

The Diagnostic Value of Bilirubin in Acute Appendicitis

Ravindra Nath Singh^a, Jayanth D.H.^a, Udaya Shankar^b, Arjun C.^c

^aAssistant Professor ^bProfessor ^cPost Graduate, General Surgery, MVJ Medical College and Research Hospital, Hoskote, Karnataka 562114, India.

Abstract

Acute appendicitis is the commonest cause of "Acute abdomen". Appendicectomy is the most frequently performed emergency operation. The aim of this study is to determine the diagnostic accuracy of the total bilirubin in acute and perforated appendicitis as well as its value in excluding the condition. The study is a prospective study. This study was performed on 100 patients who have been clinically diagnosed of having acute appendicitis and who were posted for emergency appendicectomy have been clinically and radiologically diagnosed of acute appendicitis. Out of 100 patients, 52 were males and 48 are females, so male predominance is seen in the present study.

Appendicitis is common in the age group of 21 - 30 years and <20 years in this study. Appendicitis reaches its peak incidence in the teens and early 20's. Clinical diagnosis was found to be correct in 88% of cases and hence the rate of negative laprotomies for acute appendicitis in our study is 12%. Patients presenting with elevated levels of serum bilirubin in the context of right iliac fossa pain warrant early surgical intervention. The diagnosis of acute appendicitis, however remains multifactorial and such test simply help to guide the surgeon in the decision making process.

Keywords: Acute Appendicitis; Acute Abdomen; Appendicectomy; Laprotomy.

Corresponding Author: Arjun C., Post Graduate, General Surgery, MVJMC & RH, Hoskote, Karnataka, India.
E-mail: dr.arjun.c001@gmail.com

Received on 02.05.2017, Accepted on 26.05.2017

Introduction

Appendicitis is one of the common causes of abdominal pain. Acute appendicitis with clinical manifestations may simulate almost any other acute abdominal conditions and in turn may be mimicked by a variety of conditions. So its diagnosis is established by surgeon's clinical impression depending on presenting history, clinical evaluation and laboratory tests. It is estimated that the accuracy of clinical diagnosis of acute appendicitis is lying between 76% to 92%. Therefore normal appendices unnecessarily removed remains high (15%-30%) despite several techniques. On one hand, a normal appendix at appendicectomy represents a misdiagnosis, on the other hand, a delayed diagnosis of appendicitis may lead to increased mortality and morbidity (perforation and peritonitis). Equally distressing is the fact that perforation may occur in up to 35% of Cases.

So traditionally, surgeons have accepted a higher incidence of unnecessary appendicectomies in order to decrease the incidence of perforation. This approach is being increasingly questioned in today's era of evidence based medicine. The high rate of negative explorations for appendicitis is a burden faced not only by the general surgeon, but also the patient and the society as a whole, since appendicectomy, like any other operation, results in socio-economic impacts in the form of hospital expenses, lost working days, and declined productivity. So the goal of surgical treatment is removal of an inflamed appendix before perforation with a minimal number of negative appendicectomies.

Although the overall mortality from appendicitis

has dropped from about 26% to less than 1% with the advent of antibiotics and early surgical intervention, in elderly it is approximately 5 to 15%. The morbidity due to appendiceal perforation ranges from 17% to 40%. The perforation rate is higher in elderly and children. Failure to make an early diagnosis converts acute appendicitis to perforated appendicitis, a disease with potential complications including intra abdominal abscesses, wound infection and death. The negative laparotomy rate ranges from 15% to 35% and is associated with significant morbidity. The negative laparotomy rate is significantly higher in young women (up to 45%) because of prevalence of pelvic inflammatory disease (PID) and other common obstetrical and gynecological disorders.

To conclude as acute appendicitis may simulate many other acute abdominal conditions/illnesses, and despite intensive clinical research and discussion, the diagnosis of acute appendicitis still remains a challenge. And the exact diagnosis is important for proper management. The aim of this study is to determine the diagnostic accuracy of Total Bilirubin in acute and perforated appendicitis as well as their value in excluding the condition.

Objectives of the Study

To study and analyze the diagnostic value of bilirubin levels in cases of acute appendicitis and its complications.

Methodology

Source of Data

This study was performed on 100 patients who have been clinically diagnosed of having Acute Appendicitis and who were posted for emergency appendicectomy in General Surgery Department of MVJ. Hospital and Research Center, Bangalore, during the period from 1st January 2013 to 31st July 2015.

Sample Size

100 cases.

Study Design

The study will be prospective study.

Inclusion Criteria

- All clinically and radiologically diagnosed cases

of acute appendicitis and its complications.

Exclusion Criteria

- Patients with hepatic disorders.
- patients with a history of alcohol intake with AST/ALT >2.
- A history of hepatotoxic drug intake.
- HBsAg positive and /or those with a past history of jaundice.
- Concomitant conditions where CRP/Leukocyte count/Neutrophil count is elevated in acute appendicitis patients with associated diseases like;
 - a. Rheumatoid arthritis
 - b. SLE
 - c. Glomerular nephritis
 - d. Gout

The method of study consists of

Clinical diagnosis of acute appendicitis was done by in the Department of Surgery, based on symptoms of pain, migration, nausea and vomiting, anorexia, fever and signs of peritoneal inflammation like right iliac fossa tenderness, rebound tenderness and guarding. Once acute appendicitis was suspected, patient was subjected to routine investigations as per the hospital protocol. Urine microscopy was performed in all cases. Elderly patients were subjected to further investigations as part of pre-anaesthetic work up including X-ray chest, ECG etc. Total bilirubin was done in all cases. Total bilirubin more than >1mg was considered positive. Ultrasonography of abdomen was done in most of the cases to confirm diagnosis and rule out other causes of pain abdomen. Patients with strong suspicion of acute appendicitis were advised emergency appendicectomy. After obtaining consent, patient was operated, and the appendicectomy specimen was sent for histopathological examination.

The histopathology report was considered as the final diagnosis.

The histopathologically positive cases among Total Bilirubin positive group were considered true positives. The histopathologically negative cases in the same group were considered as false positives. The histopathologically positive cases among CRP negative group were considered false negatives. The histopathologically negative cases in the same group were considered as true negatives. The evaluation of total bilirubin in the diagnosis of acute appendicitis is done as follows.

Test	HPE	
	Positive	Negative
Positive	a	b
Negative	c	d

The patients were meticulously monitored in the post-operative period for any complications. All patients were followed up in the outpatient department for a period of two months. The case study was done as per a detailed proforma which is shown in the annexure. The hospital ethical committee clearance was obtained prior to undertaking the study.

Results

The Sensitivity, Specificity, Positive predictive

value, Negative predictive value were 60%, 66.6%, 92.9% and 18.6% respectively. All patients were found to have SGOT and SGPT within the normal range, thus excluding any associated liver pathology (Exclusion criteria).

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.

Khan et al (2008), in his study said that elevated total serum bilirubin good indicator of acute appendicitis. The specificity and sensitivity of elevated total serum bilirubin was 100% and 82.07% respectively with a predictive value for positive test 100%. If total serum bilirubin is added to already existing laboratory tests, then the diagnosis of acute appendicitis in clinically suspected cases can be made with fair degree of accuracy and unnecessary or delay in surgery can be avoided.

Table 1: Age distribution of patients studied

Age in Years	No. of Patients	%
10-20	37	37.0
21-30	40	40.0
31-40	14	14.0
41-50	6	6.0
>50	3	3.0
Total	100	100.0

Table 2: Gender distribution of patients studied

Gender	No. of Patients	%
Female	48	48.0
Male	52	52.0
Total	100	100.0

Table 3: Histopathology correlation

Histopathology	Gender		Total
	Female	Male	
Normal appendix	8(16.7%)	4(7.7%)	12(12%)
Inflamed appendix	32(66.7%)	38(73.1%)	70(70%)
Gangrenous appendix	4(8.3%)	5(9.6%)	9(9%)
Perforated appendix	4(8.3%)	5(9.6%)	9(9%)
Total	48(100%)	52(100%)	100(100%)

P=0.597, Not significant, Chi-Square test

Evaluation of the role of total bilirubin in diagnosis

Of acute appendicitis by correlation with hpe reports

Out of 100 patients of acute appendicitis 57 had Raised Total bilirubin, rest 43 patients had normal Total bilirubin.

Table 4: Role of Total Bilirubin

Total bilirubin	HPE	
	Positive	Negative
Positive	53	4
Negative	35	8

Table 5: Comparison of role of total bilirubin in diagnosis of acute appendicitis with other studies

	Sensitivity	Specificity	Predictivevalueofpositivetest	Predictivevalueofnegativetest
Yahya et al	45.9	80.3	93.7	19
Khan etal	100	82.7	-	-
Salmath khanetal	50	77	-	-
Chambers etal	69	69	-	-
Yangetal	-	-	-	-
Presentstudy	60%	66.6%	92.9%	18.6%

Sensitivity	60%
Specificity	66%
Positive Predictive Value	92%
Negative Predictive Value	18%

Conclusion

This study highlights the value of blood markers in the diagnosis of Acute Appendicitis and its complications. This is particularly important in the patients with equivocal symptoms or in female patients with a differential diagnosis of gynecological pathology. Furthermore, it highlights the importance of Hyperbilirubinemia in the diagnosis of Appendicitis.

The diagnosis of Acute Appendicitis, however remains multifactorial and such test simply help to guide the surgeon in the decision making process. Patients presenting with elevated levels of serum Bilirubin in the context of right iliac fossa pain warrant early surgical intervention.

References

- Shakhatresh HS. The accuracy of C-reactive protein in the diagnosis of acute appendicitis compared with that of clinical diagnosis. *Med Arh* 2000;54(2):109-10.
- Oosterhuis WP, Zwinderman AH, Teeuwen M, Van Andel G, Oldenzijl H, Kerkhoff JF et al, C reactive protein in the diagnosis of acute appendicitis, *Eur J Surg* 1993 Feb;159(2):115-9.
- Khan MN, Davie E, Irshad K. The role of white cell count and c reactive protein in the diagnosis of acute appendicitis. *Journal of Clinical and Diagnostic Research*. 2009 August;13:1647-1652.
- Yahay A, Al -Abed Naseer Alobaida. Diagnostic markers in acute appendicitis. *The American journal of surgery* 2014:64-67.
- Dueholm S., Bagi P., Bud M. Labrotary aid in the diagnosis of acute appendicitis. A blinded, prospective trial concerning diagnosis value of leucocyte count, neutrophil differential count and c reactive protein. *Dis colon rectum* 1989.
- Marchand A, Van lente F, Galen RS .The assessment of labrotary tests in the diagnosis of acute appendicitis. *Am J Clin Pathol* 1983 sep;80(3):369-74.
- Hoffmann J, Rasmussen O. Aids in the diagnosis of acute appendicitis *Br.J.Surg.* August 1989;76:774-9.
- Peltola H, Ahlquist J, Rapola J, Rasanen J, Louhimo I, Saarinen m et al. C reactive protein compared with white blood cell count and erythrocyte sedimentation rate in the diagnosis of acute appendicitis in children. *Acta Chir Scand*. 1986 Jan;152:55-8.
- Pieper r.Kager L et al Obstruction of the appendix vermiformis causing acute appendicitis an experimental study in the rabbit. *Acta Chir Scand*. 1982:148:63.