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Medical Science**
Journal homepage: www.Sjournals.com**Original article****Delayed appendectomy in adults with acute appendicitis. Safe or unsafe?****S.Y. Arain*, S.A. Ali, M.Mairaj, A.J. Siddiqui***Department of Surgery Muhammad Medical College Hospital, Mirpurkhas, Sindh Pakistan & Liaquat University of Medical & Health Sciences Jamshoro, Sindh Pakistan.*

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ABSTRACT

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To examine whether delayed surgical intervention in adult patients with acute appendicitis is safe? Prompt appendectomy has long been the standard of care for acute appendicitis because of the risk of progression to advanced pathology. This time-honored practice has been recently challenged by studies in pediatric patients, which suggested that acute appendicitis can be managed in an elective manner once antibiotic therapy is initiated. No such data are available in adult patients with acute appendicitis. A retrospective review of 1081 patients who underwent an appendectomy for acute appendicitis between January 2004 and January 2008 was conducted. The following parameters were monitored and correlated: Demographics, Time from onset of symptoms to arrival at the emergency room (patient interval) and from arrival to the emergency room to the operating room (hospital interval), Complications, Length of stay, and Length of antibiotic treatment. Pathologic state was graded 1 (G1) for acute appendicitis, 2 (G2) for gangrenous acute appendicitis, 3 (G3) for perforation, and 4 (G4) for a periappendicular abscess. The risk of advanced pathology, defined as a higher pathology grade, increased with the total interval. When this interval was <12 hours, the risk of developing G1, G2, G3, and G4, was 94%, 0%, 3%, and 3%, respectively. These values changed to 60%, 7%, 27%, and 6%, respectively, when the total interval was 48 to 71 hours and to 54%, 7%, 26%, and 13% for longer than 71

hours. Increased length of hospital stay ($P < 0.001$) and antibiotic treatment ($P < 0.001$) as well as postoperative complications ($P < 0.001$) also correlated with progressive pathology. In adult patients with acute appendicitis, the risk of developing advanced pathology and postoperative complications increases with time; therefore, delayed appendectomy is unsafe.

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1. Introduction

Acute appendicitis is the most common surgical emergency in Pakistan. Although the exact mechanisms leading to this condition are still obscure, it is likely that luminal obstruction by external (lymphoid hyperplasia) or internal (inspissated fecal material, appendicoliths) compression plays a key pathogenic role. The luminal obstruction leads to increased mucus production, bacterial overgrowth, and stasis, which increase appendiceal wall tension. Consequently, blood and lymph flow is diminished, and necrosis and perforation follow (Yardeni, D., Hirschl, R.B., 2004, Surana et al., 1993). As these events occur over time, it is conceivable that early surgical intervention prevents progression of disease. Indeed, this notion provided the basis for the historical concept of immediate operation for patients with acute appendicitis. Nevertheless, a review of the literature indicates that the common practice of early appendectomy is supported by limited data. Furthermore, recent reports in pediatric patients suggest that postponing surgery with fluid and antibiotic treatment can be safely pursued (Bachoo et al., 2001, Hosmer, D.W., Lemeshow, S., 2000, Maroju et al., 2004).

The present study was designed to evaluate whether acute appendicitis in adult patients is indeed a surgical emergency requiring immediate intervention or a disease that can be approached in a semi-elective manner. To that end, the relationships between duration of symptoms, timing of surgery, degree of pathology, and complications were determined in all adult patients who underwent an appendectomy for acute appendicitis during a 4-year period in a tertiary care rural hospital and a tertiary care university hospital.

2. Materials and methods

A retrospective analysis was performed on 1200 adult patients (≥ 16 years of age) who underwent an appendectomy for acute appendicitis at Department of Surgery, Muhammad Medical College Hospital Mirpurkhas and Liaquat University Hospital, Jamshoro/Hyderabad between January 2004 to January 2008. Out of 1200, 120 patients excluded from the study because of a negative appendectomy. Preoperative data extracted from the patients' history sheets included: gender, age, time from onset of symptoms to the emergency room (patient interval), and time from emergency department admission to the operating suite (hospital interval). Interval from onset of symptoms to surgery (total interval) was calculated by adding the patient and hospital intervals. Operative and pathologic findings were graded G1 for acute appendicitis, G2 for gangrenous appendicitis, G3 for perforated appendicitis, and G4 for a periappendicular abscess. Postoperative data also retrieved included length of hospital stay and of antibiotic treatment, complications, and mortality.

3. Results

3.1. Demographics

Most patients were males in their 30s (Table 1). Advanced pathology was associated with the female gender ($P = 0.006$) and increase in age ($P < 0.001$).

Table 1

Pathological Grade.					
	G1	G2	G3	G4	TOTAL
N	802	64	172	43	1018
M:F RATIO	1.42	1.78	1.05	0.59	1.32
AGE	31.8	39.4	44.2	43.5	34.6

3.2. Relationship between timing of surgery and degree of pathology

The prevalence of advanced pathology, defined as a higher pathology grade, positively correlated with prolonged total interval ($P < 0.001$, Fig. 1). The odds of advancing pathology were greater in prolonged total intervals ($P < 0.001$). For example, the risk for progressive pathology increased 13-fold when the total interval was greater than 71 hours. Patient and hospital intervals, the components of total interval, also increased with advanced pathology ($P < 0.01$).

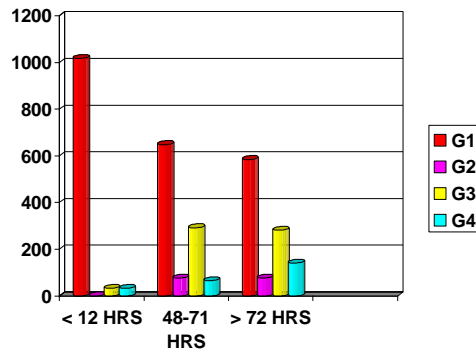


Fig. 1. Relationship between advanced pathology and interval from onset of symptoms to surgery (total interval).

3.3. Relationship between severity of pathology and clinical course

Length of hospital stay and antibiotic treatment (Table 2) as well as postoperative complications (Table 3) increased with advanced pathology. No mortality was recorded (Table 3).

Table 2

Pathological Grade.					
	G1	G2	G3	G4	TOTAL
N	802	64	172	43	1018
Length of hospital Stay (median 25)	2 (1,2)	3 (3,7)	5 (3,7)	5 (4,6)	2 (1,3)
Length of antibiotic use (median 25)	1 (1,1)	3 (2,4.5)	5 (3,6)	5 (3,6)	1 (1,3)

Table 3

Pathological Grade.					
	G1	G2	G3	G4	TOTAL
Infectious complications	11	4	22	5	42
Non-infectious Complications	3	3	9	4	19
Total	14	7	31	9	61
Mortality	0	0	0	0	0

4. Discussion

The present study demonstrates that the severity of pathology and complication rate in adult patients with acute appendicitis are time dependent, and therefore suggests that delaying appendectomy is unsafe. This observation contrasts with reports in pediatric patients whose appendectomy was postponed overnight without an increase in perforation rate, morbidity, and duration of hospitalization (Yardeni, D., Hirschl, R.B., 2004, Bachoo et al.,2001). The reasons for these diverse observations remain speculative. Potential explanations include differences in the immune status and etiologies of acute appendicitis in adult compared with pediatric patients.

The core finding in support of the observation that pathology grade and symptom duration correlate positively is the quantification of the relationship between these 2 parameters. The use of a new pathology grading system, which unlike previous studies includes the entire spectrum of acute appendicitis, and the exact time recording of events, allowed the calculation of the additional risk for advanced pathology per time interval. For example, when the total interval was less than 12 hours, the risk of developing G1, G2, G3, and G4, was 94%, 0%, 3%, and 3%, respectively. These values changed to 60%, 7%, 27%, and 6% when the total interval was 48 to 71 hours and to 54%, 7%, 26%, and 13% for longer than 71 hours. The odds for progressive pathology were 13 times higher when the total interval exceeded 71 hours compared with a total interval below 12 hours.

The data presented herein suggest that both patient and hospital factors affect the severity of acute appendicitis at the time of operation. However, the positive relationship of increasing patient to hospital interval ratio with pathology grade (Fig. 1) indicates that patient delay in presenting to the emergency room was more profoundly related to worsening pathology compared with in-hospital delays. A similar observation was previously reported in 2 series (Temple et al., 1995, Eldar et al., 1997) which included a much smaller number of patients (114 and 95, respectively). As the ability to minimize patient delay is limited, it is imperative that every effort is made by the hospital and physicians to expedite the evaluation and operation of patients with acute appendicitis. It should be noted that a previous study in 486 patients aged 5 to 85 years with acute appendicitis demonstrated that only patient but not hospital delay adversely affects the severity of disease (Wagner et al.,1996) The lack of correlation between hospital factors and pathology grade in the latter study can be related to the inclusion of pediatric patients, who can be safely managed in a delayed fashion (Yardeni, D., Hirschl, R.B., 2004, Bachoo et al.,2001).

5. Conclusion

The present study confirms the time dependency of pathology grade and complication rate on symptom duration in adult patients with acute appendicitis. Taken together, these findings suggest that appendectomy should be performed as expeditiously as possible once the diagnosis of acute appendicitis is established in adult patients. This information could impact hospital resource utilization and quality of life of the entire operating room team. It should be noted that the retrospective nature of the study does not allow definitive conclusions, which can be obtained in a prospective fashion only.

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