



A STUDY ON HYPERBILIRUBINEMIA IN PATIENTS OF ACUTE APPENDICITIS AND IT'S ROLE IN THE PREDICTION OF APPENDICULAR PERFORATION AT RIMS, RANCHI

Surgery

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ABSTRACT

Background: Acute appendicitis is the most common condition that needs urgent intervention, has to be diagnosed and evaluated at the earliest. It is found that a correlation exists between appendicular perforation and high serum bilirubin level. In the absence of radiological investigations, patients with clinical signs with hyperbilirubinemia might have a higher probability of appendicular perforation. **Aim:** To study the role of elevated serum bilirubin level as a diagnostic marker of acute appendicitis and to evaluate the predictive potential of hyperbilirubinemia in appendicular perforation. **Methods:** This is an observational prospective study of 100 cases of acute appendicitis with or without appendicular perforation admitted in General Surgery department of Rajendra Institute of Medical Sciences, Ranchi, who underwent appendicectomy for acute appendicitis from August 2019 to October 2021. **Results:** Most of the patients belonged to the age group of 15-24 years with male to female ratio 1.4:1. Total serum bilirubin levels were raised in 72% patients, comparatively higher in appendicular perforation 77.78% than in acute appendicitis 70.73%. Sensitivity n specificity of hyperbilirubinemia was 70.73% and 22.22% respectively. **Conclusion:** Serum bilirubin level appears to be a promising new diagnostic laboratory marker which when combined with thorough history taking and clinical examination can aid significantly to arrive to the diagnosis of acute appendicitis. Higher level of serum bilirubin ($\geq 2\text{mg/dl}$) hints towards the increased chances of appendicular perforation.

KEYWORDS

Acute appendicitis, serum bilirubin, appendicular perforation, hyperbilirubinemia.

INTRODUCTION

Acute appendicitis is one of the most common cause of abdominal pain which requires urgent abdominal surgery. Acute appendicitis is more common in children and young adults. Patients may not always present with classical signs and symptoms of acute appendicitis. There are various causes of right iliac fossa pain which may mimic acute appendicitis, especially in females of reproductive age group due to gynecological problems. Thus, a new marker for the diagnosis of acute appendicitis would be helpful. The diagnosis of acute appendicitis is mostly based on clinical history, physical examinations and laboratory findings of the patient. The signs and symptoms of acute appendicitis may be variable and it is difficult to make a firm diagnosis, especially in retrocaecal and retroileal appendix. This might delay laparotomy and lead to various complications like perforation and peritonitis with increased morbidity and mortality.

15-30% of appendicectomy specimens, are found to be normal. Therefore, to reduce the number of unnecessary appendicectomies and to supplement clinical diagnosis, laboratory investigations like TLC, DLC, C-reactive protein have been emphasized. Imaging techniques like USG abdomen has been widely known and accepted as a diagnostic tool for appendicitis. Various scoring systems like Alvarado and Modified Alvarado scoring have been developed using clinical history, physical examination and laboratory investigations to reach the diagnosis. Still there is no definitive laboratory marker to determine acute appendicitis and appendicular perforation.

On bacterial invasion of appendix, there is transmigration of bacteria which leads to release of pro-inflammatory mediators like TNF-alpha, IL-6 and various other cytokines. They reach the liver via superior mesenteric vein and may produce inflammation, abscess or dysfunction of liver directly or indirectly by affecting blood flow to the liver.

In view of the above context, the study was undertaken to assess the relationship between increased bilirubin level and acute appendicitis and to evaluate the predictive potential of hyperbilirubinemia for appendicular perforation.

MATERIALS AND METHODS

Our study was conducted on 100 patients admitted in department of General Surgery, at Rajendra Institute of Medical Sciences, Ranchi from August 2019 to October 2021.

Inclusion Criteria

1. Patients aged 15 - 64 years.
2. All the patients diagnosed as acute appendicitis with or without appendicular perforation clinically on admission.

3. Patients who gave written informed consent to participate in the study.

Exclusion Criteria

1. All the patients documented to have past history of
 - Ascites or liver disease
 - Chronic alcoholism
 - Haemolytic anaemia
 - Congenital or acquired biliary disease
2. All the patients with viral hepatitis or cholelithiasis or hepatobiliary malignancies.

RESULTS

A total of 100 patients with clinical diagnosis of acute appendicitis or appendicular perforation admitted in department of General Surgery, Rajendra Institute of Medical Sciences, Ranchi were studied.

Table No. 01: Age Distribution

Age group (in years)	No. of patients	Percentage
15 - 24	46	46%
25 - 34	35	35%
35 - 44	10	10%
45 - 54	05	5%
55 - 64	04	4%

Table no. 01 shows that patients aged 15-24 years (46%) were most commonly affected followed by the age group 25-34 years (35%). The mean age of presentation was 28 years.

58 (58%) patients were male whereas 42 (42%) patients were female.

Table No. 02: Liver Function Test In 100 Patients

Parameter	Mean value	Standard deviation
Total bilirubin	1.42	0.66
Direct bilirubin	0.78	0.45
Indirect bilirubin	0.65	0.32
SGPT	28.4	8.30
SGOT	30	8.96
ALP	86.45	13.91

Table no. 02 shows that the mean total serum bilirubin level of 100 patients was 1.4. The mean direct and indirect bilirubin levels in total sample was 0.78 and 0.65 respectively.

Table No. 03: Distribution Of Patients According To Postoperative Diagnosis

Diagnosis	No. of patients	Percentage
Acute appendicitis	82	82%

Appendicular perforation	18	18%
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Table no. 03 shows that out of total sample postoperatively 82 (82%) patients were diagnosed with acute appendicitis whereas 18 (18%) patients were diagnosed with appendicular perforation.

Table No. 04: Total Serum Bilirubin Levels

Total serum bilirubin	Total sample (n=100)	Acute appendicitis (n=82)	Appendicular perforation (n=18)
≥ 1gm/dl	72	58	14
Percentage	(72%)	(70.73%)	(77.78%)
<1gm/dl	28	24	4
Percentage	(28%)	(29.27%)	(22.22%)
Total	100	82	18

Table no. 04 shows that total serum bilirubin level in the total study sample was ≥ 1gm/dl in 72 (72%) patients and < 1gm/dl in 28 (28%) patients. In patients of acute appendicitis total serum bilirubin was ≥ 1gm/dl in 58 (70.73%) patients and < 1gm/dl in 24 (29.27%) patients and in patients of appendicular perforation total serum bilirubin level was ≥ 1gm/dl in 14 (77.78%) and < 1gm/dl in 4 (22.22%) patients.

6 (7.32%) patients of acute appendicitis and 6 patient (33.33%) of appendicular perforation had clinical jaundice. Out of the total sample TLC in 64 (64%) of patients was > 11000/mm and in 36 (36%) of patients was ≤ 11000/mm. The mean TLC and mean Neutrophil count in total sample was 11008.7 ± 2770.24 and 69.92 ± 9.55 respectively.

Out of the total sample, clinically 92 (92%) patients were diagnosed as acute appendicitis and 8 (8%) patients were diagnosed as appendicular perforation. Ultrasonography findings were suggestive of acute appendicitis in 77 (77%) of patients, of appendicular perforation in 11 (11%) of patients and of normal appendix in 12 (12%) patients. Postoperative diagnosis of acute appendicitis was made in 82 (82%) patients and of a appendicular perforation was made in 18 (18%) patient.

The sensitivity and specificity of hyperbilirubinemia was 70.73% and 22.22% respectively.

DISCUSSION

Acute appendicitis is the most common abdominal emergency presenting to a clinician. Despite the advances in the diagnostic field, the diagnosis of acute appendicitis remains an enigma for the surgeon. To minimize the late complications of acute appendicitis, the most dreadful being appendicular perforation, surgeons all over the world prefer to perform appendicectomy as soon as possible rather than to wait and watch. A negative appendicectomy rate ranging from 20 to 30% has been accepted by the surgeons worldwide. The rise on serum bilirubin levels in acute appendicitis has been attributed to the sepsis caused by Gram-negative bacteria, most commonly by *Escherichia coli* and its endotoxin leading to portal pyemia. This causes hepatic parenchymal damage and difficulty in secretion and excretion of bile in biliary canaliculi raising total serum bilirubin levels. Elevated serum bilirubin level can, therefore, help in the early diagnosis of acute appendicitis and in predicting its perforation as studies suggest that perforation of appendix occurs around 48 hours after onset of acute appendicitis.

In our study patients aged 15 - 24 years were most commonly affected (46%) and the mean age was 28 years. Acute appendicitis and appendicular perforation were more common in males (58%) than in females (42%). The mean total serum bilirubin was 1.42 ± 0.66. The mean value of liver enzymes were SGOT - 30, SGPT - 28.4 and ALP - 86.45. In our study postoperatively 82% were diagnosed with acute appendicitis and 18% were diagnosed as appendicular perforation. The total serum bilirubin level in 100 patients was ≥ 1gm/dl in 72% and < 1gm/dl in 28%. In 82 patients of acute appendicitis total serum bilirubin was ≥ 1gm/dl in 70.73% and < 1gm/dl in 29.27% and in 18 patients of appendicular perforation total serum bilirubin level was ≥ 1gm/dl in 77.78% and < 1gm/dl in 22.22%.

Clinical jaundice was present only in 12% of total patients. Leukocytosis was present in 64% of patients with mean TLC 11008.7 ± 2770.24 and the mean Neutrophil count 69.62 ± 9.55. Clinically 92% of patients were diagnosed as acute appendicitis and 8% of patients were diagnosed as appendicular perforation. Ultrasound finding were suggestive of acute appendicitis in 77% and of appendicular

perforation in 11% of patients. Appendix was found to be normal in 12% of patients. The sensitivity and specificity of hyperbilirubinemia was 70.73% and 22.22% respectively. Thus hyperbilirubinemia alone cannot be used as a diagnostic marker in acute appendicitis and appendicular perforation.

Serum bilirubin levels appear to be a promising new diagnostic laboratory (clinical jaundice was present in 12%) marker which when combined with thorough history taking and clinical examination can aid significantly to arrive to the diagnosis of acute appendicitis. Higher level of serum bilirubin ≥ 2mg/dl hints towards the increased chances of a particular perforation.

CONCLUSION

The present study suggests that serum bilirubin level estimation, a simple cheap and easily available test in every laboratory, can be added to the routine investigation list of clinically suspected case of acute appendicitis or perforated appendix for the confirmation of diagnosis. Serum bilirubin levels appears to be a promising new laboratory marker for diagnosing acute appendicitis, however diagnosis of appendicitis remains essentially still is clinical. Patients with clinical signs and symptoms of appendicitis and with hyperbilirubinemia higher than the normal range should be identified as having a higher probability of appendicular perforation, since the rise in serum bilirubin level was significantly higher in patients with appendicular perforation in the study. Serum bilirubin has a definite predictive potential in these cases suggesting, serum bilirubin levels have a predictive potential for the diagnosis of appendicular perforation. Therefore, obtaining serum bilirubin values upon admission can be used in conjunction with more modern diagnostic tests such as ultrasonography, CT scan to help determine the presence of perforation and thus aid in prompt clinical management. Serum bilirubin levels may be considered as one more positive factor for strong suspicion of appendicitis or perforated appendix in differential diagnosis of right iliac fossa pain.

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