Research Article

A Comparative Analysis of Total Leucocyte Count and Serum Total Bilirubin in Diagnosis of Acute Appendicitis

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ABSTRACT

The acute appendicitis may present as fatal life threatening condition. Many times, the laboratory and radiological investigations support are required to surgeons for the confirmative diagnosis of acute appendicitis. The parameter of increased total leucocyte count along with clinical condition findings are commonly utilized for diagnosis of acute appendicitis. The present study was undertaken to evaluate the serum total bilirubin parameter for early detection of acute appendicitis. The retrospective analysis was done over the period of six months. Total 100 adult appendectomy cases which were clinically diagnosed and duly supported by radiological and/ laboratory investigations included in this study. The preoperative total leucocyte count and serum total bilirubin and postoperative histopathology reports were analyzed. The serum total bilirubin results were noted from the preoperative Liver Function Tests panel results. And the total leucocyte count results were noted from the preoperative CBC test. Out of 100 cases, the 10 cases were of negative appendectomy. The cut off level of total leucocyte count of 11,000/cmm or more and the cut off level of serum total bilirubin of more than 1.0mg/dl showed the accuracy of 83% and 98% respectively. From this study, it was concluded that the serum total bilirubin found to be excellent predictive marker for precise diagnosis of acute appendicitis and had upper hand than total leucocyte count parameter.

Keywords: Acute appendicitis, serum total bilirubin and total leucocyte count.

INTRODUCTION

Acute appendicitis (AA) is acute surgical emergency condition risking life in 7% to 9% cases. [1] There is several other clinical conditions which mimics to the clinical presentation of AA. Generally, the decision of appendectomy is taken on basis of clinical presentation along with supporting radiological and laboratory investigations of respective case. All these currently followed procedures in diagnosis of AA may lead to negative appendectomy. In the literature, around 15% to 50% cases of negative appendectomy had been reported. [2] Hence, for the confirmative diagnosis of AA, the several biomarkers like elevated Total Leucocyte Count (TLC)-leukocytosis > 11,000/cmm or more, increased C - reactive protein level, increased Neutrophil-to-Lymphocyte Ratio (NLR), Procalcitonin (PCT) and Interleukin-6 (IL-6) etc. were studied in the past.[3] In this study, the retrospective analysis was done in clinically confirmed and operated AA cases, with the comparison of markers of increased TLC and increased serum total bilirubin level for earlier detection of AA.

MATERIALS AND METHODS

The retrospective study was conducted in tertiary care Hospital over the period of six months. The Total 100 adult appendectomy cases which were clinically diagnosed and duly supported by radiological and/ laboratory investigations included in this study. The information of TLC and serum total bilirubin was collected from preoperative investigations of respective patient. TLC results were recorded from the CBC test results and serum total bilirubin results were recorded from Liver Function Tests (LFT). The cut-off of TLC count more than 11,000/cmm and the cut off of serum total bilirubin of more than 1.0mg/dl was counted as positive indicator for respective parameter for diagnosis of AA. The histopathology (HP) diagnosis of each case was recorded from HP report of appendectomy specimen. The SPSS software was utilized for statistical analysis. The TLC and serum total bilirubin markers were analyzed for sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and accuracy for diagnosis of AA.

RESULTS AND DISCUSSION

The timely precise diagnosis of AA is very much required to avoid future serious complications like perforation and sepsis. [4] The several atypical presentations are common in AA along with the classical presentation of migrating pain from the periumbilical region to the right iliac fossa. There are several other clinical conditions like diverticulitis, endometriosis, Crohn's disease and acute ovarian conditions mimics to AA. All these facts submit the diagnostic difficulty of precise diagnosis of AA. [5]

The ultrasonography and CT scan had limited role in diagnosis of AA in spite their good accuracy, in view of their infrastructure cost, cost per test, observer dependent methodology and possibility of radiation exposure. [4]

The various mechanisms are considered for increased bilirubin level in AA condition. One possibility is bacterial translocation from AA developing the systemic

inflammation. The possibility of E. coli like microorganisms causing the disruption of liver sinusoids and impairing bilirubin metabolism is also considered. [6] Regarding the increased TLC count in AA, it is considered that microbial infection in AA is encountered by leucocytes, leading to increase in their total count. [7]

In the present retrospective study, the parameter TLC count and serum total bilirubin were analyzed for their accuracy for precise diagnosis of AA. Out of total 100 adult cases of AA, 55 were male and 45 were female. The postoperative histopathology results confirmed the preoperative clinical diagnosis of AA in 90 cases. In 10 clinically suspected AA cases, post-operative histopathology showed the histology of normal appendix and this condition is labeled as negative appendectomy (NA). The multiple clinical conditions like diverticulitis, colitis etc. mimicking to the AA, along with, the limited role of supporting laboratory investigations and radiological investigations for precise diagnosis of AA, are the main reasons of NA. In the present study, there were 10% NA cases were found. The rate of NA mentioned in previous studies ranges from 15% to 50%. [2, 8]

Out of 90 HP confirmed AA cases, we found 81 cases with leukocytosis, with TLC cut off level of 11,000/cmm level. In HP confirmed 10 normal appendix cases, total 08 cases showed TLC level of 11,000/ cmm or more. Thus, the TLC level with cut off of 11,000/cmm showed sensitivity, specificity, accuracy, PPV and NPV of 90%, 20%, 83%, 91.01% and 18.18% respectively for detection of AA. (Table 1)

Table 1: TLC test evaluation for AA cases

	HP confirmed AA Cases	HP negative AA cases	Total	Predictive value (PV)
Elevated TLC cases	81	08	89	**PPV (91.01%)**
Normal TLC cases	09	02	11	**NPV (18.18%)**
Total	90	10	100	
	Sensitivity (90.00%)	**Specificity (20.00%)**	**Accuracy (83.00%)**	

Table 2: Sr. Bilirubin test evaluation for AA cases

	HP confirmed AA Cases	HP negative AA cases	Total	Predictive value (PV)
Elevated Sr. Bilirubin cases	89	01	90	**PPV (98.88%)**
Normal Sr. Bilirubin cases	01	09	11	**NPV (90.00%)**
Total	90	10	100	
	Sensitivity (98.88%)	**Specificity (90.00%)**	**Accuracy (98.00%)**	

The elevated serum bilirubin level found in 89 cases out of 90 HP conformed AA cases with the serum total bilirubin cut off level was of 1.0mg/dl or more. In negative appendectomy 10 cases, the total serum bilirubin was elevated in one case and was normal in remaining 9 cases. Thus, the serum bilirubin with cut off of 1.0mg/dl or more showed sensitivity, specificity, accuracy, PPV and NPV of 98.88%, 90%, 98%, 98.88% and 90% respectively for diagnosis of AA. (Table 2)

Thus, in the present study, it was observed that serum bilirubin (accuracy 98.88%) was excellent parameter than the TLC count (accuracy 83%) for earlier, precise diagnosis of AA. Various studies supported these findings. The Elafandy A. et al. found in their study that the serum Bilirubin was highly specific marker with specificity of 96.2% for the diagnosis of AA. [9] The Ambre S R et al. in their study found that the hyperbilirubinemia could be the diagnostic marker AA diagnosis. [10]

There are few limitations to this study. The current study is retrospective study and hence limited data was available for study from each case record. The two different groups of complicated and uncomplicated AA were not made and analyzed in this study in reference to increased level of serum total bilirubin. In many studies it was found that hyperbilirubinemia was observed in cases with complicated or perforative AA. [11] Thus, the elevated levels of bilirubin is predominantly related to advanced inflammation; hence utility of hyperbilirubinemia in cases of early and non-complicated simple AA cases is limited. [12] Also, in the literature, it is mentioned that hyperbilirubinemia lacks specificity for AA diagnosis as its diagnostic reliability can be confounded by other pre-existing conditions like hepatic dysfunction or haemolytic disorders etc. [13]

CONCLUSION

The future of AA diagnosis mainly depends upon the development of sophisticated biomarker parameter. In the present study, the serum total bilirubin parameter found to be valuable, reliable and cheap biomarker for precise diagnosis of AA than the conventional TLC marker. Thus, hyperbilirubinemia plays crucial role in diagnosis of AA and also in the preoperative risk stratification and the surgery planning. More research is required for establishing definitive role of hyperbilirubinemia in different types AA cases and for to find out optimal cutoff value for hyperbilirubinemia in different geographical study population.

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