

A STUDY OF CLINICOPATHOLOGICAL PROFILE IN PATIENTS OF APPENDICULAR PERFORATION

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ABSTRACT

Objective: Appendicular perforation is one of the most common surgical emergencies. The diagnosis of appendicular perforation is based on clinical history, examination combined with investigation. Hb, total leukocyte count (TLC), and neutrophil USG CT help in confirming the diagnosis.

Methods: A prospective study was conducted on patient coming with appendicular perforation, at a tertiary care center. Included subject underwent a through physical and clinical evaluation. Data were collected in performa and statistical analysis was done by applying the appropriate test.

Results: Among 100 cases of operated appendectomy, great number of patients belonged to 11–20 years (40%) with male predominance (72%). Among all, 90% were diagnosed as histopathological examination positive (appendicular perforation). Sixty-nine percent (69%) patients were C-reactive protein (CRP) positive. Increased TLC in 70% of patients and raised neutrophilia in 54% of patients was observed. Out of 100 patients, 86% were USG positive and retrocecal appendix was the most common position. Tenderness at RIF was the most common sign present (100%). Rovsing's sign was present in 25% cases while 15% cases were noted with obturator test. Majority of them (70%) had score of >7 and were diagnosed as modified Alvarado-positive cases.

Conclusion: In our study, the combination of CRP, TLC, and neutrophil count has PPV of 100% which signifies their greater diagnostic accuracy in early diagnosis of acute appendicitis while the NPV after combining this test is 100% which signifies negative appendectomy can be decreased, if appendectomy is avoided in cases where TLC, CRP, and NC are normal.

Keywords: Appendicular perforation, Clinicopathological, Modified Alvarado score.

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INTRODUCTION

Recently, the most common condition encountered at general surgical emergency is acute appendicitis. Moreover, it is the most common cause of acute abdomen requiring surgical intervention. In many cases, usually during the prodromal phase, its clinical manifestations may be vague and uncertain. Many patients present with fever, pain in the abdomen, and vomiting. Delay in presentation leads to complications such as abscess formation, gangrene, perforation, and peritonitis [1-3].

Imaging techniques such as plain radiograph (X-ray), ultrasound, or computed tomography scan. Among all causes of peritonitis, perforated peptic ulcer is the most common cause in our country [4,5]

Appendicular perforation in patients with acute appendicitis may cause a variety of potentially life-threatening complications and is responsible for a considerable amount of morbidity [6,7]

It is also true that with decreased diagnostic accuracy, the negative appendectomy rate increases. Hb, total leukocyte count (TLC), and neutrophil USG CT help in confirming the diagnosis. However, they are expensive and sometimes inaccessible [7,8]. Several scoring systems have been developed to help in the diagnosis of appendicular perforation such as Alvarado and modified Alvarado scoring system; patients with normal leukocyte count and neutrophil count are highly unlikely to have appendicular perforation; and the purpose of our study is to find the usefulness of above in our setup [9-11].

The present study aims to evaluate the clinicopathological spectrum of cases, the symptoms, and clinical signs and to find various clinical parameters and investigations aiding in early diagnosis of appendicular perforation.

METHODS

A prospective clinicopathological study was conducted over a period of 1 year from 2021 to 2022 at Gulbarga Institute of Medical Sciences, Gulbarga. Institutional ethical committee clearance was taken before the commencement of the study. Written and informed consent were taken for open appendectomy. All patients diagnosed as appendicular perforation clinically on admission, diagnosed on laparotomy, and patients ready to give informed written consent were included in the study. The patients with primary peritonitis or due to anastomotic dehiscence and with intestinal perforation and patients not willing for operative procedure were excluded from the study. Clinical signs of appendicular perforation were determined by the surgeons and the duration of the symptoms was documented on admission. The surgeons were aware of the routine laboratory ultrasonographic findings. Routine laboratory investigations were carried out. On the basis of history, clinical signs, and laboratory investigations, a modified Alvarado score was applied to each case. Modified Alvarado score: This consists of three symptoms, three signs, and laboratory findings as described by Alvarado and later modified by Kalan *et al.* [12]

Patients were scored according to the modified Alvarado score (0–9). Neutrophil shift was not included in the modified Alvarado scoring. Patients were divided as per Alvarado positive (>7) and Alvarado negative (<7) and their correlation was done with the final histopathological examination (HPE) report. Blood samples for routine laboratory test (WBC, neutrophil count) and C-reactive protein were obtained on admission. The normal WBC value in our laboratory is 0–10*10⁹/L levels and above 10*10⁹/L were considered as above normal (+). The percentage of neutrophil was considered elevated when more than 75%. Serum C-reactive protein (CRP) measurements

were not taken into account for the decision of the surgical intervention and to compare it with the surgeon’s clinical diagnosis. Further, the laboratory staff was not informed about the clinical findings, decisions, and outcome (double-blind study). Removed appendix was fixed in 4% formalin, stained with hematoxylin and eosin, and analyzed histologically. The HPE was carried out by senior pathologists (faculty members) and was not informed of the patient’s clinical and laboratory data. This was used to get the incidence of negative appendectomy. For statistical purpose, the patients were assigned into two groups: GROUP A=patients with/perforated/gangrenous appendix and GROUP B=patients with normal appendix.

RESULTS

In the present study, a total of 100 operated appendectomies were included. The age of the patients was grouped into 10 groups ranging

Table 1: Correlation of CRP, TLC, Neutrophil count, and WBC count with HPE

Parameters	HPE positive	HPE negative
CRP		
Raised	69	1
Normal	20	10
TLC		
Raised	69	1
Normal	20	10
Neutrophil count		
Raised	53	1
Negative	36	10
WBC count		
>10,000 cells/mm ³	62	4
<10,000 cells/mm ³	4	10

Table 2: Correlation of USG with HPE reports

USG findings	HPE		Total
	Positive HPE	Negative HPE	
Positive	85	0	85
Negative	04	11	15
Total	84	16	100

Table 3: Clinical features of patients

Clinical features	No. of patients	Percentage
Symptoms		
1. Pain	100	100
2. Fever	69	69
3. Anorexia	65	65
4. Nausea, vomiting	85	85
5. Burning micturition and frequency	11	11
Signs		
1. Tenderness at McBurney’s point	100	100
2. Rebound tenderness (Blumberg’s sign)	64	64
3. Rigidity	70	70
4. Guarding	70	70
5. Rovsing’s sign	25	25
6. Obturator sign	15	15
7. Psoas test	07	07

Table 4: Position of appendix

No. of patients	Position of appendix					
	Retrocecal	Post-ileal	Pre-ileal	Sub-cecal	Para-cecal	Pelvic
100	89	00	00	03	00	08

from 0–10 to 90 years. Majority of the patients belonged to 11–20 years (40 patients, i.e., 40%). Among 100 patients of operated appendectomy in this study, 28 were female (28%) and 72 were male (72%).

Out of the total 100 operated patients, 90 patients were diagnosed as HPE positive (90%) Rest 10 patients had HPE negative (normal appendix), i.e., 10%.

By applying Fisher’s exact test, we found a significant association between CRP levels and HPE-positive/negative cases (p<0.0001). By applying Chi-square test, significant association between total leukocyte count and HPE-positive/negative cases (p<0.05) as well as between (Table 1) neutrophil count and HPE-positive/negative cases (p<0.0044) was seen.

Out of 100 patients, 86 % were USG positive (Table 2 appendicular perforation) and 14% were USG negative (normal appendix).

By applying Chi-square test, there is a significant association between USG with intraoperative findings (p<0.0001).

Out of 100 cases, pain was the most common symptom (100%) with a fever (69%) as the second most common symptom, and 11 patients had a history of burning and increased frequency of micturition. Tenderness at RIF was the most common sign present (100%). Rovsing’s sign was present in 25% cases while 15% cases were noted with obturator test (Table 3).

Among all the cases, retrocecal appendix was the most common position noticed (89%). There were 8% patients with pelvic position appendix and 3% with subcecal (Table 4).

By applying Chi-square test, there is a significant association between modified Alvarado score and histology report (p<0.05) (Tables 5 and 6).

DISCUSSION

In this study, the CRP has a sensitivity of 95.2%. This is comparable to the result of study done by Asfar *et al.* [13] where sensitivity was 86.6%. In our study, none of the cases with appendicular perforation had normal CRP. This observation is supported by the study done by Gronroo’s and Gronroo’s [14].

In our study, 20 cases had normal CRP levels even though HPE was positive in 89 cases. Thimsen *et al.* [15] in his study advised that if the symptoms are present for more than 12 h and CRP was negative, acute appendicitis was unlikely, it is better to follow these patients in and outpatient setting and do repeat clinical examination and repeat investigation. Hence, the negative appendectomy rates are reduced. Thus, at the end, it should be stressed that serum CRP is sensitive for the diagnosis of appendicitis but not specific for the diagnosis.

On correlating TLC with HPE-positive and negative cases, it was found that the sensitivity and specificity of the TLC count were 80.9% and 75%. It was comparable with the studies done by Hoffmann and Rasmussen [16] (81–84%), Peltola *et al.* [17] (76%), Marchand *et al.* [18] (81–84%), and Yang *et al.* [19] (71.4%) indicate high association between TLC count and acute appendicitis (p=0.011439>0.025). In this study, neutrophilia of more than 75% was seen in 54% of cases. It is comparable with other studies done by Verma *et al.* [20] (75%), Hoffman and Rasmussen [16] (78%), Marchand *et al.* [18] (81%), and Yang *et al.* [19] (88%).

In our study, we correlated the total leukocyte count and CRP, neutrophil count with CRP, TLC, neutrophil count, and CRP in combination with

Table 5: Total number of cases and their modified Alvarado score

Modified Alvarado score	No. of cases	Percentage
>7	70	70
<7	30	30
Total	100	100

Table 6: Modified Alvarado score and HPE report

Modified Alvarado score	Histology report		Total
	Positive	Negative	
>7	69	1	81
<7	20	10	19
Total	89	11	100

Value of $\chi^2=43.266$, $P<0.05$, significant

histopathologically positive and negative cases. We found sensitivity and specificity of 93.9 and 71.4 (in TLC and CRP correlation with HPE), while sensitivity and specificity of 94.2% and 62.5%. The study findings were comparable to the recent studies done by Tantarattanapong and Arwae [21] and Naderan *et al.* [22].

CONCLUSION

Appendicular perforation is more common in age group 11–20, i.e., adolescents and young adults. Migration of pain, vomiting, and anorexia with right iliac fossa tenderness are characteristic symptoms and signs of acute appendicitis. TLC, NC, and CRP are useful in the diagnosis of acute appendicitis.

In our study, the association of CRP and acute appendicitis has shown to be significant. In our study, the combination of CRP, TLC, and neutrophil count has PPV of 100% which signifies their greater diagnostic accuracy in early diagnosis of acute appendicitis while the NPV after combining this test is 100% which signifies that negative appendectomy can be decreased if appendectomy is avoided in cases where TLC, CRP, and NC are normal. The modified Alvarado score is a fast, simple, reliable, non-invasive, repeatable, and safe diagnostic modality without extra expense.

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