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ANALYSIS OF FACTORS THAT AFFECT DELAY IN DIAGNOSIS OF ACUTE APPENDICITIS, AFFECTING THE MORBIDITY AND MORTALITY OF PATIENTS

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Abstract:

Introduction: *Acute appendicitis is one of the commonest abdominal emergencies and appendectomy is one of the commonest emergency procedures performed all over the world.*

Aims and objectives: *The basic aim of the study is to analyse the factors that affect delay in diagnosis of acute appendicitis, affecting the morbidity and mortality of patients.*

Material and methods: *This cross sectional study was conducted at Services Hospital, Lahore during 2018 to 2019. The demographics, preoperative data, and postoperative information were obtained from the electronic medical records. The data collected included the patient's characteristics, symptoms at presentation (e.g., abdominal pain, migrating pain, nausea, vomiting, diarrhea, fever, and anorexia), temperature, history of any recent prior medical visit, admission course, duration of symptoms, physical examinations.*

Results: *The data was collected from 50 patients. There was no difference in sex (P=0.134), age distribution (P=0.463), and BMI (P=0.419) in both genders. The delayed group had a higher mean value in CRP, but there was no significant difference between the 2 groups. In addition, the other laboratory results were insignificant. The delayed group's hospital day was significantly longer (P=0.001) than the nondelayed group. The PAS and complication cases showed no differences between the 2 groups.*

Conclusion: *It is concluded that patients who underwent an appendectomy had a delayed diagnosis of appendicitis. The risk factors of a delayed diagnosis of appendicitis were found to be seasonal variations, prior medical visits, admission course, symptom duration, fever, diarrhea and CRP.*

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INTRODUCTION:

Acute appendicitis is one of the commonest abdominal emergencies and appendectomy is one of the commonest emergency procedures performed all over the world. Appendicitis is the most common cause of acute abdomen in all age groups. Almost 10% of the general population develops acute appendicitis with a highest incidence in the second and third decades of life. Late diagnosis and surgical intervention is regarded as an important cause of morbidity in acute appendicitis [1]. Delay in treatment results in complications like perforation, but there are controversies as to whether preadmission or post admission delay is more important. Death due to acute appendicitis is now rare (mortality rate, 0– 2.4%). Different factors are responsible for perforation in acute appendicitis in different age groups and this can be explained by the difference in immune status and aetiologies of appendicitis [2]. Appendicectomy is relatively safe with a mortality rate for non-perforated appendicitis of 0.8 per 1,000 and mortality after perforation of 5.1 per 1,000 [3].

Appendicitis is often difficult to diagnosis because of the absence of a pathognomonic signs or symptoms, the poor predictive value of associated laboratory testing, and its varied presentation1). Moreover, diagnosis is more complicated, especially in children for several reasons. The first is the inability to accurately communicate the typical historical features in children, who are less cooperative with physical examination [4]. To increase the diagnostic accuracy, various scoring systems with modern imaging modalities have been applied. On the other hand, distinguishing between the diagnosis of appendicitis and other common pediatric diseases with overlapping symptoms remains a challenge [5]. Despite the availability of multiple new diagnostic modalities, the initial misdiagnosis rates range from 28% to 57% for children 12 years old or younger to nearly 100% in those 2 years old or younger. Previous studies have shown that between 5.9% and 27.6% of patients with acute appendicitis had missed the opportunities to make the diagnosis earlier, resulting in an increase in the rate of perforation to 33.3% to 50.0% from a baseline of 20.3% to 28.0% [6].

A delayed diagnosis of appendicitis can lead to complications and longer hospitalization. Difficulties of history taking and physical examination particularly in infants and younger children often cause 'diagnostic delay' before appendicitis is eventually diagnosed8. Diagnostic delay can result in the rupture, abscess formation, wound complication, and a prolonged hospital stay. An early diagnosis of appendicitis in children is important to prevent perforation, abscess formation, and postoperative complications, and decrease the cost by shortening hospital days [7].

Aims and objectives:

The basic aim of the study is to analyse the factors that affect delay in diagnosis of acute appendicitis, affecting the morbidity and mortality of patients.

MATERIAL AND METHODS:

This cross sectional study was conducted at Services Hospital, Lahore during 2018 to 2019. The demographics, preoperative data, and postoperative information were obtained from the electronic medical records. The data collected included the patient's characteristics, symptoms at presentation (e.g., abdominal pain, migrating pain, nausea, vomiting, diarrhea, fever, and anorexia), temperature, history of any recent prior medical visit, admission course, duration of symptoms, physical examinations (tenderness, rebound tenderness), laboratory examinations (e.g., white blood cell, polymorphonuclear leukocyte [PMNL], C-reactive protein [CRP], bilirubin, aspartate aminotransferase/alanine aminotransferase), and radiological findings. In addition, the variables included the type of operation, pathologic finding, hospital day, and the presence of complications. Each patient's body mass index (BMI) and pediatric appendicitis score (PAS) were calculated.

Statistical analysis:

Statistical analysis was performed using IBM SPSS Statistics ver. 20.0 (IBM Co., Armonk, NY, USA). A Student *t* test, Pearson chi-square, linear by linear association analysis was done. The logistic regression was used and $P<0.05$ was considered significant.

RESULTS:

The data was collected from 50 patients. There was no difference in sex ($P=0.134$), age distribution ($P=0.463$), and BMI ($P=0.419$) in both genders. The delayed group had a higher mean value in CRP, but there was no significant difference between the 2 groups. In addition, the other laboratory results were insignificant. The delayed group's hospital day was significantly longer ($P=0.001$) than the nondelayed group. The PAS and complication cases showed no differences between the 2 groups.

Table 01: Laboratory data of patients with acute appendicitis

Characteristic	Delayed group	Nondelayed group	*P* value
WBC (mm^3)	13,780±609	14,149±199	0.566
PMNL (%)	73.9±1.6	76.4±0.5	0.150
CRP (mg/dL)	6.61±0.73	5.93±1.84	0.874
Bilirubin (mg/dL)	0.89±0.05	0.88±0.03	0.853
AST (U/L)	22.8±0.8	22.2±0.4	0.547
ALT (U/L)	14.1±0.7	15.5±0.4	0.184

Values are presented as mean±standard deviation.

Table 02: Risk factors of delayed diagnosis of acute appendicitis

Variable	*P* value	OR (95% CI)
Age	0.463	0.89 (0.66–1.21)
Sex	0.135	1.38 (0.91–2.09)
Body mass index	0.125	0.78 (0.56–1.07)
Season	0.004	2.54 (1.34–4.82)
Prior local clinic visit	<0.001	3.09 (1.98–4.83)
Admission course	<0.001	1.26 (1.11–1.44)
Symptom duration	<0.001	2.59 (1.78–3.78)
Migrating pain	0.350	1.39 (0.69–2.79)
Fever	0.022	1.37 (1.05–1.81)
Nausea	0.659	1.12 (0.69–1.81)
Vomiting	0.873	1.04 (0.65–1.66)
Diarrhea	0.026	1.94 (1.08–3.46)
Anorexia	0.495	1.33 (0.59–2.99)
RLQ Tenderness	0.075	0.55 (0.29–1.06)
RLQ Rebound tenderness	0.063	0.64 (0.39–1.03)
WBC	0.831	0.97 (0.71–1.32)
PMNL	0.612	0.85 (0.45–1.60)
CRP	<0.001	1.47 (1.19–1.82)
PAS	0.882	0.98 (0.80–1.21)
Hospital day	<0.001	1.88 (1.46–2.43)

DISCUSSION:

Despite the numerous publications on the appropriate evaluation and treatment of acute appendicitis, the diagnosis of this condition is often complicated in children. The classic progression of symptoms is well recognized. Unfortunately, this progression does not always occur, physicians find difficulty in recognizing the uncommon presentation [7]. Nonspecific symptoms, intermittent abdominal complaints, and parental delay also have been described to cause diagnostic delays. Such diagnostic delays can result in rupture, abscess formation, wound complications, and prolonged hospital stay. Early diagnosis and intervention remain the most promising means of reducing the morbidity, mortality, and discomforts for the child, as well as the cost [8]. This study attempted to determine the underlying factors of a delay in the diagnosis of acute appendicitis.

Addiss et al.reported a seasonal variation of appendicitis in an epidemiologic analysis with 11% more cases occurring from May to August compared to November through February. On the other hand, little is known regarding the seasonal variations in diagnosing appendicitis [8]. In the present study, seasonal variations are a significant predictor of a delayed diagnosis of appendicitis, particularly from March to May [9]. Generally from March, doctors start to work in their new position and considering the result that most of the children (81.6%) who underwent appendectomies are admitted through ED, a physician with little experience can make a delayed diagnosis [10]. This is because the diagnosis of appendicitis is still primarily a clinical one and is dependent on the physician's skill in eliciting the patient's history and appreciating its significance [11].

CONCLUSION:

It is concluded that patients who underwent an appendectomy had a delayed diagnosis of appendicitis. The risk factors of a delayed diagnosis of appendicitis were found to be seasonal variations,

prior medical visits, admission course, symptom duration, fever, diarrhea and CRP.

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