THE ROLE OF HYPERBILIRUBINEMIA IN THE DIAGNOSIS OF COMPLICATED APPENDICITIS A CLINICAL SURVEY

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ABSTRACT

Objective: *The aim of this study was to determine the serum total bilirubin level for preoperative diagnosis of complicated appendicitis.*

Materials & Methods*: This study was prospective observational study conducted in emergency department of a private health care facility of Peshawar from May 2018 to Nov 2018. Patients with abdominal pain complaints who were admitted to Emergency departmentduring 6 month were included in the study based on the initial clinical examination for acute appendicitis. Data from each patient, including demographic data, duration of pain, symptoms, fever and history of liver disease and the results of initial examinations, were entered into a questionnaire. For all patients, complete white blood cell count and total serum bilirubin level were measured and the results were entered in the questionnaire.For those undergoing surgery, macroscopic findings and the pathology response of the sample were included in the questionnaire.Statistical analysis was carried out using SPSS version 21. Descriptive analyses were reported as mean of continuous variables. A value of P<0.005 was accepted as statistically significant.*

Results:*Of the 295 patients studied, the most cases of appendicitis were between the ages of 15 to 24 years (42.7%) and the mean age was 30.35 years.Of these, 60% were males and 40% were females.Leukocytosis and left shift in cases of complicated appendicitis (98.5%) were significantly higher than those with uncomplicated appendicitis (85.6%) were.In addition, the study showed that bilirubin level was significantly higher in complicated cases compared to uncomplicated group (P<0.0.1). In the present study, the association between the complications of appendicitis with bilirubin level was found to be higher in patients with clinical symptoms of appendicitis and hyperbilirubinemia compared with those with normal bilirubin levels.Therefore, the total serum bilirubin level, as a test along with WBC, can be used to evaluate and diagnose cases of complicatedappendicitis.*

Conclusion:*The total serum bilirubin level, as a test along with WBC, can be used to evaluate and diagnose cases of complicated appendicitis.*

Keywords*: Hyperbilirubinemia, complicated appendicitis, uncomplicated appendicitis*

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INTRODUCTION

Acute appendicitis is one of the most common cause of surgical emergency,[1] in case of perforation, several life-threatening conditions such as bacterial peritonitis, sepsis, intestinal obstruction, and abdominal abscesses may be increased, which, if not treated, renders mortality to 80%.[2] To reduce mortality, a timely diagnosis and surgical intervention are necessary.

Examination and clinical judgment have been definitive determinants of preoperative diagnosis, and in only 80% of cases firm diagnosis is made by the surgeon.[3] In 15-50% of cases normal appendix is found and in 50% of cases postoperative complications can occur.[4] Delay in diagnosis and delay in treatment result in perforation and peritonitis.

Today, clinicians pay attention to the appendicitis diagnostic strategies they use various laboratory methods and tools such as ultrasound, White Blood Cell (WBC) counts and C-reactive protein (CRP) etc. As these investigations supplement the clinical diagnosis and help to reduce the frequency of unnecessary appendicectomy.[5] But despite these techniques, it seems that the error in diagnosis of appendicitis has not decreased. Studies have shown that clinical and biochemical findings are still more helpful in diagnosis of appendicitis.[6]

Among the various laboratory factors used to diagnose and predict the side effects of appendicitis, Hyperbilirubinemia has recently been identified as a strong predictor of preoperative perforation and gangrene. Possible pathophysiology of hyperbilirubinemia is bacterial infections and inflammatory factors during the occurrence of perforation that causes disturbances in the clearance of bilirubin and its production.E.Coli and fragilisbactetroid have been more involved in these cases.[7] The specificity and the positive predictivevalue of hyperbilirubinemia were higher than leukocytosis, but its sensitivity was less reported.[8]

Hyperbilirubinemia is defined as an increase in the amount of bilirubin in the blood, due to increased bilirubin production or changes in bilirubin clearance, and as a laboratory marker for diagnosis of preoperative appendicular perforation.Both of these mechanisms lead to bilirubin accumulation and may contribute to the hyperbilirubinemia of patients with perforated appendicitis.[9]

It has recently been noted that a number of bacterial infections contribute to liver dysfunction, leading to abnormalities in the formation and secretion of bile acids.This can ultimately lead to the development of hyperbilirubinemia, which is known to be a side effect of bacterial infections, especially in septic patients.[10] Septic patients and patients with extrahepatic bacterial infections, such as perforated appendicitis, indicate a cholestasis caused by proinflammatory cytokines and nitric oxide, which is caused by the destruction of hepatocellular structures and bile ducts.[11]

The current study was undertaken to find out the role of serum bilirubin as an aid in the diagnosis of complicated appendicitis in a emergency unit of a private health care facility of Peshawar.

MATERIALS AND METHODS

This study was prospective observational study conducted in emergency department of a private health care facility of Peshawar from May 2018 to Nov 2018. Patients with abdominal pain complaints who were admitted to Emergency departmentduring 6 month were included in the study based on the initial clinical examination for acute appendicitis. Informed written consent was taken from the patients. Sampling method was inaccurate and patients were included until the sample size reached the desired level.Generally, the formula for calculating the sample size based on the positive likelihood ratio and assuming that the sample group was selected in the uncomplicated and uncomplicated group was as follows.According to other studies, the sensitivity was 79%, the specificity was 96%,[3] and the lower likelihood ratio 9was considered according to the effectiveness of the test.

The above relationship was used according to the study by Sand et al[3]. Study was continued until the golden test (pathology) complained of 151 people complicated and 151 people uncomplicated.It should be noted that complicated cases of appendicitis include perforated appendicitis, gangrene, and phlegmon, and uncomplicated include catarrhal and suppurativeappendicitis. The findings of the pathology and surgery were almost identical and confirmed each other. The total sample size was 300 patients..

All patients diagnosed with acute appendicitis

clinically on admission and who operated on the same day were included in study population. Those who have pre-existing liver disease, or any hemolytic disease, cholelithiasis which can influence the liver function were excluded from the study. These data included demographic information, duration of pain and fever. Thorough clinical examination was done on which bases diagnosis was made.

A complete history and thorough clinical examination for all selected patients were carried out. All patients had undergone routine investigations such as routine blood investigations Once pre-operative clinical diagnosis of appendicitis was made, all patients were subjected to surgery.

The appendix was sent for histological examination to the pathology laboratory of the hospital and on the basis of microscopic and macroscopic findings appendix was diagnosed as normal, inflamed and complicated i.e. gangrene or perforated.

TLC between 4500 to 11000/µL and total bilirubin ≤1 mg/dL were considered to be normal. total serum bilirubin measurements of all the patients studied in the laboratory using same kitby calorimetry method. Serum bilirubin higher than 1mg/dl were considered as Hyperbilirubinemia. Statistical analysis was carried out using SPSS version 21. Descriptive analyses were reported as mean of continuous variables. A value of P<0.005 *was* accepted as statistically significant.

RESULTS

Patients who had non-appendicitis pathology during surgery were also excluded (one case of ileum perforation, 2 cases of ovarian cysts rupture). In addition, patients with normal appendix during surgery were also excluded (two cases). Therefore 295 patients were included in the study see table1, of which 177 were male (60%) and 118 (40%) were female. The mean age of the patients was 35.30 years and the average time for onset of pain was 59.34 hours.

According to the results, the frequency of complicated appendicitis in males was 100 (73.5%), while in females, 36 cases (26.4%) had complicated appendicitis.

In 295 patients who referred to Hospital with abdominal pain, the frequency of fever was 88 (29.28%).It was noted that 65(22%) of patients with appendicitis were febrile, while off those with complicated appendicitis, 43(31.6%) had fever, and this result was not statistically significant or meaningless.

In the study, 167 cases had normal bilirubin levels and 128 cases had hyperbilirubinemia.

Frequency distribution of the type of appendicitis by sex in the studied patients was similar.

The proportion of complications in patients with left-shift in CBC was significantly higher than others (p<0.05). Serum bilirubin levels were significantly higher in left shift individuals compared to those without it(P<0.01).

In the study of the association between the complication of appendicitis with the bilirubin level, the rate of complication of appendicitis in the group with high serum bilirubin levels was significantly higher than those with normal levels(P<0.001).

Table 1: Histological Diagnosis of Appendix

Histology	Frequency	Percentage %
Acute appendix	159	53.90
Complicated appendix	136	46.10

DISCUSSION

Appendix perforation is associated with a high degree of mortality in patients with acute appendicitis. In order to reduce this mortality, timely diagnosis and appropriate surgical intervention are necessary.[12]

Today, attention is paid to diagnostic strategies for appendicitis and different laboratory methods such as ultrasound, scan and laparoscopy are been used. However, despite these techniques, the error in diagnosis of appendicitis has not diminished, and the results of multiple Meta-analyzes indicate that clinical and biochemical findings are still more helpful in diagnosis.[13]

According to surgical texts and previous studies, most cases of appendicitis are between the ages of 10 and 29 years (40%). In our study the most common cases of appendicitis were between the ages of 15 and 24 years (42.7%) and the mean age was 35.30 years.

In the present study, the incidence of appendicitis was found in males (60%) and females (40%), which are consistent with previous texts and studies, which suggest a ratio of 3.1 to 1 (male to female).[4]

According to the results, the frequency of com-

plicated appendicitis in males was 100 (73.5%), while in females, 36 cases (26.4%) had complicated appendicitis

The differential state in complicated group had significant association with left shift (P<0.05) that is consistent with the results of the previous studies and the contents of the reference books.[1]

The findings also show that hyperbilirubinemia has been reported in 126 patients with left shift, of which only two were reported in other patients, which is quite significant. (P<0.001)

Finally, in the present study, the association between appendicitis complication and total bilirubin serum level before surgery was investigated. Hyperbilirubinemia was seen in 118 cases (86.7%) of patients with complicated appendicitis, while in the group with Uncomplicated appendicitis was only 10 cases (28.6%), which significantly affects the association between the complication of appendicitis and the level of bilirubin.

Hyperbilirubinemia was reported in the group of patients with complicated appendicitis (70.1%) in a similar study conducted by Sand at the University of Bochum in 2007, while in the group with uncomplicated appendicitis 17.7%. These results are consistent with the findings of this study.

Another study that confirms the results of the present study is by Estrada et al[5]. At the University of Los Angeles, California, and the results suggest that hyperbilirubinemia was significantly higher in the group of patients with complicated appendicitis (57.3%) in comparison with patients with uncomplicated appendicitis (11.2%).

In the study of the importance of the evaluation of bilirubin in comparison with other indicators, such as WBC and CRP, studies have generally been performed that have a stronger predictive role for bilirubin. In a December 2008 study by Sengupta et al. in the United States, showed that the increase in WBC, CRP alone or in combination with the increase in bilirubin is a poor predictor of the diagnosis of appendicitis complications.

In a study by Oliak in Greece in 2000, it was observed that the level of bilirubin in the diagnosis of complications of appendicitis before surgery was more sensitive than other two factors (WBC, CRP).[6]

Another study by Kaser in 2002 in Switzerland found hyperbilirubinemia as a major statistical marker of perforation in acute appendicitis compared to CRP and WBC.[13]

CONCLUSION

According to the presented results, it can be concluded that patients with complicated appendicitis (gangrene, perforation, etc.) have higher levels of bilirubin levels than patients with uncomplicated appendicitis.

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