

Research article

Liver function test as a marker for acute appendicitis

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ABSTRACT

Background and Objectives: Acute appendicitis is one of the commonest surgical emergencies of the abdomen worldwide. Even with the availability of current imaging investigation like USG , CT scan and MRI, the diagnosis is still a problem. Delay in diagnosis increases mortality and morbidity. Liver function test is one of the biochemical parameters being assessed as a marker of acute appendicitis and may also predict the severity of the inflammation. However the available literature is limited and views are conflicting. In this study, it is proposed to assess the validity of using liver function test to predict the appendicitis and its severity.

Material and Methods: This is a prospective study of 80 cases of operated patients of acute appendicitis in Universal College Of Medical Sciences, Bhairahawa, Nepal during the period from 6th May 2013 to 6th July 2014. Data were collected from the patient by their clinical history, examination and investigations, Liver function test and ultrasound. Post operative follow up was done to note for complications and histopathology findings. Data collection was compiled in a systemic way in preformed proforma and analyzed.

Results: Out of 80 patients, 44(55%) were male and 36(45%) were female. Total serum bilirubin was elevated in 29 (36.25%) of the patients. Rise in serum bilirubin was mixed type with direct bilirubin Predominance. In Liver enzymes ALT, AST, ALP were raised in 32.5%, 28.75% and 82.5% respectively. Hyperbilirubinemia has the specificity (80 %) sensitivity (37.33%) with good positive predictive value of 96.55%. Similarly sensitivity and specificity of direct bilirubin (90.67%, 20.00%), Indirect bilirubin (16.00%, 80%), AST/SGOT (30.67%, 100%), ALT/SGPT (34.67%, 100%) ALP (84.00%, 40%) respectively. The positive predictive value for direct bilirubin, indirect bilirubin, AST/SGOT, ALT/SGPT and ALP are 94.44%,92.31%,100%,100% and 95.45% respectively.

Conclusion: Liver function test is a marker for acute appendicitis and its complication with a good positive predictive value. Liver function test should be used together with clinical examination and other laboratory investigations in the assessment of patients with suspected acute Appendicitis.

Key words: Acute appendicitis, Liver function test,

INTRODUCTION

Acute Appendicitis is one of the most common surgical emergencies with life time

prevalence rate of approximately one in seven [1]. The incidence is 1.5 - 1.9 per 1000 in the population and is approximately 1.4 times greater in men than in women [2]. The

diseases occurs at all ages but is most frequent in the 2nd and 3rd decades of life [3].

Though most commonly performed surgery of the abdomen, it is still difficult to diagnose thereby leading to high negative appendectomy rate with the delayed diagnosis depending on clinical acumen alone leads to increased mortality and morbidity [4-6]. Diagnosis of acute appendicitis remains a surgical dilemma, with negative appendectomy rates of 5% to 40% and perforation suggestive for late operative intervention in 5% to 30% [7]. Many surgeons will accept a certain rate of negative laparotomy in order to avoid missing an inflamed appendix and its complications like perforation [8].

The higher awareness about diseases and its complications, higher access to health care and health insurance in the developed countries has shown fewer complications of the appendicitis with early detection and surgery following acute symptoms. But the situation is different in developing nations where poverty, illiteracy and high cost of medical treatment make them slow to report to health facility leading to high complications [9].

Appendicitis is notorious in its ability to simulate other conditions and in the frequency it can be mimicked by other pathological conditions. The diagnosis of acute appendicitis is based purely on clinical history and examination combined with minimal laboratory investigations such as elevated white cell count. Despite being a common problem diagnosis of the acute appendicitis remains difficult to establish, particularly among the young, the elderly and females of reproductive age, where a lots of

other genitourinary and gynaecological inflammatory conditions can present with signs and symptoms that are similar to those of acute appendicitis [10]. CT scan is a reliable diagnostic modality but has limitations like increased radiation and cost. No reliable specific marker for acute appendicitis has been identified. Even none of the clinical or laboratory test is able to reliably predict acute appendicitis. Therefore much interest exists in finding ways to diagnose and estimate the extent of acute appendicitis before relying on radiological test [11]. A simple cheap biochemical test that is specific for acute appendicitis useful in conjunction with clinical finding in predicting diagnosis of appendicitis or appendicitis with its complication needs to be evaluated for surgical decision [12, 13].

Liver function test is one of the biochemical parameters being assessed as a marker of acute appendicitis and may also predict the severity of the inflammation. However the available literature is limited and views are conflicting. In this study, it is proposed to access the validity of using liver function test to predict the appendicitis and its severity.

MATERIALS AND METHODS

This is a prospective analytical study of 80 cases of operated patients of acute appendicitis in Universal College Of Medical Sciences, Bhairahawa, Nepal during the period from 6th May 2013 to 6th July 2014. The cases were selected by following selection criteria.

Selection criteria

Inclusion Criteria

1. All operated patients of acute appendicitis.

2. All patients who agreed to participate in study and given a written consent.

Exclusion Criteria

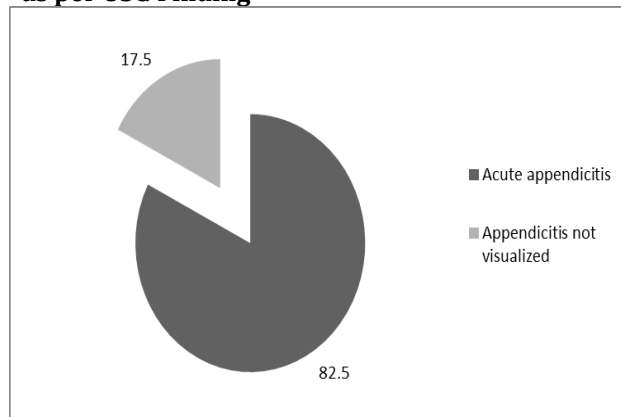
1. Documented biliary, Hemolytic or liver disease.
2. History of jaundice.
3. History of alcoholism.
4. History of blood transfusion and hepatotoxic medication

Data were collected on preformed proforma during the stay in the hospital from the patient by their clinical history; examination and investigations including liver function test and ultrasound. Post operative follow up was done to note for complications and histopathology findings. Data collection was compiled in a systemic way in preformed proforma and analyzed using SPSS ver. 20. The major focus was on liver function test (unconjugated bilirubin, conjugated bilirubin, alkaline phosphatase, SGOT, SGPT) acute appendicitis and its histology.

RESULTS

A total of 80 patients were enrolled for the study that had been operated for Acute Appendicitis. Out of 80 cases studied, 44 cases (55%) were males and females accounting for 36 cases (45%).

Fig no 1: Diagram showing distribution of case as per USG Finding



Male to Female ratio was 1.22:1. The Age group most commonly involved was 11-20 years followed by 21-30 years. The minimum age is 8 years and maximum age is 70 years.

All 80 patients were subjected for ultrasound examination, out of which 66 case showed acute appendicitis where as in 14 cases appendix was not visualized (Fig 1). Table 1 reveals the descriptive statistics of liver function tests among 80 patients.

Table 1 showing descriptive statistics of Liver Function Test (LFT)

LFT	Mean ± SD	Min	Max
Total Bilirubin	1.15 ± 0.57	0.3	3
Direct Bilirubin	0.56 ± 0.32	0.1	1.6
Indirect Bilirubin	0.58 ± 0.31	0.2	1.7
SGOT/AST	42.06 ± 34.17	10	223
SGPT/ALT	32.89 ± 32.08	6	272
ALP	239.34 ± 89.55	80	570

Figure 2: showing histopathological findings

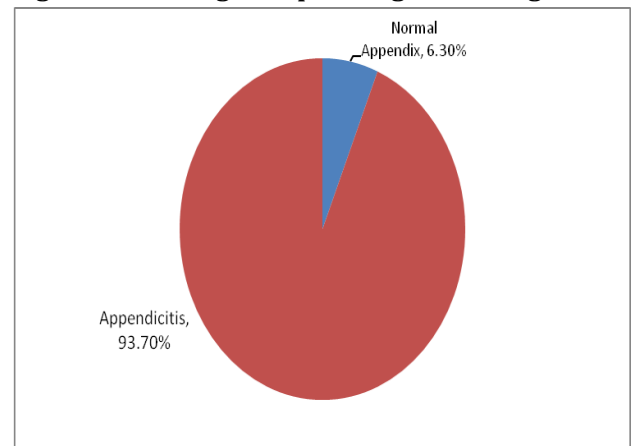


Figure 2 depicts distribution of histopathological findings. Normal appendix was seen in 5 cases (6.3%),(n=80) where as 75 (93.7%) cases were of appendicitis.

Table 3: Liver Function Test and Histopathology (Appendicitis and Normal Appendix) in cross tabulation

Liver function Tests	Histopathology		Total	Sensitivity/Specificity/ Positive Predictive value
	Appendicitis	Normal Appendix		
Total Bilirubin				
Elevated	28	1	29	Sensitivity=37.33%, Specificity=80%, Positive Predictive value =96.55
Normal	47	4	51	
Total	75	5	80	
Direct Bilirubin				
Elevated	68	4	72	Sensitivity=90.67%, Specificity=20%, Positive Predictive value =94.44
Normal	7	1	8	
Total	75	5	80	
Indirect Bilirubin				
Elevated	12	1	13	Sensitivity=16%, Specificity=80%, Positive Predictive value =92.31
Normal	63	4	67	
Total	75	5	80	
SGOT/AST				
Elevated	23	0	23	Sensitivity=30.675%, Specificity=100%, Positive Predictive value =100
Normal	52	5	57	
Total	75	5	80	
SGPT/ALT				
Elevated	26	0	26	Sensitivity=34.67%, Specificity=100%, Positive Predictive value =100
Normal	49	5	54	
Total	75	5	80	
ALP				
Elevated	63	3	66	Sensitivity=84%, Specificity=40%, Positive Predictive value =95.45
Normal	12	2	14	
Total	75	5	80	

Serum Total Bilirubin: <=1.1Normal, >1.1Elevated
Serum direct Bilirubin: <=0.2mg Normal, >0.2mg Elevated
Indirect Bilirubin : <=0.9U/L Normal, >0.9U/L Elevated
Liver Enzymes: SGOT/AST<=40U/L Normal, >40U/L Elevated
Liver Enzymes: SGPT/ALT<=35U/L Normal, >35U/L Elevated
Liver Enzymes: ALP

DISCUSSION

In current study, ultrasonography was positive for acute appendicitis in 66

patients (82.5%). This value is similar to that found by Lohani B et.al [14].

Normal appendix was seen in Histopathological findings of 5 cases (6.3%) out of 80 cases. This is less with observations of M. Sand et. al. who reported 12.45% (67 out of 538) of normal appendix [15]. Dhakal et. al. reported 22.7% of case of negative appendectomy [6]. But more than that of reported by Subedi et. al. 1.4% (5 case) of normal appendix in histopathological finding out of 345 case [16].

The Present study has shown male preponderance with 55% case of Acute Appendicitis with male to female ratio of 1.2:1. Similar observation of male preponderance with ratio of 1.7:1 were also made by one of the hospital based study done in Nepal [17].

In current study, serum bilirubin raised in 36.25% (29 cases) i.e more than 1/3rd of case of Acute Appendicitis. It ranged from 0.3mg/dl to 3mg/dl and median is 1.11mg/dl. Conjugated bilirubin raised in 72 (90%) case where as serum unconjugated bilirubin raised on 13(16.75%). In, hyperbilirubinemia, conjugated type is predominant. Estrade et al. had also shown hyperbilirubinemia 59(38%) of 157 patients i.e 1/3rd of case of Acute Appendicitis [18]. Andrew Emmanuel et.al. showed 30% of patients of hyperbilirubinemia in case of simple acute appendicitis [11].

Also, observation of hyperbilirubinemia of 24.9% of patients, range 0.1-4.3 mg/dl, median 0.7mg/dl reported by Sand, et.al. [15]. Similarly, Kaser et al. also have shown 38% case of hyperbilirubinemia in case of acute appendicitis [19]. Whereas Young et.al [20] showed less than current study 17.66% (211 patients out of 1,195) case of acute appendicitis had raised

bilirubin. Khan (2008) found serum bilirubin raised in majority of cases 86.60% of patients. Hyperbilirubinemia was of mixed type and also predominantly of conjugated type [21]. Mahammad et.al. showed 57.70% i.e. 41 in 71 of patients had raised serum bilirubin. [22].

The present study has shown sensitivity, specificity, positive predictive value of total bilirubin 37.33%, 80.00%, 96.55% respectively in case of appendicitis with direct bilirubin had higher sensitivity than direct bilirubin. Similar very close observation was showed by Andrew Emmannel et. al. i.e. total bilirubin sensitivity 30%, specificity 88% and positive predictive value 91%. [11]. Also, Kaser et al. showed total bilirubin sensitivity 38%, specificity 78%, positive Predictive value 32% [19], where as Young et. al. showed bilirubin sensitivity 55.92% and specificity 66.11% [20].

Similarly, Our result was inconsistent with observation of Atahan et. al. has shown bilirubin sensitivity 77.77%, specificity 87.21% with positive predictive value 45.16% [23]. And Sand et.al. showed specificity of bilirubin 86%, sensitivity 70% with positive predictive value 51% [15].

AST in current study raised in 23 (28.75%) case, ranged from 10 to 223 U/L, average level 42.06 U/L and S.D 34.17 with positive predictive value of 100%. ALT raised in 26 (32.5%) case, range 6 to 272 U/L, average level 32.89 U/L and S.D 32.08 with positive predictive value of 100%. Age and sex adjusted ALP elevated in 82.5% of case with positive predictive value of 95.45%.

Similarly, Khan (2008) showed AST elevated in 38.77% of case, , ALT elevated in 26.54% of case and ALP elevated in 48.97% of case [21]

And Sand et.al showed an average level of AST 21.5 U/L, ranged 5-26U/L and S.D 19.2. and average level of ALT 21.8 U/L, ranged 7-133U/L and S.D 11.1 [15].

As a summary, Hyperbilirubinemia have the highest specificity (80.00%) than sensitivity (37.33%) with good positive predictive value of 96.55%. Similarly, sensitivity, specificity and positive predictive value for prediction of appendicitis by Direct bilirubin, Indirect bilirubin, AST/SGOT, ALT/SGPT and ALP are (90.67%, 20.00%, 94.44%), (16.00%, 80.00%, 92.31%), (30.67%, 100.00%, 100.00%), (34.67%, 100.00%, 100.00%), (84.00%, 40.00%, 95.45%) respectively.

CONCLUSION

Liver function test is a marker for acute appendicitis and its complication with a good positive predictive value. Liver function test should be used together with clinical examination and other laboratory investigations in the assessment of patients with suspected acute Appendicitis.

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