


Original Research Article

The role of hyperbilirubinemia as a marker of gangrenous/ perforated appendicitis

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Abstract

Background: Acute appendicitis is the most common cause of acute abdomen in young adults requiring Emergency Surgery. Diagnosing Acute Appendicitis clinically still remains a common surgical problem.

Objectives: To study the Incidence of Hyperbilirubinemia in cases of Acute appendicitis and its Complications (Gangrenous/ Perforated), to compare other variables such as age, symptoms, clinical profile, total leukocyte count, Alvarado's score and USG in a similar role.

Materials and methods: All patients presenting with Right Iliac Fossa pain of abdomen who were admitted in the Emergency ward were evaluated by Detailed History and Examination and complete Hemogram, Liver function Test, Seropositivity for Hbs Ag, Alvarado's scoring system and USG. Confirmed cases were operated and clinical diagnosis was confirmed Per-operatively and post operatively by Histopathological Examination. Final HPE was considered as a gold standard for diagnosing and categorising patients as having Normal Appendix, Acute appendicitis and Acute appendicitis with Perforation/ Gangrene. During the study period, out of 249 cases operated, 246 cases were taken for study purpose. Rest of the three cases met the exclusion criteria. Two cases were HbsAg +ve and one case was Acute appendicitis associated with Cholelithiasis hence, excluded from the study.

Results: Within the 204 cases of Acute suppurative appendicitis, 35 cases had Hyperbilirubinemia (17.16%). Among 42 cases of Gangrenous/ Perforated Appendix, 36 cases had Hyperbilirubinemia (85.71%). Hyperbilirubinemia was most commonly associated with Gangrenous/ Perforated Appendix followed by Acute suppurative appendicitis. Here the cut off value for Hyperbilirubinemia was 1.15 mg and it was supported by statistical analysis.

Conclusion: Total serum bilirubin appears to be a new promising marker for diagnosing Gangrenous/ Perforated Appendicitis. Patients with clinical signs and symptoms of Acute appendicitis with raised serum bilirubin should be considered as having high predictive potential for Appendicular gangrene/

Perforation. Serum Bilirubin is an important adjunct in diagnosing the presence of Gangrenous/ Perforated Appendicitis along with other diagnostic aids. Therefore Hyperbilirubinemia may be considered as a marker for Gangrenous/ Perforated appendix.

Key words

Hyperbilirubinemia, Marker, Gangrenous, Perforated, Appendicitis.

Introduction

Acute appendicitis is the most common cause of acute abdomen in young adults requiring Emergency Surgery. 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 surgery and lead to Appendicular perforation with increased morbidity and hospital stay. A safe alternative seems to be appendectomy as soon as the condition is suspected, a strategy that increases the No. of unnecessary Appendectomies. Accurate diagnosis has been attempted by the employment of additional lab tests, Scoring systems, Ultrasound imaging, CT scan and Laparoscopy. None of these methods stands alone as they all come in support of and are secondary to a primary clinical assessment. In recent years studies emerge that showed that elevated serum Bilirubin levels would indicate a Gangrenous/ Perforated Appendicitis. An elevated serum Bilirubin that is not explained by liver disease or Biliary obstruction can be present in many patients of Acute Appendicitis. The present study was designed to study the Incidence of Hyperbilirubinemia in cases of Acute Appendicitis and its complications (Gangrenous/ Perforated). The significance of other parameters such as Age, Symptoms, Total Leukocyte count, USG, Alvarado's score has also been evaluated in these cases.

Materials and methods

Inclusion criteria

All patients diagnosed as Acute Appendicitis and its Complications (Gangrenous/ Perforation) clinically on admission.

Exclusion criteria

- All patients with positive HbsAg.

- All patients with cholelithiasis.
- All patients with cancer of Hepato Biliary system.
- All patients with past history of Jaundice/ Liver disease, Hemolytic disease, Congenital or Acquired Biliary disease.
- Patients with Appendicular Lump.
- Patients undergoing interval Appendectomies or Appendectomies for other Indications.

Sample size

246 patients

Duration

November 2017 to August 2018

All patients presenting with Right Iliac Fossa pain of abdomen who were admitted in the Emergency ward were evaluated by Detailed History and Examination and complete Hemogram, Liver function Test, Seropositivity for Hbs Ag, Alvarado's scoring system, and USG.

Confirmed cases were operated and clinical diagnosis was confirmed Per operatively and post operatively by Histopathological Examination. Final HPE was considered as a gold standard for diagnosing and categorising patients as having Normal Appendix, Acute appendicitis and Acute appendicitis with Perforation/ Gangrene.

Normal range of bilirubin in adults as follows

Total bilirubin: 0.3 to 1.0 mg

Direct bilirubin: 0.1 to 0.3 mg

Indirect bilirubin 0.2 to 0.8 mg

During the study period, out of 249 cases operated, 246 cases were taken for study

purpose. Rest of the three cases met the exclusion criteria. Two cases were HbsAg +ve and one case was Acute appendicitis associated with Cholelithiasis hence, excluded from the study.

The collected data were analyzed with IBM SPSS statistics software 23.0 Version. To describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean and S.D were used for continuous variables. To find the efficacy of the tools the Receiver Operating Curve (ROC) with Sensitivity, Specificity, PPV and NPV was used. To find the significance in categorical data Chi-Square test was used. In the

above statistical tool the probability value $P < 0.05$ was considered as significance.

Results

In our study, out of 246 study population, majority of the Acute appendicitis were between 11 to 20 years age group that were 116 cases (47.2%) followed by 21 to 30 years age group that were 71 cases (28.9 %). Majority of cases were between 11 to 30 years age group that were 187 cases (76.1%) and small no. of cases were belongs to < 10 years that were 4 cases (1.6%) and > 50 years that were 2% of cases (**Figure – 1**).

Figure – 1: Age distribution of Acute appendicitis.

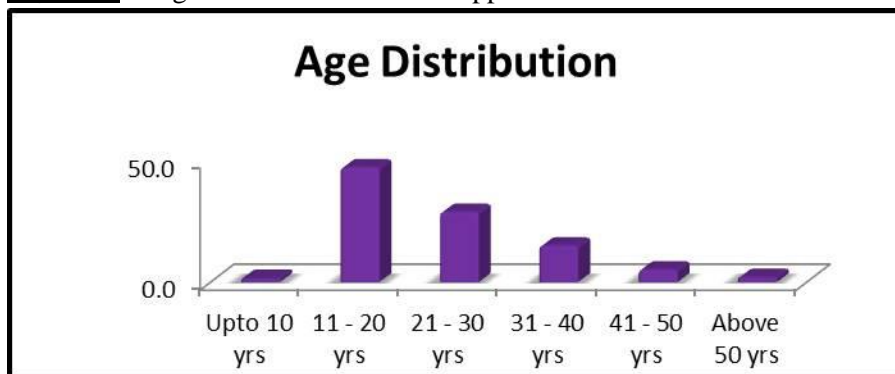
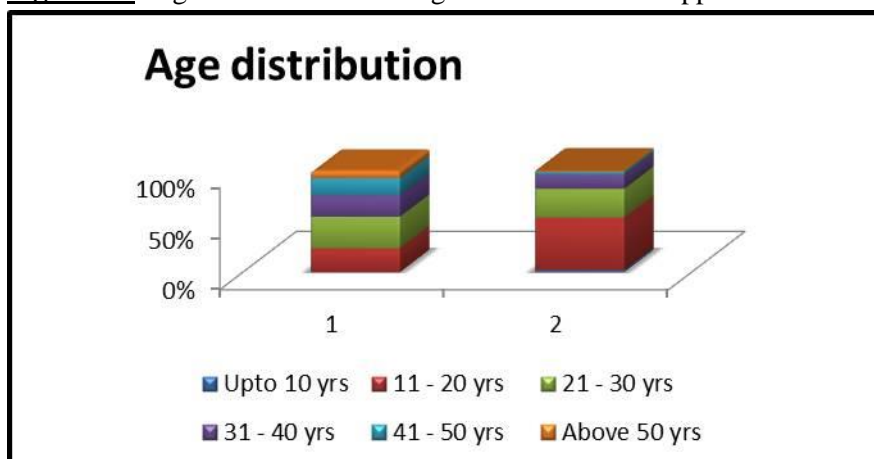


Figure – 2: Age distribution of Gangrenous/ Perforated appendix.



Out of 246 cases of Acute appendicitis, 42 cases were Gangrenous/ Perforated Appendix (17.07%). Out of 42 cases of Gangrenous/ Perforated appendix, maximum cases were seen in the Age group 21-30 years (31%) and least

seen in below 10 years (0.0%). Above 50 years, no. of cases of Gangrenous/ Perforated appendix was 3 (7.1%) as per **Figure - 2**.

In our study, out of 246 cases, 152 (61.8%) were male cases (64.3%) and 15 were female cases (35.7%) as per **Figure – 3, 4**.
42 cases of Gangrenous/ Perforated appendix, 27

Figure – 3: Gender distribution of cases.

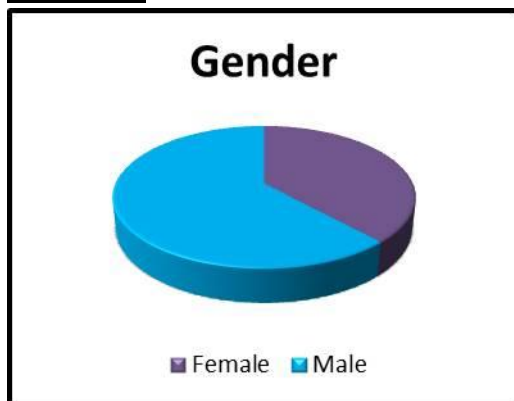


Figure – 4: Gender distribution as per appendicitis.

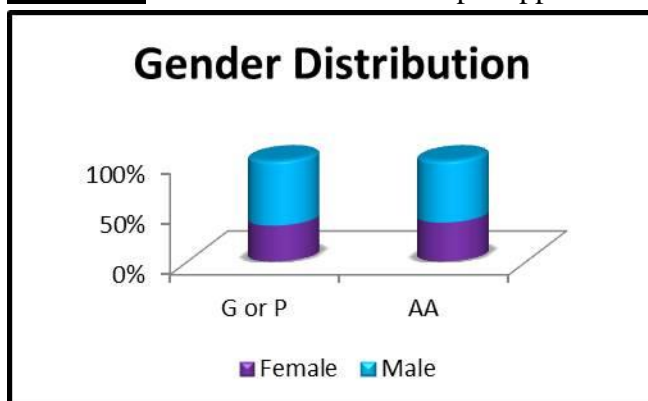
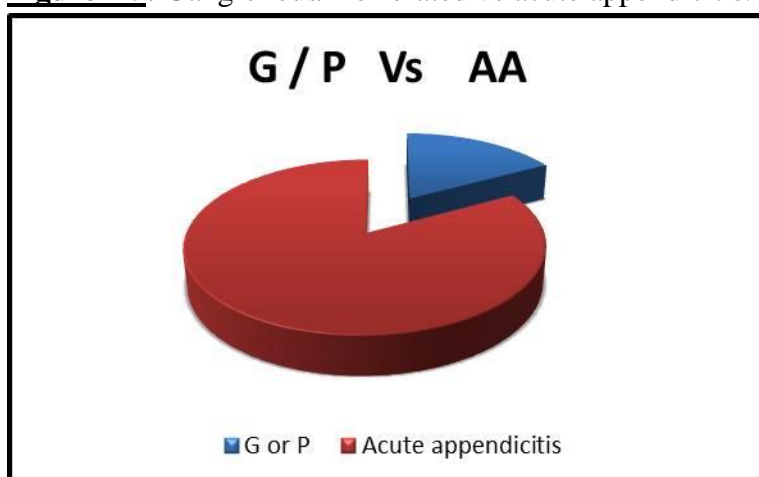


Figure – 5: Gangrenous/ Perforated vs acute appendicitis.



Out of 246 cases of histologically confirmed cases of Acute appendicitis and Gangrenous/ perforated appendix, 42 (17.1%) were Gangrenous / Perforated Appendix and rest of the 204 cases (82.9%) were Acute appendicitis (**Figure – 5**).
the 193 cases (78.46%). Among 246 cases, 42

Hyperbilirubinemia was found both in Suppurative Acute appendicitis and Gangrenous/ Perforated Appendicitis. Among 246 cases of HPE confirmed cases of Acute appendicitis, 42 were Gangrenous/ Perforated Appendix and 204 were Acute Suppurative appendicitis. Within the 204 cases of Acute suppurative appendicitis, 35 cases had Hyperbilirubinemia (17.16%). Among 42 cases of Gangrenous/ Perforated Appendix cases, 36 cases had Hyperbilirubinemia (85.71%). Hyperbilirubinemia was most commonly associated with Gangrenous/ Perforated Appendix followed by Acute suppurative appendicitis. Here the cut off value for Hyperbilirubinemia was 1.15 mg and it was supported by statistical analysis.

Discussion

The appendix, ileum, and ascending colon are all derived from the mid gut. Appendix developing at 8th week of Gestation as an out pouching of the caecum and it becomes fixed in right lower quadrant after the medial rotation. It is a blind muscular tube with mucosal, submucosal, muscular and serosal layers with average length 7.5 to 10 cm. Base of the Appendix is constant found at the confluence of three Taenia coli of the caecum which fuse to form the outer longitudinal muscle coat. Mesentery of the Appendix is called Mesoappendix. Appendicular artery a branch of lower division of the Ileocolic artery lies in the free border of Mesoappendix, being an end artery thrombosis of which results in necrosis of Appendix. Lumen contains multiple longitudinal folds of mucous membrane lined by columnar cells of Colonic type. Submucosa contains numerous Lymphatic follicles seems to be important in etiology of Acute appendicitis. Appendix lying in various positions common being the Retrocaecal (74%). The varying location of the tip of the appendix likely explains the myriad of symptoms that are attributable to the inflamed appendix. Abdominal pain first noticed in peri umbilical region with progressive inflammation of the appendix, pain shifting to Right iliac fossa, Anorexia (especially in children), Nausea and Vomiting, and Fever,

this is Typical presentation. Atypical presentation include in elderly patients in whom localization to right iliac fossa unusual. An inflamed appendix in the pelvis may cause supra pubic pain and tenesmus. Typically two clinical syndromes of acute appendicitis are Acute catarrhal (non-obstructive) and Acute obstructive appendicitis. Later characterized by more acute and abrupt onset with generalized abdominal pain and vomiting which may mimic acute intestinal obstruction. On examination low grade pyrexia with Right iliac fossa tenderness, Muscle guarding and Rebound tenderness. Patient asked to point where the pain began and where it moved (Pointing Sign). Maximum tenderness and muscle guarding present in Mc Burney's point. Deep palpation of the left iliac fossa may cause pain in the Right iliac fossa (Rovsing's Sign). Inflamed appendix may lie on the psoas muscle and the patient lies with the right hip flexed for pain relief (Psoas Sign). If an Inflamed appendix is in contact with obturator internus, when the hip is flexed and internally rotated will cause pain in the Hypogastrium (Obturator Sign).

Hyperbilirubinemia is the result of imbalance between production and excretion of bilirubin by the Liver. It may be because of hemolytic, hepatocellular or cholestatic diseases. Liver receives blood through portal system and portal blood carries nutrients and other substances absorbed from gut including bacteria and its toxins. The association between hyperbilirubinemia and variety of infectious diseases has been studied in various studies. The pathogenesis is thought to be because of bacteremia or endotoxemia causing impaired excretion of bilirubin from the bile canaliculi. The present study has been designed to evaluate the association between hyperbilirubinemia in cases of acute appendicitis and its complications. The most likely explanation of the rise in SB is therefore circulating endotoxemia as a result of appendiceal infection.

Hepatocellular function is depressed during the early stage of sepsis despite the increased cardiac output and hepatic blood flow and decreased

peripheral resistance. The depression of hepatocellular function in the early, hyper-dynamic stage of sepsis does not appear to be due to reduction in hepatic perfusion but is associated with elevated levels of circulating pro-inflammatory cytokines such as TNF and IL-6. Thus up regulation of TNF and/ or IL-6 may be responsible for producing hepatocellular dysfunction during the early hyper-dynamic stage of sepsis. Endotoxins produces cholestasis by damaging biliary salt transport through cytokine mediated mechanisms. E.Coli is the most frequently isolated bacteria from peritoneal fluid in acute appendicitis. Elevated total bilirubin level in acute appendicitis can either appear as a result of bacteremia, or endotoxemia, both possible in catarrhal and phlegmonous forms as well as in the perforated appendicitis. Hence, a liver function test is most helpful in detecting the cases of appendicular perforation along with the other clinical findings.

Though imaging modalities likes Computed tomography and Magnetic resonance imaging may diagnose the appendicular perforation and these imaging facilities may not be easily available in developing nations. In this situations clinical and lab investigations may be cheaper and easily available.

Conclusion

Hence, a simple liver function test is most helpful in detecting the cases of appendicular perforation/ Gangrenous appendicitis along with clinical correlation there by reducing morbidity and mortality associated with the Gangrenous/ Perforated appendicitis especially in the developing nations.

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