STUDY OF PREOPERATIVE SERUM BILIRUBIN AND SERUM C-REACTIVE PROTEIN WITH POSTOPERATIVE HISTOPATHOLOGY IN DIAGNOSIS OF ACUTE APPENDICITIS

Trishul Senapati Aakala[1], Charan Panda[2], Suramya Anand[3], Manas Ranjan Behera[4], Chitta Ranjan Thatei[5]

[1]3rd Year Post Graduate Student, Department of General Surgery, M. K. C. G. Medical College & Hospital.
[2]Professor & HOD, Department of General Surgery, M. K. C. G. Medical College & Hospital.
[3]3rd Year Post Graduate, Department of General Surgery, M. K. C. G. Medical College & Hospital.
[4]Assistant Professor, Department of General Surgery, M. K. C. G. Medical College & Hospital.
[5]Senior Resident, Department of General Surgery, M. K. C. G. Medical College & Hospital.

ABSTRACT

BACKGROUND

Delayed or wrong diagnosis of acute appendicitis in patients results in complications like perforation, gangrene, etc. These complications carry a significant amount of morbidity and mortality to the patients. So timely diagnosis of acute appendicitis by the surgeon plays an important role to prevent these complications. Recently, it was found that serum bilirubin and serum C-reactive protein (CRP) individually can be a useful marker for appendiceal perforation/gangrene. In this era of technical edge, some places specifically in this part of world, people lack this technological advantage (i.e. access to ultrasonography), so simple laboratory investigation can be very useful for the surgeon regarding diagnosis point of view.

METHODS

Here in this retrospective study, 100 patients were included randomly during September 2013 to August 2015, suffering from acute pain abdomen suspecting clinically as acute appendicitis and got admitted to Department of General Surgery of MKCG Medical College, Berhampur, Odisha for the treatment of same.

RESULTS

During management of those patients, the intraoperative finding was noted, which latter confirmed by histopathological finding, are compared with preoperative blood investigation (i.e. serum bilirubin and serum CRP). The findings are noted and analysed and tried to find the relationship of serum bilirubin and serum CRP with acute appendicitis.

CONCLUSION

We will try to see how helpful the above obtained results are and thus their importance regarding the diagnosis of the same for the surgeon.

KEYWORDS

Serum Bilirubin, Serum CRP, Acute Appendicitis.

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INTRODUCTION: The vermiform appendix is considered by most to be a vestigial organ; its importance in surgery results only from its propensity for inflammation, which results in a clinical syndrome known as "Acute appendicitis". It is the most common cause of an acute abdomen in young adults and appendectomy is a most frequently performed urgent abdominal operation. Worldwide, perforated appendicitis is the leading general surgical cause of death. Early surgical intervention improves outcome. Diagnosis of acute appendicitis can be elusive and a high index of suspicion is important in preventing serious complications from this disease. Now a days, the negative appendectomy rate is still about 15 percentage and perforation rate can be as high as 35 percentage. Recently, the role of total serum bilirubin and serum CRP were found to be having some positive evidence regarding diagnosis of acute appendicitis.

AIMS AND OBJECTIVE: To study the effectiveness and establish the role of preoperative serum bilirubin and serum CRP in diagnosis of acute appendicitis.

MATERIALS AND METHODS: This is a retrospective study. This study was done in 100 patients, admitted to General Surgical wards of M.K.C.G. Medical College and Hospital, Berhampur, Odisha, within a period of September 2013 to August 2015 with features suggestive of acute appendicitis and undergone surgery for the same. The selection of cases were done on the basis of their clinical symptoms and signs supplemented by routine investigation and ultrasonography reports to arrive at a diagnosis.

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Corresponding Author:
Dr. Trishul Senapati Aakala,
C/o. RN Das, Plot No. 65, 2nd Lane, Medical Bank Colony,
Berhampur, Ganjam Dist, Odisha.
E-mail: ats001janu@gmail.com
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Inclusion Criteria:

- All the patients, diagnosed clinically to have acute appendicitis are subjected to appendectomy operation.
- All patients above 12 years.

Exclusion Criteria:

- All patients below 12 years.
- Patients who are managed conservatively.
- Patients with other diagnosis like peptic perforation, acute cholecystitis, etc. (excluded by history, clinical examination and investigation).

OBSERVATION: The present study was performed on 100 patients, who have been clinically diagnosed as a case of acute appendicitis and were posted for appendectomy operation in Postgraduate Department of General Surgery, M.K.C.G. Medical College and Hospital, Berhampur, during the period September 2013 to August 2015. Apart from all routine investigation done, all 100 cases were subjected to ultrasonography of abdomen and pelvis, serum total bilirubin and serum CRP to evaluate their role in diagnosing a case of acute appendicitis. All the 100 cases were subjected to histopathological examination of removed specimen of appendix, which was considered as confirmatory and final diagnosis.

Age in years	Incidence	Percentage (%)
12 – 20	38	38.00
21 – 30	34	34.00
31 – 40	19	19.00
41 – 50	8	8.00
51 – 60	1	1.00

Table 1: Age Distribution

In this present study, most of acute appendicitis patients (72%) are of age group of 12 to 30 years. Maximum number of patients are in age between 12 to 20 years. Lowest age has been 12 years and highest age being 52 years.

Sex	No. of Cases	Percentage (%)
Male	72	72.00
Female	28	28.00

Table 2: Sex Distribution

Here males are affected more than females with male to female ratio is 2.6: 1.

Symptoms	No. of Cases	Percentage (%)
Pain abdomen	100	100
Anorexia	87	87
Nausea/Vomiting	62	62
Fever	48	48

Table 3: Distribution of Symptoms

Sign	No. of Cases	Percentage (%)
Tenderness in Right lower quadrant	100	100
Rebound tenderness	57	57
Guarding/Rigidity	29	29

Table 4: Distribution of Signs

Here in this study, all the patients with acute appendicitis presented with pain abdomen with tenderness in right lower quadrant. Next common symptoms being anorexia, nausea/vomiting. Next common sign being rebound tenderness.

TLC(11 x 10^3 cells / mL)	Histopathology report (Acute Appendicitis)	Histopathology report (Other than Acute Appendicitis)
Elevated	86	5
Normal	4	5

Table 5: Role of Total Leucocyte Count (TLC)

$$\text{Sensitivity} = \frac{86}{90} \times 100 = 95.55\ \%$$

$$\text{Specificity} = \frac{5}{10} \times 100 = 50.00\%$$

$$\text{Positive Predictive value} = \frac{86}{91} \times 100 = 94.55\ \%$$

$$\text{Negative predictive value} = \frac{5}{9} \times 100 = 55.55\%$$

Serum Total Bilirubin (1.1mg/dL)	Histopathology Report (Acute Appendicitis)	Histopathology Report (Other than Acute Appendicitis)
Elevated	52	2
Normal	38	8

Table 6: Role of Serum Total Bilirubin

$$\text{Sensitivity} = \frac{52}{90} \times 100 = 57.77\ \%$$

$$\text{Specificity} = \frac{8}{10} \times 100 = 80.00\%$$

$$\text{Positive Predictive value} = \frac{52}{54} \times 100 = 96.29\ \%$$

$$\text{Negative predictive value} = \frac{8}{96} \times 100 = 17.39\%$$

Serum CRP (10 mg/dL)	Histopathology Report (Acute Appendicitis)	Histopathology Report (Other than Acute Appendicitis)
Elevated	68	5
Normal	22	5

Table 7: Role of Serum CRP

Sensitivity = $\frac{68}{90}$ x 100= 75.55 %

Specificity = $\frac{5}{10}$ x 100 = 50.00%

Positive Predictive value = $\frac{68}{73}$x 100= 93.15 %

Negative predictive value = $\frac{5}{27}$x 100 =18.51%

Both Serum Total Bilirubin & CRP	Histopathology Report (Acute Appendicitis)	Histopathology Report (Other than Acute Appendicitis)
Elevated	46	1
Normal	44	9

Table 8: Role of both Serum Total Bilirubin and Serum CRP taken Together

Sensitivity = $\frac{46}{90}$ x 100= 51.11%

Specificity = $\frac{9}{10}$ x 100 = 90.00%

Positive Predictive value = $\frac{46}{47}$x 100= 97.87 %

Negative predictive value = $\frac{9}{53}$x 100 = 16.18%

DISCUSSION: In this present study, most of the cases are in adolescent and young age group i.e. 12 to 30 years. This finding is quite similar to study of Korner H et al.[1] Here, we found that males are affected more than females with M:F=2.6:1. Luckmann R et al[2] found that incidence rate in males were higher than females in all racial/ethnic groups for most ages with relative ratio between 1.1 to 1.7.

All the patients in our study are presented with pain abdomen with tenderness in right lower quadrant with next common signs and symptoms being anorexia, nausea/vomiting, rebound tenderness. This finding is consistent with Humes DJ et al.[3]

Elevated TLC has a good sensitivity of 95.55% with low specificity i.e. 50%. It has a good positive predictive value of 94.5% and negative predictive value of 55.55%. Kamran H et al[4] found that TLC has sensitivity and specificity of 76.5% and 73.7% respectively with positive predictive value of 92.5%. This is nearly similar to our finding.

In this present study, elevated serum bilirubin is found to have sensitivity of 57.77% and specificity of 80% with positive predictive value at 96.29% and negative predictive value at 17.39%. This finding is similar to Estrada JJ et al.[5] Here, elevated serum CRP has sensitivity of 75.55%, specificity of 50%, positive predictive value of 93.15%, negative predictive value of 18.51%, but a study by Amalesh T et al[6] shows the sensitivity and specificity of elevated CRP at 91% and 42% respectively.

When we combine the serum CRP and serum bilirubin, the results are quite improved with specificity of 90% and positive predictive value of 97.87%. This finding is quite similar to study done by Abdella MR et al.[7]

Several serum markers have been analysed in order to predict the severity of acute appendicitis including IL6 and lipopolysaccharide binding protein. The presence of jaundice in sepsis is well documented, especially associated with Gram-negative pathogen (e.g. E. coli). Several mechanisms have been described explaining serum total bilirubin elevation in systemic infections. The haemolysis produced by bacteria produces increase in total serum bilirubin. Also some endotoxins released in peripheral blood stream are responsible for impeding the liver's mechanism for bilirubin uptake and canalicular excretion. Regarding CRP, it was confirmed that CRP rises within 2 hours of onset of inflammation; up to 50,000 fold and peaks at 48 hours. So its level is determined by rate of production and hence severity of the precipitating cause.

CONCLUSION: Clinical symptoms are enough to hint the diagnosis of appendicitis. However, a diagnosis can only be confirmed upon surgery with subsequent histopathological evaluation.

Serum markers including bilirubin and CRP may increase in patients with appendicitis and even more in patients suffering from perforated/gangrenous appendicitis.

Here in this present study, we found that there is rise in both serum bilirubin and serum CRP level in acute appendicitis. When we combined both (serum bilirubin and serum CRP), its specificity is increased. This will help to reduce the negative appendectomy rates, subsequently unnecessary morbidity and financial burden for patients. Also, it has a good predictive value for diagnosis of acute appendicitis. So this gives a very good scope for surgeon to make an early diagnosis and quick intervention, thus minimise complications and avoid false positive appendectomies.

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