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Original Research Article

Estimating Preoperative Bilirubin Level and its Role in Predicting the Severity Complicated Appendicitis

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Abstract

Aim: The aim of the present study was to identify whether preoperative bilirubin level can predict the severity complicated appendicitis.

Material & Methods: The study was conducted in the Department of General Surgery, Lord Buddha Koshi medical College and Hospital, Saharsa, Bihar, India for 12 months on 200 consecutive patients who were clinically diagnosed as acute appendicitis. These patients were evaluated with Alvarado score. In addition, preoperative bilirubin level and liver enzymes were estimated. Ultrasound abdomen was done preoperatively routinely. After surgery histopathology was studied. The parameters which showed statistically significant results for predicting complications were analyzed.

Results: In our study 60 (60%) were males and 40 (40%) were females. Out of the 200 cases 90 were complicated. 124 cases had elevated bilirubin and 76 cases had normal bilirubin. Out of 200 cases 90 patients had a total leucocyte count more than 11000.

Conclusion: Patients with appendicitis with elevated bilirubin levels have more chance for complications like perforation, gangrene and suppuration.

Keywords: Acute appendicitis, Gangrenous appendix, Hyperbilirubinemia, Perforated appendix

Introduction

Acute appendicitis is one of the leading causes of acute abdomen. Around 7% of the population may contract this condition at some point in their lives, and up to 20% of those affected will suffer a perforation as a result.[1] Appendicectomy is the most frequently performed urgent abdominal operation and is often the first major procedure performed by a surgeon in training. Often, it is difficult to reach a proper diagnosis. There may not be classical symptoms and signs of appendicitis. Different clinical signs and symptoms always mimic the diagnosis of acute appendicitis, as there are a number of causes leading to pain in right iliac fossa particularly in female patients. Diagnosing acute appendicitis clinically still remains a common surgical problem. Accurate diagnosis can be aided by additional testing or expectant management or both. These might delay laparotomy and lead to appendiceal perforation with increased morbidity and hospital stay.[2,3,4] Diagnosis of appendicitis is based on history, examination, laboratory values and imaging. In some cases, the signs and

symptoms are variable and a diagnosis can be difficult to make.

Delay in diagnosis of acute appendicitis leads to perforation and peritonitis and increased mortality. Incidence of perforation ranges 50- 90% in various series.[5,6] To supplement clinical diagnosis and to reduce the frequency of unnecessary appendicectomy, the importance of laboratory investigations like white blood cell (WBC) counts and

C-reactive protein (CRP) values has been stressed.[7] The use of ultrasonography (USG) as a diagnostic tool for appendicitis has been widely known and studied.[8] Scores combining clinical features and laboratory investigations have also been developed and are good enough to reach the diagnosis. Available scoring systems are the Alvarado score and the Modified Alvarado score.[9,10] Hyperbilirubinemia not caused by liver dysfunction or biliary obstruction can be observed in cases of acute appendicitis. Although some studies have reported on the usefulness of hyperbilirubinemia for assessing acute appendicitis [11-16] its clinical value remains controversial.

We therefore aimed to investigate the clinical significance of preoperative hyperbilirubinemia and to assess its value hyperbilirubinemia as a predictor of the severity of acute appendicitis.

Material & Methods

A study was conducted in Department of General Surgery, Lord Buddha Koshi medical College and Hospital, Saharsa, Bihar, India.for 12 months . The study had a sample size of 200 patients and the study duration was 18 months. Institutional ethics committee clearance was taken for the study.

Inclusion criteria

All patients who were diagnosed to have appendicitis and admitted in surgery department and who underwent appendicectomy were included in the study.

Exclusion criteria:

Appendicectomy performed incidentally, patients with appendicular lump, history of alcoholic liver disease, hemolytic or liver diseases associated with hyperbilirubinemia, history of viral hepatitis, Gilbert's disease, Dubin Johnson syndrome were excluded.

Methodology

Data was collected by interview with the participant with help of structured proforma, clinical examination, blood routine examination, Alvarado score, ultrasound abdomen, histopathology examination, pre and postoperative values of total bilirubin, direct bilirubin and indirect bilirubin.7 The upper limit of normal value in our laboratory for total bilirubin was 1.4 mg/dl (direct- 0.3 mg/dl, indirect- 1.1 mg/dl).

Statistical Analysis

The patient information was recorded in Microsoft Office Excel 2019 and subsequently integrated into SPSS (IBM Corp., Armonk, NY). IBM SPSS Statistics for Windows, Version 26.0 (IBM Corp.) was utilized for data analysis. For descriptive statistics, simple counts and percentages were employed, coupled with the chisquare test to demonstrate differences in means. For all tests, a 95% level of confidence and a p-value of less than 0.05 were considered significant.

Results

Table 1: Distribution of acute appendicitis in complicated and uncomplicated cases

Type of appendicitis	Number	Percentage
Acute appendicitis(uncomplicated)	110	56
Perforated appendicitis	28	14
Gangrenous appendicitis	24	12
Suppurative appendicitis	38	19
Total	100	100
Gender		
Male	120	60
Female	80	40
Total	200	100

In our study 60 (60%) were males and 40 (40%) were females. Out of the 200 cases 90 were complicated.

Table 2: Distribution of cases based on preoperative elevated bilirubin

Type of appendicitis	Bilirubin elevated	Normal bilirubin	Total
Acute appendicitis(uncomplicated)	52	58	110
Gangrenousappendicitis	20	4	24
Suppurativeappendicitis	28	10	38
Perforated appendicitis	24	4	28
Total	124	76	200

124 cases had elevated bilirubin and 76 cases had normal bilirubin.

Table 3: Total leucocyte count

TLC (cells/mm^3)	Number	Percentage
<4000	10	5
4000-11,000	100	50
>11,000	90	45

Out of 200 cases 90 patients had a total leucocyte count more than 11000.

Discussion

Acute appendicitis is one of the most common abdominal emergencies requiring emergency surgery, and appendectomy is the most frequently performed emergency operation worldwide.[17,18] Various scoring systems, such as the Alvarado score, have been suggested for appendicitis, based on clinical features, physical examination, and laboratory data.[19] However, the classical symptoms and signs of appendicitis may sometimes be absent, making it difficult to reach a definite diagnosis.[20] Given that the delayed diagnosis and treatment of severe appendicitis is associated with increased risks of perforation and postoperative morbidity, mortality, and hospital stay, there is an urgent need for a predictor of the severity of acute appendicitis.[21]

As far as appendicitis is concerned, bilirubin is not a generally recognized marker. Raised bilirubin levels have been shown in prior studies to be a good and specific marker for perforated appendicitis.[22,23] Among the adult surgical population, elevated bilirubin levels are frequently the consequence of liver or gallbladder disorders.[24] Hepatic dysfunction caused by sepsis has been extensively studied.[25] In acute appendicitis, the rise of serum bilirubin is thought to be caused by microorganisms and bacterial toxins migrating via the portal vein and eventually being metabolized by the liver.[26] The dysfunctionality of the hepatocytes, driven by the toxic nature of

the bacterial products and the product of the inflammatory response influences bilirubin excretion.[27] When the appendix wall is damaged, microorganisms and endotoxins can migrate out of the appendix lumen and into the portal system. After that, the inflammatory cytokines potentially end up in the liver, where they could trigger intrahepatic cholestasis. Our findings of rising bilirubin levels with increasing appendicitis severity are consistent with previous studies showing that Escherichia coli endotoxin produces dose-dependent cholestasis.[28]

In our study 60 (60%) were males and 40 (40%) were females which was similar to studies by Chaudary et al and Atahan et al.[29,30] In a study by D'Souza et al elevated total bilirubin preoperatively showed significant diagnostic value of complicated appendicitis.[31] Out of the 200 cases 90 were complicated. 124 cases had elevated bilirubin and 76 cases had normal bilirubin. Out of 200 cases 90 patients had a total leucocyte count more than 11000. In a study of 157 patients by Estrada et al patients with suppuration were significantly more likely to have hyperbilirubinemia. Appendicular perforation was 3 times higher for patients with hyperbilirubinemia when compared to normal bilirubin levels.[32] From our study preoperative hyperbilirubinemia was a predictor of complicated appendicitis similar to a study by Fabio Silva et al.[33]

Conclusion

Patients with appendicitis with elevated bilirubin levels have more chance for complications like perforation, gangrene and suppuration. Surgeons often have difficulty making an accurate diagnosis of acute appendicitis; nevertheless, our results suggest that a serum bilirubin level is a strong indicator of the presence of complicated appendicitis. TB, in combination with others such as WCC, CRP, and clinical presentation, is more sensitive and specific in identifying patients who would develop complicated appendicitis.

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