



EVALUATION OF HYPERBILIRUBINEMIA IN PREDICTION OF APPENDICULAR PERFORATION AS A DIAGNOSTIC TOOL

General Surgery

Dr. Sangram Dabholkar

Resident, D.Y.Patil Hospital & Research Centre, Kolhapur, Maharashtra

Dr. R. R. Khayalpa*

M.S.(General Surgery), D.Y.Patil Hospital & Research Centre, Kolhapur, Maharashtra
*Corresponding Author

Dr. Abhinandan Kadiyal

M.S.(General Surgery), D.Y.Patil Hospital & Research Centre, Kolhapur, Maharashtra

Dr. Aniket Patil

M.S.(General Surgery), D.Y.Patil Hospital & Research Centre, Kolhapur, Maharashtra

ABSTRACT

Background: Acute appendicitis still remains mystery. In spite of tools like ultrasonography, & CT the failure rate of diagnosing appendicular perforation in cases of appendicitis is high. Acute appendicitis is most frequently encountered emergency.

Objectives: This study was done to find out whether appendicular perforation can be predicted by Serum Bilirubin level.

Material Methods: 166 patients diagnosed acute appendicitis or appendicular perforation were evaluated with LFT and Serum Bilirubin at D.Y.Patil hospital during 2016 to 2018 in an observational cross sectional study.

Results: Of 166 patients, 137(82.53%) were with Non-perforation Appendicitis, 14.6% & 85.4% had raised & normal bilirubin respectively, and of 29 with Appendicular Perforation 23(79.31%) & 6(20.69%) had raised & normal bilirubin levels respectively. Sensitivity & Specificity of Serum Total bilirubin as Diagnostic marker in Non-perforated & Perforated appendicitis was 79% & 85% respectively.

Conclusion: Serum total Bilirubin (Hyperbilirubinemia) looks like a convincing laboratory marker for prediction of appendicular perforation.

KEYWORDS

Acute Appendicitis; Appendicular perforation; Hyperbilirubinemia; Serum Bilirubin.

Introduction

Acute appendicitis still remains a mystery although we have made a great deal of progress in Radiological & Laboratory investigations. Clinical history, Physical examination and Laboratory findings help wise clinicians pin point diagnosis of Appendicitis 80% of the times³. Signs and symptoms vary in some cases especially in retrocaecal /retroileal appendix thus diagnosis may be done but conform diagnosis becomes difficult. Which in turn leads to postoperative complications (perforation/peritonitis if diagnosis is delayed) & Appendix found to be normal in 50% & 15-50 % of cases. about 50-90% acute appendicitis cases perforation is evidenced.

Ultrasonography is considered the backbone diagnostic tool in Appendicitis along with white blood cell count (WBC) and C-reactive protein (CRP) coupled with Clinical Diagnosis. Also scoring systems like Alvarado & Modified Alvarado are used. In spite of all the above techniques Appendicular perforation in Acute appendicitis still remains a Mystery. Thus need of the time is to have a Laboratory marker that can pin-point this diagnosis.

Total Bilirubin was reported to be raised recently in cases of acute appendicitis and appendicular perforation. Here Inflammation altered functions of liver is believed to be directly or indirectly caused by effecting hepatic blood flow (reaching via Superior mesenteric vein) by Pro-inflammatory like cytokines, IL6 and TNF-a in turn caused due to transmigration of bacteria and leukocytosis.

This study was thus intended to find a more convincing proof relating hyperbilirubinemia & Appendicitis to solidify hyperbilirubinemia as a Laboratory Diagnostic tool for appendicular perforation.

MATERIALS AND METHODS

The study was conducted in the Department of General Surgery, D.Y.Patil Hospital and research institute, Kolhapur during the period of September 2016 to September 2018.

Study design & period - A two years observational cross sectional study from September 2016 to September 2018.

Source of data - Patients admitted with diagnosis of acute appendicitis or appendicular perforation under the Department of Surgery D.Y.Patil Hospital and research institute, Kolhapur, during the study period.

Sample size - A total of 166 patients with clinical diagnosis of acute

appendicitis or appendicular perforation were studied.

Inclusion criteria

1. All patients diagnosed as acute appendicitis clinically on admission.
2. All patients diagnosed as appendicular perforation clinically on admission.
3. Patients giving consent for participation in study.

Exclusion criteria

- I) All patients documented to have a past history of-
 1. Jaundice or Liver disease.
 2. Chronic alcoholism
 3. Haemolytic disease.
 4. Acquired or congenital biliary disease.
- II) All patients with positive HBsAg.
- III) Patients with evidence of other G.I perforations
- IV) All patients with cholelithiasis.
- V) All patients with cancer of hepato-biliary system.

Procedure

Ethical clearance has been obtained from "Ethical Clearance Committee" of the institution for the study.

The following tests were carried out on admission.

1. Routine blood investigations (Complete blood count)
2. Liver Function Tests (LFTs) which include; Serum Bilirubin (Total and Direct bilirubin), Total protein, Serum albumin, Aspartate transaminase (AST), Alanine transaminase (ALT), Alkanine phosphatase (ALP).
3. Seropositivity for HbsAg
4. Urine analysis (routine and microscopy).
5. CRP

Method used to analyse serum bilirubin was Diazomethod, End point With BS 220 (Mindray) fully automated analyser.

Reference Ranges

Haemoglobin Male- 12-16gm % female- 11-14gm%

Total leucocytes count- 4,000-11,000/mm³

CRP- 0.2-3.0 mg/dl

Serum Bilirubin- Total 0.3 - 1.0 mg/dl

The results were grouped as "Normal" or "Raised" (hyperbilirubinemia \geq 1mg/dL) as per the above reference values.

RESULTS

A total of 166 patients with diagnosis of acute appendicitis without perforation or with appendicular perforation admitted in the Department of General surgery, D.Y.Patil Hospital and research institute, Kolhapur during September 2016 to September 2018 were studied.

123 patients (74%) of all 166 patients were found to have normal bilirubin levels (< 1.0 mg/dL), while 43 patients (24%) had raised bilirubin levels (≥1.0mg/dL).

Table 1 :Distribution of levels of serum total bilirubin in cases of acute appendicitis (non-perforated) and perforated appendicitis.

TOTAL BILIRUBIN	PERFORATED APPENDICITIS	ACUTE APPENDICITIS (NON-PERFORATED)
≥1.0 mg/dl	23(79.31%)	20(14.59%)
<1.0mg/dl	6(20.69%)	117(85.41%)
Total	29(100%)	137(100%)

Of 137 patients diagnosed as uncomplicated(non-perforated)acute appendicitis,20 patients (14.59%) had raised bilirubin levels (≥ 1.0 mg/dL), while the remaining 85.41 patients (85.41%) had normal levels (< 1.0 mg/dL).29 patients diagnosed as Appendicular perforation, 23 patients (79.31%) had raised bilirubin levels (≥1.0 mg/dL), while the remaining 6 patients (20.69%) had normal levels (<1.0 mg/dL).

Accuracy of serum bilirubin as a marker in predicting Appendicular perforation

Sensitivity and Specificity of serum bilirubin as a marker in predicting acute appendicitis(non-perforated) and Appendicular perforation was 79.31% and 85.40% respectively. Similarly the Positive predicative value and Negative predicative value for the same is 53.48% and 95.12% respectively.

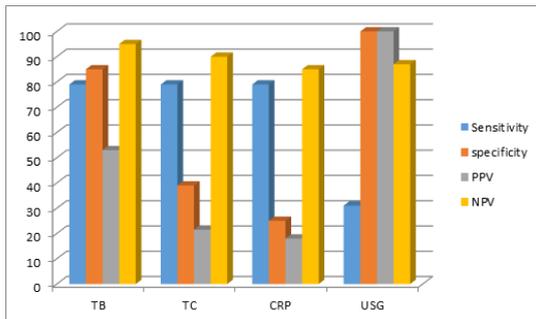
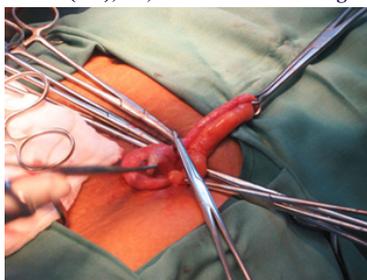


Fig 2:Comparison of sensitivity and specificity between Serum Total bilirubin level(TB),TC,CRP and USG findings



Picture 1: Open appendectomy

DISCUSSION

A new tool to help in the diagnosis of acute appendicitis and prediction of its complication would be welcome, to predict beforehand to go for open appendectomy in complicated appendicitis or laparoscopic appendectomy.

Serum Bilirubin level elevation may help in the accuracy of clinical diagnosis of acute appendicitis and more importantly help in foreseeing and preventing impending complications of acute appendicitis like perforation of appendix. This study was taken up with this thought is it possible to add increased serum bilirubin level as a new laboratory marker to aid in the prediction of an impending complication of acute appendicitis & perforation of appendix.

Importance of hyperbilirubinemia and its association in complicated appendicitis like appendicular perforation has being postulated recently. There are only a few case reports in the available literature that describe the finding of hyperbilirubinemia in patients of appendicular perforation.It is hypothesized that an association exists between hyperbilirubinemia and appendicular perforation.

In the present study of the 166 patients enrolled for the study, 123 patients (74%) had normal serum bilirubin levels (≤ 1.0 mg/dL). Estrada et al had found hyperbilirubinemia in 95(38%) of 175 patients studied with acute appendicitis. Difference in incidence of hyperbilirubinemia may be subject to inclusion of suppurative appendicitis cases in study.

In our study population of 166 patients, 137 patients (82.53%) were diagnosed as acute appendicitis pre-operatively while 29 patients (17.47%) 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,these findings were similar to Khan S. study at Nepalgunj medical college,Nepal during 200 -2007 and Sand et al.

Amongst the patients diagnosed with Acute appendicitis without perforation(n=137), 20 patients (14.59%) were found to have elevated serum bilirubin while 117 patients (85.41%) had normal serum bilirubin levels. In patients diagnosed with Appendicular perforation (n=29), 23 patients (79.31%) had serum bilirubin elevated while 6 patients (20.69%) had normal serum bilirubin levels.Thus, Hyperbilirubinemia was found in most of the patients diagnosed with Appendicularperforation (79.31%),Estrada et al and Sand et al had similar findings in there study.

The total leukocyte count was found elevated in 107 patients (64.45%) of the total 166 patients. Amongst the patients diagnosed with Acute appendicitis without perforation 84 patients were found to have elevated total leukocyte count while 53 patients had normal count. In patients diagnosed with Appendicular perforation (n=29), 23 patients had elevated total leukocyte count while 6 patients had normal levels.

Sensitivity of TLC was 79.31% in diagnosing appendicular perforation. These findings were similar to those in Estrada et al study, Khan S. study and Sand et al study.

On Ultrasonography, 119 patients were diagnosed as Acute appendicitis, 9 patients as Appendicular perforation and 38 patients were reported as inconclusive ultrasonographic findings. Ultrasonography per-se was 31% sensitive for Appendicular perforation, hence Ultrasonography is not a helpful tool in diagnosing perforation. Similar findings were obtained in Khan S.,Estrada et al study and in study by Sand et al.

Hence, we see that patients with Appendicular perforation had higher levels of serum bilirubin as compared to that of acute appendicitis. So we infer that, patients with features suggestive of appendicitis with higher values of serum bilirubin, are more suspicious of having Appendicular perforation than those with normal.

Sand et al in his study found the mean serum bilirubin levels in patientswith Appendicular perforation to be significantly higher than those with a non-perforated appendicitis.

Sensitivity and Specificity of Serum Total bilirubin in predicting appendicular perforation was 79.31% and 85% respectively. Similarly Positive predictive value and Negative predicative value of serum bilirubin in predicting acute appendicular perforation diagnosis was 53% and 95% respectively. 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:

Present study was undertaken to assess relationship between hyperbilirubinemia and complicated acute appendicitis and to see whether elevated bilirubin levels have a predictive potential for the diagnosis of Appendicular perforation. As shown in results the patients diagnosed with Acute appendicitis without perforation, 20 patients were found to have elevated serum bilirubin while 117 patients had normal serum bilirubin levels. In patients diagnosed with

Appendicular perforation, 23 patients (79.31%) had bilirubin elevated while 6 patients had normal levels.

Thus, Hyperbilirubinemia was found in most of the patients diagnosed with Appendicular perforation (79.31%). Thus the present study concludes that- Diagnosis of appendicitis remains essentially clinical, however Hyperbilirubinemia appears to be a promising new laboratory marker for predicting complicated acute appendicitis.

Patients with clinical signs and symptoms of appendicitis with hyperbilirubinemia should be identified as having a higher probability of appendicular perforation. Hyperbilirubinemia may help in prediction of complication such as Perforation of appendix and would be helpful investigation in decision making for surgical plan of the patient.

In spite of statistically significant results in favor of relation between Hyperbilirubinemia and appendicular perforation, study needs to be carried on Large scale and in different regions races and strata to make hyperbilirubinemia As a predictive tool for appendicular perforation widely acceptable.

REFERENCES

1. "Evaluation of hyperbilirubinemia as an innovative diagnostic marker for acute appendicitis and its role in the prediction of appendicular perforation" International surgery journal, vol4 no.5(2017) Veerabhadra Radhakrishna, S.M Patil, Rajshekhar S. Patil
2. Estrada et al study, Khan S. study at Nepalgunj medical college, Nepal during 2005-2007 and Sand et al study.
3. Sand et al in his study found the mean serum bilirubin levels in patients with Appendicular perforation to be significantly higher than those with a non-perforated appendicitis.
4. O'Connell PR. "The Vermiform Appendix". In: Williams NS, Bulstrode CJK, O'Connell PR (Ed.), Bailey and Love's - Short practice of surgery. 26 ed. London: Arnold; 2013; p. 11200-10.
5. Smink DS, Soybel DI. "Appendix and Appendectomy". In: Zinner MJ, Stanelly W (eds) Maingot's abdominal operations. 12th ed. Ashely: McGraw Hill; 2012. p. 500-650.
6. John Maa. "The Appendix". In Townsend CM, Beauchamp RD, Evers BM, Mattox KL, eds. Sabiston Textbook of Surgery. 20th ed. Philadelphia, Pa: Saunders Elsevier; 2016. p: 1333-1347.
7. Bernard M. Jaffe and David H. Berger. "The Appendix". In Brunicaudi F, Andersen D, Billiar T, Dunn D, Hunter J, Matthews J, et al. Schwartz's Principles of Surgery. 10th ed. New York: McGraw Hill; 2014. p. 1073-1092.