

ORIGINAL RESEARCH

A prospective study to establish Hyperbilirubinemia as a predictor of gangrenous/perforated appendicitis

¹Dr.Sahil Khajuria¹, Dr. Rohit Goel², Dr. Nair Furqan³

¹Lecturer Department of Surgery, Government Medical College, Jammu J&K.

²Registrar, Department of Surgery, Government Medical College, J&K

³Post Graduate, Department of Surgery, Government Medical College, J&K

Corresponding author

Dr. Rohit Goel

Registrar, Department of Surgery, Government Medical College, J&K

Received: 12 March, 2023

Accepted: 18 April, 2023

Abstract

Background: Approximately 6% of the population suffers from acute appendicitis during their lifetime; therefore, much effort has been directed toward early diagnosis and intervention. Hence, the present study was conducted to establish Hyperbilirubinemia as a predictor of gangrenous/perforated appendicitis.

Material & Methods: The present cohort, prospective study was conducted among 30 cases of acute appendicitis over a period of two years. Patients of age between 15 to 65 were included in the study. Patients were clinically evaluated, routine examination was performed and the investigations were done. These cases were operated and clinical diagnosis was confirmed per-operatively and post-operatively by histopathological examination. Their clinical and investigative data were compiled and analyzed.

Results: In the present study, 83.33% cases were male and 16.66% were female. Maximum cases belong to age group 15-25 years. Among 30 cases clinically diagnosed as acute appendicitis preoperatively, 24 had acute appendicitis, 2 had gangrenous appendix, 4 cases had perforated appendix and no patient had normal appendix. According to histopathology, 80% cases were negative in which acute appendicitis with no perforation or gangrene was present and in 20% cases were positive in which acute appendicitis with perforation or gangrene was present.

Conclusion: The study concluded that total serum bilirubin was found to be significantly increased in case of gangrenous/perforated appendicitis.

Keywords: Gangrenous/perforated appendicitis, total serum bilirubin, histopathological examination.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Introduction

Hyperbilirubinemia has also been found during some infective diseases involving organs other than liver.¹ Neonates are more susceptible to develop hyperbilirubinemia following gram-negative bacterial infections. Severe intra-abdominal infection in adults has also been associated with development of hyperbilirubinemia.² Appendicitis is one of the commonest causes of abdominal pain requiring emergency surgery. Often, it is difficult to reach a proper diagnosis.³ Various scoring systems, such as the Alvarado score, have been suggested for appendicitis, based on clinical features, physical examination, and

laboratory data.⁴ However, the classical symptoms and signs of appendicitis may sometimes be absent, making it difficult to reach a definite diagnosis.⁵ 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.⁵ The Gram-negative bacteria secretes endotoxin which is absorbed in portal circulation and is responsible for damaging hepatocytes thereby raising serum bilirubin levels.⁶ Elevated serum bilirubin level can help in the early diagnosis of acute appendicitis and in predicting its serious complications,

most importantly the perforation.⁷Hence, the present study was conducted to establish Hyperbilirubinemia as a predictor of gangrenous/perforated appendicitis.

Material & Methods

The present cohort, prospective study was conducted among 30 cases of acute appendicitis over a period of two years. Before the commencement of the study, ethical clearance was taken from the ethical committee of the institute and informed consent was taken from the participants after explaining the study to them. Patients of age between 15 to 65 were included in the study. Patients in which appendectomy performed incidentally or for other indications; age below 15 years; patients with appendicular lump; history of alcoholic liver disease; hemolytic or liver diseases associated with hyperbilirubinemia; history of gastrointestinal or hepatopancreatobiliary malignancy in the past were excluded from the study. Patients were

clinically evaluated by detailed history, routine examination was performed and the investigations were done. For these investigations blood samples were drawn within half an hour of presentation. Determination of Serum Bilirubin was done with photometric testing using 2,4-dichloroaniline. These cases were operated and clinical diagnosis was confirmed per-operatively and post-operatively by histopathological examination. Final histopathological examination was considered as a gold standard for diagnosing and categorizing patients as having normal appendix, acute appendicitis and acute appendicitis with perforation and/or gangrene. Their clinical and investigative data were compiled and analyzed. Based on histopathological examination patients were categorized as negative (acute appendicitis without perforation or gangrene) and positive (acute appendicitis with perforation and/or gangrene).

Results

Table 1: Demographic characteristics

Variable	N(%)
Gender	
Male	25(83.33%)
Female	5(16.66%)
Age groups(yrs)	
15-25	15(50%)
26-35	10(33.33%)
36-45	3(10%)
46-55	1(3.33%)
56-65	1(3.33%)

In the present study, 83.33% cases were male and 16.66% were female. Maximum cases belong to age group 15-25 years.

Table 2: Distribution of the cases according to level of total serum bilirubin (SB)

	Total serum bilirubin		Total
	< 1.2 mg/dL	> 1.2 mg/dL	
acute appendicitis	6(20%)	18(60%)	24(80%)
gangrenous appendix	0(0%)	2(6.66%)	2(6.66%)
Perforated appendix	0(0%)	4(13.33%)	4(13.33%)
Normal appendix	0(0%)	0(0%)	0(0%)

Among 30 cases clinically diagnosed as acute appendicitis preoperatively, 24 had acute appendicitis, 2 had gangrenous appendix, 4 cases had perforated appendix and no patient had normal appendix.

Table 3: Distribution of the cases according to histological examination

Histopathology	N(%)
Negative (acute appendicitis with no perforation or gangrene)	24(80%)
Positive (acute appendicitis with perforation and/or gangrene)	6(20%)

According to histopathology, 80% cases were negative in which acute appendicitis with no perforation or gangrene was present and in 20% cases were positive in which acute appendicitis with perforation or gangrene was present.

Discussion

Simple appendicitis (phlegmonous or catarrhal) can be cured by appendectomy, complicated appendicitis (perforated or gangrenous) may cause complications such as bacterial peritonitis, urinary disorders, small bowel obstruction, or intra-abdominal abscess formation. These complications may become life-threatening, thus highlighting the need for a correct diagnosis and early treatment.^{8,9}In the present study, 83.33% cases were male and 16.66% were female. Maximum cases belong to age group 15-25 years. Among 30 cases clinically diagnosed as acute appendicitis preoperatively, 24 had acute appendicitis, 2 had gangrenous appendix, 4 cases had perforated appendix and no patient had normal appendix. According to histopathology, 80% cases were negative in which acute appendicitis with no perforation or gangrene was present and in 20% cases were positive in which acute appendicitis with perforation or gangrene was present. Atahan et al. concluded that the assessment of preoperative total bilirubin is useful for the differential diagnosis of perforated versus acute suppurative appendicitis, whereas a white blood cell (WBC) assessment is effective for diagnosing the presence versus absence of appendicitis. Symptom duration, WBCs, and total bilirubin should be used as independent parameters in the early diagnosis of appendix perforation.¹⁰RamasamyRamu T et al concluded that Hyperbilirubinemia with bilirubin levels more than 1.3 mg% are highly predictive of appendicular perforation and, hence, aid in prompt diagnosis. This can be combined with a clinical diagnosis and imaging for an accurate and precise diagnosis.¹¹Chaudhary P et al concluded that Serum bilirubin is an important adjunct in diagnosing the presence of gangrenous/perforated appendicitis.³Bakshi S, et al concluded that Serum bilirubin level estimation, which is a simple, cheap and easily available laboratory test, can be added to the routine investigations in clinically suspected cases of acute appendicitis for early diagnosis of complications.¹²

Conclusion

The study concluded that total serum bilirubin was found to be significantly increased in case of gangrenous/perforated appendicitis.

References

1. Whitehead MW, Hainsworth I, Kingham JG. The causes of obvious jaundice in South West Wales: perceptions versus reality. *Gut*. 2001;48(3):409–13
2. Kumari S, Bhatnagar S, Khanna C, Sethi T, Mullick DN. Neonatal jaundice: association with neonatal septicemia. *Indian Pediatr*. 1987;24(5):433–5.
3. Chaudhary P, Kumar A, Saxena N, Biswal UC. Hyperbilirubinemia as a predictor of gangrenous/perforated appendicitis: a prospective study. *Annals of gastroenterology: quarterly publication of the Hellenic Society of Gastroenterology*. 2013;26(4):325.
4. Alvarado A. A practical score for the early diagnosis of acute appendicitis. *Ann Emerg Med* 1986; 15: 557–564.
5. Son CS, Jang BK, Seo ST, et al. A hybrid decision support model to discover informative knowledge in diagnosing acute appendicitis. *BMC Med Inform Mak* 2012; 12: 17.
6. Estrada JJ, Petrosyan M, Barnhart J, et al. Hyperbilirubinemia in appendicitis: a new predictor of perforation. *J Gastrointest Surg* 2007 Jun;11:6:714–718.
7. Saxena D, Tandon M, Shah Y, Gedam BS. Hyperbilirubinemia as a diagnostic tool for the prediction of appendicular perforation: a prospective study. *Euroasian Journal of Hepato-Gastroenterology*. 2015 Jul;5(2):87.
8. Son CS, Jang BK, Seo ST, et al. A hybrid decision support model to discover informative knowledge in diagnosing acute appendicitis. *BMC Med Inform Mak* 2012; 12: 17
9. Eren T, Rombalak E, Ozemir IA, et al. Hyperbilirubinemia as a predictive factor in acute appendicitis. *Eur J Trauma Emerg Surg* 2016; 42: 471–476
10. Atahan K, Üreyen O, Aslan E, et al.: Preoperative diagnostic role of hyperbilirubinaemia as a marker of appendix perforation. *J Int Med Res*. 2011, 39:609-618. 10.1177/147323001103900230
11. RamasamyRamu T, ChinnakkulamKandhasamy S, Andappan A, et al. (August 27, 2018) A Prospective Study on the Diagnostic Value of Hyperbilirubinemia as a Predictive Factor for Appendicular Perforation in Acute Appendicitis. *Cureus* 10(8): e3214. doi:10.7759/cureus.3214
12. Bakshi S, Mandal N. Evaluation of role of hyperbilirubinemia as a new diagnostic marker of complicated appendicitis. *BMC gastroenterology*. 2021 Dec;21:1-6.