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Research Article

Appendicitis

A study to correlation serum C reactive protein and bilirubin in appendicitis individuals in a tertiary health care setup

Rakesh B.[1], Chandra T.[2], Balaji K.[3*]

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[1] Bevunapalli Rakesh, Assistant Professor, Department of General Surgical, Konaseema Institute of Medical Sciences and Research Foundation, Amalapuram, A.P, India.

[2] T Jaya Chandra, Professor, Department of Microbiology, GSL Medical College, Rajahmundry, A.P, India.

[3*] Karnasula Balaji, Assistant Professor, Department of General Surgical, Konaseema Institute of Medical Sciences and Research Foundation, Amalapuram, A.P, India.

Introduction: Acute appendicitis (AA) is one of the commonest surgical conditions. CT scan is widely used for the diagnosis of AA. Different studies reported the utility of CRP and serum bilirubin (SB) in the diagnosis of AA. With this background, a study was conducted to find the diagnostic accuracy of SB and CRP in the diagnosis of AA. **Materials and methods:** The study was conducted in the Department of General Surgery, Konaseema Insititute of Medical Sciences and Research Foundation, Amalapuram for 18 months. Individuals AA were included. Those with a history of jaundice, liver diseases, chronic alcoholism were not considered in this research. Initially, all were subjected to thorough clinical examination and mantrel score (MS) was defined. USG abdomen, liver function tests, CRP were evaluated. Serum bilirubin (SB) and liver enzymes were estimated. A latex agglutination test was used to estimate CRP in the blood. Based on the clinical condition of the study participant appendicectomy was carried out. Chi-Square test. P less than or equal to 0.05 was considered statistically significant. **Results:** A total of 60 participants were included. Gender wise, the male-female ratio was 1.85. The mean MS was 8.142, 8.714 and 9.444, respectively for AA, gangrenous appendicitis (GA) and perforated appendicitis (PA); statistically, there was no significant difference. SB was evaluated, the mean values were 0.91+0.28mg/dl, 1.31+0.22 mg/dl and 2.03+1.06 mg/dl, respectively in AA, GA and PA; statistically, there was a significant difference (P<0.05). **Conclusion:** Appendicitis is common among males. The MS was an important indicator for the diagnosis of appendicitis with elevated SB and CRP.

Keywords: Appendicitis, C reactive protein, Bilirubin, Score

Corresponding Author

Karnasula Balaji, Assistant Professor, Department of General Surgical, Konaseema Institute of Medical Sciences and Research Foundation, Amalapuram, A.P, India.

Email: balaji.kla@gmail.com

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Introduction

IntroductionAcute appendicitis (AA) is one of the commonest surgical conditions. As per the studies, the lifetime risk of AA is around 7 – 8% only. [1]. Usually, appendectomy is the treatment choice for AA. There is a drastic decline in the mortality rate after appendectomy. After the appendectomy, the mortality is ranged between 0.07% - 0.7%. [2,3]. Accurate diagnosis is the only way to decrease the negative appendectomy. Not only this, the correct diagnosis can help the unnecessary financial burden as well as pain on the victim and save a lot of working days. Previously, the clinical condition was the only aid in the diagnosis of AA. Now CT scan is widely used for the diagnosis of AA. Fever and tachycardia are the common clinical presentations during AA. The clinical examination of the abdomen can reveal localised tenderness as well as muscular rigidity; pain in the right iliac fossa is the most important clinical presentation. [4]. As per the study by studies, mantrel score (MS) is the most useful in the diagnosis of AA. [5,6]. The authors reported that scores 9 – 10, of MS, help in the accurate diagnosis of AA. Different studies reported the utility of CRP and serum bilirubin (SB) in the diagnosis of AA. [7, 8, 9]. With this background, a study was conducted to find the diagnostic accuracy of SB and CRP in the diagnosis of AA.

Materials and Methods

Settings: The study was conducted in the Department of General Surgery, Konaseema Insititute of Medical Sciences and Research Foundation, Amalapuram.

Duration and type of study: This was a prospective study conducted from January 2016 to June 2017, 18 months.

Sampling method: Random sampling was considered.

Sample size calculation: All the eligible members who satisfy the inclusion criteria were considered in this study.

Inclusion criteria: Individuals $\geq$ 18 years, both gender who were clinically diagnosed to be acute appendicitis (AA) and appendicular perforations were included in this research.

Exclusion criteria: Non-cooperative individuals, Those with a history of jaundice, liver diseases, chronic alcoholism, haemolytic diseases, biliary tract infections and those who refused to submit informed consent were not considered in this research.

Data collection, procedure: The individuals with AA presented to this organization, those who satisfy inclusion criteria were taken up for study. Initially, all participants were subjected to a thorough clinical examination and MS was defined. As a part of routine checkups and institutions policy, participants were advised for different investigations such as USG abdomen, liver function tests (LFTs), CRP and viral markers. If required, a CT abdomen was also done. Serum bilirubin (SB) and liver enzymes were estimated by LFTs using the autoanalyser available in the institution. A latex agglutination test was used to estimate CRP in the blood. All the findings were recorded in the standard proforma, Based on the clinical condition of the study participant appendicectomy was carried out.

Informed consent: Written informed consent was taken from all the study participants. If the patient can't give, consent was taken from close blood relations.

Ethical committee approval: The study protocol was approved by the ethics committee of this institution.

Statistical analysis: Data were analyzed using Microsoft XL. The quantitative data comparison was carried out using the Chi-Square test. P less than or equal to 0.05 was considered statistically significant.

Results

In this study, a total of 60 (100%) participants with appendicitis were included. Based on intraoperative as well as histopathological findings these were divided into 3 categories (Table 1); simple AA is the predominant (46.7%; 28).

Table 1: Distribution of appendicitis according to the histopathological findings.

S.No	Appendicitis	n (%)
1	Simple acute	28 (46.7)
2	Perforated	18 (30)
3	Gangrenous	14 (23.3)
Total		60 (100)

SAA is the common appendicitis.

In this, gender-wise, 39 (65%) were male and 21 (35%) were female participants; the male-female ratio was 1.85. In all the three categories, there was male predominance; 18 (30%), 11 (18.3%) and 10 (16.7%), respectively in AA, perforated appendicitis (PA) and gangrenous appendicitis (GA) (Table 2).

Table 2: Gender wise distribution of appendicitis in the study participants.

Gender	AA	PA	GA	Total
Male	18 (30)	11 (18.3)	10 (16.7)	39 (65)
Female	10 (16.7)	7 (11.6)	4 (6.6)	21 (35)
Total	28 (46.7)	18 (30)	14 (23.3)	60 (100)

The male-female ratio was 1.85

The mean duration of pain was, 37.71±17.50hrs, 42.86±15.41hrs and 70.66±19.25hrs respectively in AA, GA and PA. The mean MS was 8.142, 8.714 and 9.444, respectively for AA, GA and PA; statistically, there was no significant difference between MS and groups (P>0.05). When the SB was evaluated, the mean values were 0.91±0.28mg/dl, 1.31±0.22 mg/dl and 2.03±1.06 mg/dl, respectively in AA, GA and PA; statistically, there was a significant difference (P<0.05). There were the highest mean CRP levels among the individuals with PA (14.66±7.19mg/l) followed by GA (10.14±3.05mg/l) and AA (6.82±4.16mg/l); statistically, there was a significant difference (P<0.05). 36 (60%) cases underwent open appendicectomy (OA); in this, 25% cases were AA, 20% were PA and 15% GA. Laparoscopic appendicectomy (LA) was conducted in 23 (38.3%) cases; in this 20% (12) were AA, 10% (6) were PA and 8.3% (5) were GA (Table 3).

Table 3: Type of appendicectomy among the study participants; n (%).

	Open	Laparoscopic	Converted	Total
AA	15 (25)	12 (20)	1 (1.67)	28 (46.7)
PA	12 (20)	6 (10)	0	18 (30)
GA	9 (15)	5 (8.3)	0	14 (23.3)
Total	36 (60)	23 (38.3)	1 (1.67)	60 (100%)

Open appendicectomy was the predominant technique (60%; 36)

Discussion

Age-wise, in this study, AA was ranged between 10 – 30 years; the majority of the cases (57.1%) were fell in this group and

The mean age was 28.57±12.13 years. The mean age was reported to be 26.43±5.66 years and 36.89±10.36 years respectively for GA and PA. Similar findings were reported by Lewis et al. [10], Pieper et al. [11]. AA is predominant among males. In this study also more male populations were reported with appendicitis. The gender ratio was 2.5 each and 2.6, respectively in AA, GA and PA. The gender ratio was reported to be 1.7 by Lewis et al. [10]. and 1.33 in a study by Pieper et al. [11]. With these findings there was higher male predominance was observed in this research. But the cause for this was not known. The mean duration of pain was 37.71±17.50hrs for AA, 42.86±15.41hrs for GA and 70.66±19.25 hours for PA; statistically, there was a significant difference. In a study by Hartwing Korner et al. [13]. mean duration of pain was reported as 54±13 hours. With this there was a short duration of pain was observed in this research which was due to the current institution where this research was organised. This is a tertiary care centre which is located almost in the middle of the city with very good road connectivity. So that the patients reached the hospital in a very short time. The MS in this study was 8.142, 8.714 and 9.444, respectively for AA, GA and PA; statistically, there was no significant difference between MS and groups (P>0.05). Similar MS were reported in the literature. [13]. In AA, the mean aspartate transaminase (AST) was 29.35±12.3 and alanine transaminase (ALT) was 27.21±18.43. In GA, the mean AST and ALT were 28.14±13.73 and 26.85±19.55 and among the PA individuals, 34±15.74 and 28.11±10.93 were the mean AST and ALT. In this research, the mean AST, ALT levels among the three groups were in the normal range. With this, enzymatic levels had become evident in the diagnosis of appendicitis. There was an elevation of alkaline phosphatase (ALP) among all three groups. The mean values were 233.64±67.41, 212.71±87.61 and 247.33±63.55, respectively in simple AA, GAs and PA. The raise in all the cases <3 times to the normal ALP levels adjusted to the normal age and gender. The above observations suggested that there was no damage but dysfunction of hepatocytes. The dysfunction is either derangement in permeability of hepatocytes to bilirubin or depressed function of the ductile enzyme (Na-K ATP as) leading to cholestasis and hyperbilirubinemia. Several mechanisms were reported that causes hyperbilirubinemia in systemic infections. Haemolysis causes an increased

SB load and is associated with several bacteria including *Escherichia coli*. [15]. Another mechanism was reduced hepatic uptake and canalicular excretion of Bilirubin caused by endotoxaemia. [16]. Bacterial endotoxin causes a cytokine-mediated inhibition of bile salt transport mechanisms, leading to cholestasis. The mean SB was 0.91±0.28mg/dl, 1.31±0.22 mg/dl and 2.03±1.06 mg/dl, respectively in AA, GA and PA; statistically, there was a significant difference ($P<0.05$). In a study by Bechara G et al. [14] an elevated SB level was reported among the patients with AA. This was found to be much higher by Khan S et al. [17]. In this research, the highest mean CRP levels among the individuals with PA followed by GA and AA; statistically there were significant differences ($P<0.05$). The first documented study was reported by Ingram et al. [18]. on the correlation of CRP and AA; the authors reported the role of the common parameter of inflammation in the diagnosis of AA by measuring axillary temperature, blood leucocyte, serum CRP and ESR in 354 patients with a clinical diagnosis of AA. Eriksson S et al. [19]. mentioned elevated CRP levels were an important biochemical marker for the diagnosis of AA. Erkasap S et al. [20]. concluded that the CRP levels were within the normal limits especially during the first 12 hrs of hospitalised patients with AA.

Conclusion

Appendicitis is common among males. The MS was an important indicator for the diagnosis of appendicitis with elevated SB and CRP.

Limitations of the research: Small sample size and short duration of the study are the major limitations of the research.

What does this study add to the existing knowledge? MS is an important indicator for the diagnosis of appendicitis.

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