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ORIGINAL ARTICLE

Frequency of Hyperbilirubinemia in patients of Perforated Appendicitis - A Current Update on Diagnostics and Management

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ABSTRACT

Background: Perforated appendix can be detected earlier by chemically with the aid of hyperbilirubinemia. It is a simple non-invasive modality that can aid to detecting complicated appendicitis and avoid morbidity.
Aim: To assess frequency of hyperbilirubinemia in patients undergoing appendectomy due to perforated appendicitis.
Methods: A descriptive cross-sectional study was conducted in which a total of 75 patients undergoing emergency appendectomy due to perforated appendicitis and age 15-70 years were recruited. Patients with CLD, pregnancy, Congenital or acquired biliary disease, alcoholism and hemolytic disease were excluded. Blood sample was obtained and was sent to the hospital histopathology laboratory and it was reported by consultant pathologist for assessment of hyperbilirubinemia.
Results: Age range in this study was from 15-70 years with mean age of 30.69±14.37 years. Majority of the patients 56(74.67%) were 15-40 years of age. Out of these 75 patients, 43(57.33%) were male and 32(42.67%) were females. Mean hyperbilirubinemia was 1.67±0.87 mg/dl. Frequency of hyperbilirubinemia in patients undergoing appendectomy due to perforated appendicitis was found in 63 (84.0%) patients.
Practical implication: This will aid in prompt diagnosis and early management of perforated appendix, and serum bilirubin can be used as modality for diagnosis in the absence of ultrasound facility.
Conclusion: Frequency of hyperbilirubinemia in patients undergoing appendectomy due to perforated appendicitis is very high.
Keywords: perforated appendicitis, hyperbilirubinemia, appendectomy, bilirubin level, perforation, sensitivity.

INTRODUCTION

Acute appendicitis is one of the common surgical emergencies demanding immediate surgical treatment presenting with the pain abdomen.It usually effects young children especially in the age range of 7–15 years but can also manifest at any age[1]. Diagnosis of acute appendicitis especially in young children is quite clinical thus making it a diagnostic challenge for surgical residents. False positive clinicalfindings and improper diagnosis misleadingly lead to unnecessary surgeries which is as greater as 20 percent as per recent available surveys[2,3].

Diagnosis of acute appendicitis can be confirmed with the aid of diagnostic modalities.Late surgeries due to delayed diagnosis could be a source of appendiceal perforation leading to generalized peritonitis thus increasing morbidity and mortality especially in limitations of resources[4]. Due to variable course of presentation and nonspecific laboratory findings it gets difficult to diagnose acute appendicitis.Those patients presenting with pain in right iliac fossa, open a wide range of possible diagnosis that can be differentiated with different diagnostic scoring systems. Although these scoring systems are not reliable and specific to differentiate between complicated and uncomplicated appendicitis[5].

The reticuloendothelial system of liver clears bacteria presenting in the portal blood by detoxification and immunological action. However, the insult to hepatocytes due to proliferating bacterial infection causes overwhelm to Kupffer cells directly resulting in release of liver enzymes and bilirubin to blood causing hyperbilrubinemia.[4]Simple appendectomy could be the cure of acute appendicitis if delayed could result in perforation thus increasing morbidity[6]. Current advances in medical research have highlighted a possible role of hyperbilirubinemia in acute appendicitis and appendiceal perforation[6]. As hyperbilirubinemia is reported in more than 90% of patients in case of perforated appendicitis[5,7]. Hyperbilirubinemia could be a new diagnostic modality for the assessment of perforation of appendix which is relatively simple non-invasive modality that can aid in the detection of complicated appendicitis and avoid morbidity[8-10].

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There is controversy in literature regarding the relation of hyperbilirubinemia and perforated appendicitis and there is no local data available on this topic as per best of knowledge. Therefore, a study is warranted to assess the frequency of hyperbilirubinemia in patients undergoing appendectomy due to perforated appendicitis."

MATERIALS & METHODS

A cross-sectional study design was adopted and this study was conducted at the department of General Surgery, Central Park Teaching Hospital, Lahore from April 2022 to November 2022.
Study Population: In this study, patients with the age ranging from15-70 years were included and only patients presenting in the department of Accident and Emergency were enrolled for the study. Patients with perforated appendicitis undergoing emergency appendectomy were included in this study.
Ethical Consideration: Prior written informed consent from all the participants were obtained and ethical letter as per declaration of Helsinki was obtained from institutional review board of Central Park Medical College Lahore.
Sampling Technique and Sample Size: Consecutive, non-probability sampling technique was employed and sample size was calculatedwas calculated using World Health Organization (WHO) sample size calculatorwith the power value of 90% (P=90%), absolute precision at the level of 7%and at confidence level of 95% and a total of sample size of 75 was calculated.
Exclusion Criterion: Patients with the history of CLD, cholelithiasis, chronic alcohol intake andhemolytic diseases were excluded from this study.
Data Collection Procedure: A 5cc blood sample was collected and was sent to the hospital pathology laboratory and it was reported by pathologist for assessment of hyperbilirubinemia. A detailed basic sociodemographic information was recorded on a specially designed and standardized Performa and to ensure the privacy of patients, this study was triple blinded.
Statistical Analysis and Interpretation: The data was entered in Microsoft Excel and was duly checked and was imported in SPSS ver. 26.0 for the statistical analysis. Descriptive data including of numerical values like serum bilirubin levels and age were computed for mean and standard deviation. Qualitative data including gender and hyperbilirubinemia was assessed in terms of

frequencies and percentages and was presented in pie charts. Post stratification chi-square test was employed to control and limit the impact of modifiers like age and gender.For significant p value, bench mark of 0.05 was set.

RESULTS

A total of 75 patients were recruited with theage range of 15-70 years with mean age of 30.69 ± 14.37 years. A major proportion of patients 56 (74.67%) were young with the age range of 15-40 years. In this study gender distribution was as, 43 (57.33%) were male and 32 (42.67%) were females with ratio of 1.3:1.

Mean hyperbilirubinemia was 1.67 ± 0.87 mg/dl.Frequency of hyperbilirubinemia in patients undergoing appendectomy due to perforated appendicitis was found in 63 (84.0%) patients. Stratification of hyperbilirubinemiain lieu of age was done as explained in table 1 that no significant differences in serum bilirubin levels were noted. Similarly, hyperbilirubinemia was also assed based ongender-based stratification is shown in Table II and no significant difference was noted.

Table I: Chi-Square test based onstratification of hyperbilirubinemiain regard of age.

Age (years)	Hyperbilirubinemia		P-value
	Yes	No	
15-40	45	11	**0.140**
41-70	18	01	

Table II: Chi-Square test based onStratification of hyperbilirubinemia with respect to gender.

Gender	Hyperbilirubinemia		P-value
	Yes	No	
Male	37	06	**0.575**
Female	26	06	

On appliance of one sample independent sample t test, a significantly high serum bilirubin levels were obtained with the mean value of 1.6±0.87 mg/dl and p-value of 0.002 suggestive significantly bilirubin levels in patients undergoing appendicular perforation. These levels were compared with patients of acute appendix without any signs of perforation by applying two sample independent t test significantly higher bilirubin levels were notes as 1.67±0.87 v/s 0.35±0.12 explaining higher bilirubin levels in cases of appendicular perforation with p-value of 0.001.

DISCUSSION

Surgical abdomen is usually an emergency most commonly manifesting in the form of acute appendicitis. In recent past, studies have purposed that value of serum bilirubin could be a helpful tool in the diagnosis of acute appendicitis[11]. Aspecific relationship might exist between bacteria and serum bilirubin that's why bilirubin levels are raised in appendicitis and other inflammatory conditions of abdomen including bacterial peritonitis and intestinal perforation[12].

Age range in this research survey was 15 to 70 years with mean age of 30.69±14.37 years. Majority of the patients 56(74.67%) were 15-40 years of age. Out of these 75 patients, 43(57.33%) were male and 32(42.67%) were females with ratio of 1.3:1. Frequency of hyperbilirubinemia in patients undergoing appendectomy due to perforated appendicitis was found in 63 (84.0%) patients. In 90% patients of perforated appendicitis there's increased bilirubin levels as reported byGavriilidis et al.[5] In another study, hyperbilirubinemia was observed in 48% patients of perforated appendicitis.[7]In the research analysiscarried out by Chaudhary et al., hyperbilirubinemia was noticed in the cases of acute suppurative appendicitis, and was much more elevated in cases of perforated as well as gangrenous appendicitis[12,13].

A study conducted byAkaiet al[14]has suggested a relatively higher prevalence of hyperbilirubinemia (24.9%) via their analysis of 538 acute appendicitis patients, out of whom 50.7% were found to be a case of perforated appendicitis. Pogorelić Z et al[15] reported that there was significant hyperbilirubinemia in patients suffering from perforation of appendix when compared with patients of no appendiceal perforation. They concluded that elevated serum TB has low sensitivity as of 38 to 77% but higher specificity of 70 to 87% for determining the risk of perforation in appendicitis making it debatable and controversial for standardization of serum bilirubin as serum marker for perforation.

Research survey by Bakshi et al[16] and Koirala et al.[17]have shown that total bilirubin levels of more than 1 mg/dl carried three times higher risk of appendiceal perforation when compared with normal ranging serum bilirubin. In the study conducted by Rajputet al[18] found out that in seventy percent of cases perforation was found with raised serum bilirubin levels making it more specific in appendiceal perforations.

CONCLUSION

This study concluded that frequency of hyperbilirubinemia in patients undergoing appendectomy due to perforated appendicitis is very high. So, we recommend that hyperbilirubinemiashould be used as a screening marker for complicated appendicitis diagnosis in order to improve patient care by timely and proper management, which consequently reduces patient's morbidity and mortality.

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