



VALIDATION OF DIAGNOSTIC VALUE OF HYPERBILIRUBINEMIA AS A PREDICTIVE FACTOR FOR APPENDICULAR PERFORATION IN ACUTE APPENDICITIS: AN OBSERVATIONAL STUDY AT A TERTIARY CARE HOSPITAL

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ABSTRACT

Acute Appendicitis is the most common general surgical emergency, and early surgical intervention improves outcomes. Despite the increased use of ultrasonography, computed tomography scanning and laparoscopy, the rate of misdiagnosis of appendicitis has remained constant (15.3%) and the rate of appendicular perforation. In an age accustomed to early and accurate preoperative diagnosis, acute appendicitis remains an enigmatic challenge and a reminder of the art of surgical diagnosis. This study was done to conclude whether the Serum Bilirubin can be considered as a new laboratory marker to aid in the diagnosis of Acute appendicitis and if so, does it have the predictive capacity to warn us about Appendicular perforation.

KEYWORDS :

INTRODUCTION

Acute appendicitis is the commonest cause of "Acute Surgical abdomen".^{1,2} Appendectomy is the most frequently performed urgent abdominal operation and is often the first major procedure performed by a surgeon in training.¹ The diagnosis of Appendicitis still remains a dilemma in spite of advances in the radiological and laboratory investigations. Experienced clinicians accurately diagnose appendicitis based on a combination of history, physical examination and laboratory studies about 80% of the time.³ Although most patients with Acute Appendicitis can be easily diagnosed, in some cases the sign and symptoms are variable and a firm diagnosis can be difficult. This is particularly true where the appendix is retrocaecal or retroileal. The percentage of appendectomies performed where appendix subsequently found to be normal varies 15- 20%⁴ and postoperative complications can occur in up to 50%⁵ of these patients. Delay in diagnosis of Acute Appendicitis leads to perforation and peritonitis and increased mortality. Perforation ranges 50-90% in various series.^{6,7}

To supplement the clinical diagnosis and to reduce the frequency of unnecessary Appendectomy, the importance of laboratory investigations like White Blood Cell (WBC) counts and C-reactive protein (CRP) etc values has been stressed.⁸ The use of Ultrasonography (USG) as a diagnostic tool for appendicitis has been widely known and studied. Various scores combining clinical features and laboratory investigations have also been developed and are good enough to reach the diagnosis.³ These are the Alvarado score⁸ and the Modified Alvarado score.³ However up to date there is no confirmatory laboratory marker for the preoperative diagnosis of acute appendicitis and appendicular perforation. Recently, elevation in serum bilirubin was reported, but the importance of the raised total bilirubin has not been stressed in acute appendicitis and appendicular perforation.

It is well established that when microbes invade the body, leukocytes defend it. This leads to increase in the leukocyte count. Bacterial invasion in the appendix leads to transmigration of bacteria and the release of proinflammatory cytokines such as TNF-alpha, IL6 and cytokines. These reach the liver via Superior mesenteric vein

(SMV) and may produce inflammation, abscess or dysfunction of liver either directly or indirectly by altering the hepatic blood flow

In view of the above context, the present study is undertaken to assess relationship between hyperbilirubinemia and acute appendicitis and to evaluate its credibility as a diagnostic marker for acute appendicitis and also, to see whether elevated bilirubin levels have a predictive potential for the diagnosis of appendicular perforation.

Methodology

Source of data :

Acute appendicitis patient's admitted in In patient department of General surgery Mandya Institute of Medical Sciences (MIMS), Mandya

Study setting: Department of General surgery , MIMS, Mandya.

Study design: Prospective observational study

Study period: 1 year (June 2021 to May 2022)

Sample size : 126

Taking proportion from previous study as 76%

Taking confidence level of 95%

Using the formula $n = 4PQ/L^2$

n = sample size, P = proportion, $Q = 100 - P$, L = Allowable error at 10%

$n = 126$

Sampling Method: Purposive sampling

Method of Collection of Data:

The study is conducted after obtaining approval from the institutional ethics committee. All patients with acute appendicitis admitted in Inpatient department of General surgery Mandya Institute of Medical Sciences (MIMS), is included in the study. Written informed consent is obtained from each of the patient after explaining about the study in the language they understand. After complete examination patient's blood sample is taken to measure serum bilirubin levels to know it's role in diagnosis of acute appendicitis its

role in prediction of appendicular perforation.

Inclusion Criteria

- All patients diagnosed with acute appendicitis of all age.
- All patients diagnosed with perforated appendix and gangrenous appendix of all age.

Exclusion Criteria

- Patients with appendicular mass.
- Patients with H/O alcoholic liver disease, haemolytic disease, liver disease with associated with hyper bilirubinemia.
- Patients with H/O gastrointestinal or hepato pancreatobiliary malignancy in the past.

Data analysis:

Data is entered in MS Exce software. Descriptive statistics like mean, standard deviation, percentage and inferential statistics like chi square test to know the association and other relevant statistical tests is applied. P value <0.05 is considered significant.

RESULTS:

Out of 126 patients, 84(66.7%) were male, 42(33.3%) were female. Most of the patients were in 2nd (35.71%) and 3rd (29.37%) decade.

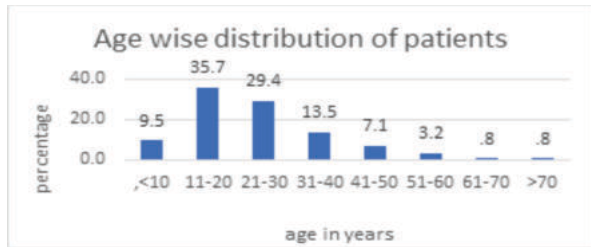


Figure 1.01: Age wise distribution of patients

- 91 (72.22%) patients out of 126 had elevated bilirubin (>1.0mg/dl), whereas 13 (27.78%) patients had normal bilirubin (<1.0mg).
- Among uncomplicated appendicitis (n=94), 62 (65.92%) patients had elevated bilirubin (>1.4mg/dl), whereas 32(34.8%) patients had normal bilirubin (<1.0mg).

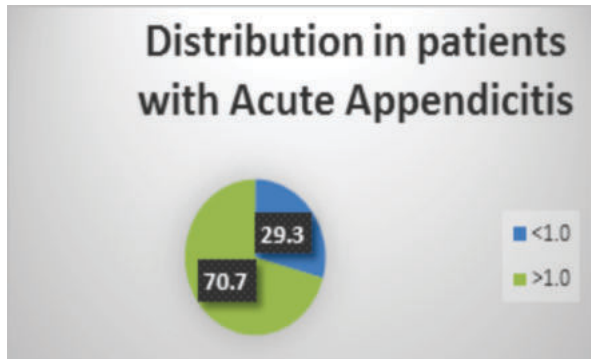


Figure 1.02: Bilirubin levels in patients with uncomplicated acute appendicitis diagnosis

Among appendicular perforation (n=32), 29 (90.63%) patients had elevated bilirubin (>1.0mg/dl), whereas 03(9.37%) patients had normal bilirubin (<1.0mg).The observed difference was found to be statistically significant(P Value < 0.01) which is done by using fischer's exact test.

The Sensitivity and Specificity of serum bilirubin as a marker in predicting acute appendicitis and Appendicular perforation was 68.13% and 8.57% respectively. Similarly the Positive predicative value and Negative predicative value for the same is 65.95% and 9.37% respectively. The Odds ratio was calculated to be 0.2004.

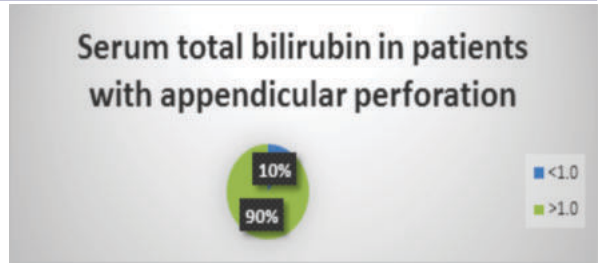


Figure 1.03: Bilirubin levels in patients with appendicular perforation

DISCUSSION

In the present study of the 126 patients enrolled for the study, 84 patients (66.7%) were males while the remaining 42 patients (33.3%) were females. The mean age in our study population (126 patients) was 24.54 ± 13.09 years . This is consistent with the quoted incidence of Appendicitis in the literature where it is most frequently seen in patients in their second through fourth decades of life.29,30 The average age group in males 23.12 ± 11.86 years was lower than females 27.38 ± 15.03 years.

Hyperbilirubinemia (> 1.0 mg/dL) in our study was found in 91 patients (72.22%) of all the 126 patients (n=50) enrolled in the study, while 35 patients (27.78%) had normal bilirubin levels (≤ 1.0 mg/dL). Estrada et al had found hyperbilirubinemia in 59 (38%) of 157 patients studied with acute appendicitis.

In our study population of 126 patients, 94patients (74.6%) were diagnosed as acute appendicitis pre-operatively while 32 patients (25.40%) were diagnosed with Appendicular perforation. The diagnosis was confirmed post-operatively by histopathological reports (HPR) and those differing from the pre-operative diagnosis were excluded from the study.

Amongst the patients diagnosed with Acute appendicitis without perforation (n=94), 62patients (65.92%) were found to have elevated bilirubin (>1.0 mg/dL) while only 32patients (34.8%) had normal bilirubin levels (≤ 1.0 mg/dL). In patients diagnosed with Appendicular perforation (n=32), 29 patients (90.63%) had bilirubin elevated (>1.0 mg/dL), while only 3patient (11.11%) had normal levels (<1.0 mg/dL). Thus, Hyperbilirubinemia was found in most of the patients diagnosed with acute appendicitis (71.69%) or Appendicular perforation (90%).

The mean bilirubin levels in patients diagnosed with Acute appendicitis was 1.25±0.41mg/dL (range, 0.5 – 2.8 mg/dL) while in patients diagnosed with Appendicular perforation was 1.96±0.91 mg/dL (range, 0.6– 4.4 mg/dL). Hence, we see that patients with Appendicular perforation had higher levels of bilirubin as compared to that of acute appendicitis.

So we infer that, patients with features suggestive of appendicitis with higher values of bilirubin, are more susceptible of having Appendicular perforation than those with normal or slightly elevated total serum bilirubin. Sand et al in his study found the mean bilirubin levels in patients with Appendicular perforation to be significantly higher than those with a non-perforated appendicitis.

The Sensitivity, Specificity, Positive predictive value, Negative predictive value and Odds ratio was calculated from a 2x2 table. Sensitivity and Specificity of bilirubin in predicting acute appendicitis and Appendicular perforation diagnosis was 68.13% and 8.57% respectively. Similarly Positive predictive value and Negative predicative value of bilirubin in predicting acute appendicitis and Appendicular perforation diagnosis was 65.95% and 9.37% respectively. The Odds ratio was calculated to be 0.2004.

The sensitivity in our study was more than that by Sand et al in which, he found the sensitivity and specificity in his study of hyperbilirubinemia for predicting Appendicular perforation to be 70% and 86.0% respectively.

CONCLUSION

Serum bilirubin levels appear to be a promising new laboratory marker for diagnosing Acute appendicitis and also promises to have a predictive potential for the diagnosis of Appendicular perforation. Patients with clinical signs and symptoms of appendicitis and with hyperbilirubinemia double the normal range (Raise in Direct Bilirubin being still higher) should be identified as having a higher probability of Appendicular perforation suggesting, serum bilirubin levels have a predictive potential for the diagnosis of Appendicular perforation

10. REFERENCES

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