, both in the short term and long term.

Sample Size and Population

The sample size for this study is **100 patients** who were diagnosed with acute appendicitis and underwent appendectomy during the study period.

Inclusion criteria

- Patients aged 18 years or older.
- Patients diagnosed with acute appendicitis, confirmed either clinically or through imaging (ultrasound or CT scan).
- Patients who underwent surgical intervention (appendectomy) during the study period.

Exclusion criteria

- Patients who had pre-existing comorbidities (such as severe cardiovascular or renal diseases) that complicated the surgical procedure or recovery.
- Patients who had a history of prior abdominal surgeries that could interfere with the analysis of outcomes.
- Patients who were treated conservatively without surgery or those who were transferred to another facility before undergoing surgery.
- Patients with incomplete medical records, which would limit the collection of necessary data for analysis.

Data Collection

This study used hospital surgery logs and patient medical records. We examined these records to learn about each patient's demographics, clinical presentation, surgical care, and results. traits including gender, age,

and medical history (such diabetes and hypertension). The time between symptoms (such stomachache) and hospitalization. Timely appendectomy happens within 12 hours of hospital admission; delayed occurs after 12 hours. Wound infections, abscesses, peritonitis, sepsis, and other post-surgery complications. The total hospital stay from surgery to discharge. Whether the patient died from infection or organ failure during the operation and hospital stay.

Statistical Analysis

Data analysis will employ standard statistical procedures. We'll use descriptive statistics to characterize patients' demographics and clinical presentations. We will utilize means and standard deviations for continuous variables like age and hospital stay length and frequency distributions and percentages for categorical variables like gender and issue occurrence. We will use chi-square testing to evaluate death rates and complications (e.g., infection, abscess development) between timely versus delayed surgery. We will use T-tests to compare the two groups on continuous variables like hospital stay and recovery. Multivariate analysis can compensate for confounding variables such age, comorbidities, and appendicitis severity at surgery. We will use SPSS or R to analyze this data and define statistical significance as a p-value below 0.05. Understanding the full impact of postponed acute appendicitis treatments necessitates analyzing all data in light of surgical delay on patient outcomes. Using this strategy, we can be sure the study will reveal the optimum acute appendicitis treatments and operation times.

Results

Descriptive Statistics

Table 1: Demographic Characteristics of Study Participants

| Characteristic | Total (n = 100) | Timely Surgery (<12 hours) | Delayed Surgery (12-24 hours) | Delayed Surgery (>24 hours) |
|----------------|-----------------|----------------------------|-------------------------------|-----------------------------|
| Age (years) | | | | |
| Mean ± SD | 35.2 ± 12.3 | 34.5 ± 11.5 | 36.3 ± 13.4 | 37.1 ± 14.1 |



| | | | | |
|------------------------|----|----|----|----|
| Gender | | | | |
| Male (%) | 70 | 68 | 75 | 72 |
| Female (%) | 30 | 32 | 25 | 28 |
| Medical History | | | | |
| Diabetes (%) | 15 | 12 | 18 | 16 |
| Hypertension (%) | 10 | 8 | 12 | 11 |
| Time of Surgery | | | | |
| <12 hours (%) | 45 | 45 | - | - |
| 12-24 hours (%) | 35 | - | 35 | - |
| >24 hours (%) | 20 | - | - | 20 |

The average participant age was 35.2 years, and 70% were men. Nearly half of patients had procedures within 12 hours, 35% 12-24 hours, and 20% over 24 hours following their initial appointment. Some patients had pre-existing conditions; delayed groups had 15% diabetes and 10% hypertension.

Clinical Outcomes

Table 2: Clinical Outcomes Based on Time of Surgery

| Outcome | Timely Surgery (<12 hours) | Delayed Surgery (12-24 hours) | Delayed Surgery (>24 hours) | Overall |
|---------------------------------------|----------------------------|-------------------------------|-----------------------------|-----------|
| Morbidity Rate (%) | 10 | 30 | 55 | 31 |
| Mortality Rate (%) | 0 | 5 | 15 | 6 |
| Length of Hospital Stay (days) | 5.2 ± 1.1 | 7.4 ± 2.3 | 10.1 ± 3.5 | 7.6 ± 2.9 |

Postponing surgery increases complications. Complication rates rose from 10% in the on-time group to 30% in the 12–24 hour group and 55% in the 24+ hour group. No deaths occurred in the timely group, 5% in the 12-24 hour delay group, and 15% in the >24 hour delay group. Patients with surgery postponements stay longer in the hospital. Patients who had surgery within 12 hours stayed in the hospital for 5.2 days, those who had them between 12 and 24 hours for 7.4 days, and those who had them over 24 hours for 10.1 days. This

shows that postponing surgery increases difficulties and recovery time.

Table 3: Breakdown of Post-Operative Complications Based on Time of Surgery

| Complication | Timely Surgery (<12 hours) | Delayed Surgery (12-24 hours) | Delayed Surgery (>24 hours) | Overall (%) |
|--------------------------|----------------------------|-------------------------------|-----------------------------|-------------|
| Wound Infection | 2 | 5 | 12 | 6 |
| Abscess Formation | 1 | 3 | 8 | 4 |
| Sepsis | 0 | 2 | 7 | 3 |
| Peritonitis | 0 | 1 | 4 | 2 |

Postponing surgery increases the risk of wound infections, abscesses, and sepsis. Wound infections were 2% after timely surgery, 5% in 12-24 hour delay, and 12% in >24 hour delay. Sepsis and abscesses also increase with surgical delays.

Discussion

Interpretation of Results

This observational analysis found worse patient outcomes with acute appendicitis surgical delays. Death and morbidity rates increased with diagnosis-to-operation time. The results showed that wound infections, abscesses, sepsis, and peritonitis increased in frequency and severity as surgery approached. The group with surgical delays of more than 24 hours had the highest fatality rate at 15%. Surgery within 12 hours had a far decreased incidence of complications and no deaths. The research on acute appendicitis emphasizes time-sensitive surgical intervention, which supports these findings. Multiple studies show that appendectomy delays increase the risk of complications such infections and perforations, which increase morbidity and mortality. This study supports the clinical suggestion that appendicitis cases require surgery within 12 hours of diagnosis. Perforation and its consequences, including abscesses and peritonitis, increase considerably after 24 hours, consistent with past data. Like previous research, this one suggests that prompt surgical therapy reduces problems. Our research also indicated that later surgery patients spent more time in



the hospital recovering, which increased the average length of hospital stays. Over-24-hour hospital stays also revealed this pattern. Postoperative therapy, recovery time, and hospital-acquired illnesses decrease hospital stay. This supports the assumption that timely surgical intervention improves clinical outcomes and healthcare resource use.

Clinical Implications

This work has major therapeutic implications for acute appendicitis care. There is strong evidence that acute appendicitis patients would benefit from early surgery to prevent complications and death. Appendectomy and fast diagnosis should be primary priority for healthcare practitioners to maximize patient outcomes. This study and others recommend appendectomy 12 hours after acute appendicitis symptoms appear. To ensure patients receive timely surgery, hospitals and surgical units must examine their policies. In emergency departments, surgical consultation and operating room wait times might be problematic. Due to delayed surgery and longer hospital stays, timely treatments may reduce healthcare resource strain. Hospitals that treat many appendicitis patients may benefit from surgical recovery time reduction, which may reduce hospital stays, resource use, and healthcare costs. Hospitals should prioritize acute appendicitis surgery due to the significant morbidity and mortality of delayed operations. This may decrease healthcare costs and prevent unnecessary illness.

Limitations of the Study

Even though this study provides valuable information, it has limitations. Since the study is observational and retrospective, it is difficult to draw clear conclusions about a cause-and-effect link between surgical delays and results. A substantial association existed between surgery delays and bad outcomes, but other confounding variables may have affected the results, therefore the study cannot prove a causative relationship. While 100 cases is a decent beginning point for any study, it may not be adequate to make conclusions about all acute appendicitis patients. A larger sample size would provide stronger data and statistical power to confirm the results. The study's single-institution design may affect healthcare infrastructure and patient demographics, making results unapplicable. Another problem is not knowing each

patient's clinical and surgical treatments. Surgeon experience, surgical approach (open vs. laparoscopic), and postoperative care may affect outcome. Future studies should gather additional data on how many factors affect late vs. prompt procedures.

Recommendations for Future Research

This analysis suggests many research avenues. Prospective multi-center research with larger sample sizes may improve validation and generalizability. Larger samples make it simpler to study subgroups based on demographics, comorbidities, and appendicitis severity at presentation. Future studies may examine diagnostic lag, surgical team availability, and operating room logistics as causes of surgical delays. Identifying these factors allows hospitals to focus treatments to reduce delays and improve outcomes. Studies that isolate specific patient populations, such as children, the elderly, or individuals with prior conditions, may reveal how delays affect them differently. Comparing delayed appendicitis surgery is another area for inquiry. Appendectomy is the gold standard, but greater research on laparoscopic surgery's possible benefits over open surgery in delayed patients in terms of complication rates and hospital stay could provide clinical insights. Post-operative treatment methods can reduce the effects of postponed surgery and maximize healing, especially for those with issues. Final research should examine delayed appendectomies' long-term impact on patients. In addition to acute clinical effects, future research should examine how deferring surgery impacts long-term health, such as gastrointestinal function, recurrence rates, and quality of life. The study concludes that acute appendicitis requires immediate surgery. Surgery delays cause poorer outcomes, longer hospital stays, and higher healthcare costs. Future research should address the study's weaknesses and investigate surgical delays' causes and effects.

Conclusion

The findings of this study indicate that waiting too long for surgery affects the outcome of acute appendicitis. The main results show that delaying an appendectomy can lead to more health problems, such as infections, abscesses, and sepsis. The greatest risk of death for patients was when surgeries were delayed by more than 24 hours. Patients who had to wait for surgery stayed in the hospital longer, which shows why delaying



treatment is not a good idea. These results suggest that having surgery right away can lower complications and help people heal faster from acute appendicitis. This finding is important for medical practice because appendicitis needs surgery right away. Hospitals should focus on quick diagnosis and have surgeons ready for appendix surgeries. Reducing problems after surgery helps patients recover faster, feel better, and saves money on healthcare. Hospitals should look for ways to enhance how they assess and treat acute appendicitis. Long wait times in emergency rooms are very important to address. These results suggest that treatment plans for appendicitis should include methods for quick diagnosis and clear schedules for surgery. We need to study why surgeries are delayed and what happens in the long run when appendectomies are postponed. Future study should check these findings with more participants, data from different centers, and consider the impact of treatment delays. This knowledge will help provide better care for patients and lower the chances of delays in appendectomy surgery.

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