

Retrospective Study to Explore a New Predictor for the Early Diagnosis of Perforated Acute Appendicitis

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Abstract

Background: Acute appendicitis (AA) is one of the most common indications for emergency abdominal surgery.

Objective: To assess diagnostic and prognostic role of serum bilirubin in the management and diagnosis of acute appendicitis, as well as confirming the relationship between them.

Methods: A data has been collected about Patients diagnosed with acute appendicitis male and females from the age of 4 up to 80 among king Fahad hospital and East Jeddah hospital during the period from 1st Jan 2012 up to 30th July 2017, with sample size of 888 patients.

Results: The study was comprised of 888 consecutive patients. Significance was confirmed as P-value <0.05 Significance was found upon analyzing direct bilirubin for all age groups, total bilirubin for age group less than 15 years, direct bilirubin for 15-20 and 21-30 age groups.

Conclusions: Our investigation confirms that bilirubin level might be a biomarker for having appendicitis, it can occasionally differentiate between types of appendicitis, but this is not a sharp ending as it has no role in patients within age groups of above 30 years. However, a problem of specificity is present which hinders the adoption of serum bilirubin as a biomarker for AA. In addition, several other methods are more specific for the diagnosis and treatment regimen through suitable surgery procedure.

Keywords: Appendectomy; Appendicectomy; Appendicitis; Bilirubin

Abbreviations: AA: Acute Appendicitis; WBC: White Blood Cells Count; CRP: C-Reactive Protein; CT: Computed Tomography.

Introduction

The analysis of inflamed appendix in its acute condition which is called appendicitis can be tested, and postponed determination may prompt extreme inconveniences. For example, aperture and peritonitis, which are related with high severity. Serum markers, for example, white blood cells count (WBC), C-Reactive Protein (CRP), serum bilirubin, and liver transaminase levels have been proposed as individual markers for an infected appendix and appendiceal aperture [1,2].

In current practice, the analysis of an infected or inflamed appendix in its acute conditions is primarily clinical, upheld by research centre and imaging examinations. Computed tomography (CT) and Ultrasonography may raise the indicative affectability or in other words, sensitivity to 66-100% and 90-100%, individually, however these practices which are resembled with imaging involve a few disadvantages, for example, cost, radiation presentation, and dependency of the operator [3]. As of now, no single clinical or research facility test can decide whether a patient has an inflamed ruptured appendix. The surgery rooms generally do not manage non- inflamed appendix.

Materials and Methods

This retrospective study was designed in order to explore a new predictor for the early diagnosis of perforated acute appendicitis. A data has been collected about patients diagnosed with acute appendicitis between male and females from the age of 4 up to 80 among king Fahad hospital and East Jeddah hospital during the period from 1st Jan 2012 to 30th July 2017, with sample size of 888 patients [4,5]. Data was collected from the records present in the hospital facility and files archives.

Data were analysed using SPSS software version 22 (SPSS® Inc, Chicago, USA). Results were expressed in various tables as counts and frequencies. Discrete variables were compared using Chi-square or Fisher exact test as appropriate [6,7]. A comparison was done for the results of statistical analysis to have a final conclusion of the study. All tests were two-tailed, and a P-value less than 0.05 were deemed to indicate a statistically significant difference [8-10].

From a sample size of 888 subjects, results show that 75.6% of the samples are Saudi compared to 24.4% of the sample Non-Saudi, and 69.1% of the sample are males compared to 30.9% females [11-13]. When we combine the sample distribution by nationality and gender, results show that 65.1% of the Saudis are males while 34.9% are Females. On the other hand, 81.6% of the Non-Saudis in the sample are Males compared to 18.4% Females [14].

The average age among the sample is 25.65 years and the median age is 25 years, In addition, the age in the sample was included within the interval of 4 to 75 years. Within the same area, 37.2% of the sample in the age group from 21 to 30 years old, 22.9% of the sample in the age group from 15 to 20 years old, 18.2 in the age group from 31 to 40 years old, the age group less than 15 years old have only 12.3% and the age group more than 40 years old is 9.3% [15,16].

Open surgery operation was adopted for 88.2% of the sample while Laparoscopic operation was done for the rest of the sample (11.8%). While the diagnosis was one of the following: acute appendicitis (51.8%), perforated appendicitis (37.5%) and abscess formation after complicated appendicitis (10.7%). The vast majority of the sample was suffering from liver disease with a percentage of 91.7 compared to normal liver disease with a percentage of 8.3 [17,18]. Direct and total bilirubin were measured and the results show that 63.4% of the patient that the direct bilirubin level observed for them has normal levels of the serum bilirubin (less than 0.3 mg/dl) on the other hand 36.6% of those patient suffering from an elevated levels of the serum bilirubin (more than or equal 0.3 mg/dl) while 83.5% of the patient that the total bilirubin level observed for them the serum level from 0.1 to 1.2 mg/dl, compared to 16.5% of those patients the serum level is more than 1.2 mg/dl [19,20]. Approximately the elevation compared to normal levels of direct bilirubin was the same when the comparison was done between Saudis and non-Saudis, females and males and different age groups [21].

Testing all age groups, result of the tests show that the level of bilirubin enzyme (direct bilirubin) is statistically significant with the lab findings of perforated acute appendicitis patients in an ordinal way as the percentage for normal level for the patients suffering from perforated appendicitis was 78.4% while the rest is abnormal in contrast to acute inflammation and abscess formation groups which are having near percentages less than 0.05 P-value in Chi-square test [22,23].

However, the findings are showing that regarding total bilirubin the results do not differentiate between different appendicitis cases as the percentages of the three types are having an average of 83.2% for the readings ranging from 0.1 to 1.2 mg/dl and the rest are cases with elevated total bilirubin above 1.2 mg/dl. In addition, P-value is above 0.05 upon Chi-square testing which means statistically insignificant difference between different appendicitis types patients' groups [24]. Nevertheless, after stratifying patients according to age, age group of less than 15 years had shown significant difference regarding total bilirubin levels when it was compared between different types of appendicitis. Abscess formation was the least percentage of normal range total bilirubin with a percentage of 0.0% and the rest of the sample suffering from abscess formation within this age interval had elevated readings. While perforation had an opposite result with a 100% percentage for normal total bilirubin readings and 0.0% elevated total bilirubin readings. While in significance results was found for total bilirubin.

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