

Original article:

Study of clinical parameters & investigations aiding in early diagnosis of Appendicular Perforation

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Abstract:

Introduction: One of the commonest clinical presentations that require emergency surgery is appendicular perforation^(4,5). It is rare amongst the elderly, but is common in children, teenagers and young adults⁽⁶⁾. Much effort has been directed towards early diagnosis and intervention as approximately 6% of the population will suffer from this disease during their life time⁽⁷⁾. Delay in diagnosis leads to increase morbidity and costs.

Material and methods: This was a prospective clinicopathological study with included 100 cases. This study included randomly all operated patients (100) suspected of appendicular perforation between 17th September 2016 to 16th September 2018 in the Department Of Surgery.

Results: When combined value of CRP, TLC and raised Neutrophil count is taken into consideration sensitivity was 100% and specificity was 83.3 predictive positive value was 96.7 while negative value was 100%. showing combination of these test will be effective in early diagnosis of appendicitis while Avoiding surgery in these cases can reduce negative appendectomy rate considerably. (p= 24.92 p<0.0001).

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.

Introduction:

One of the commonest clinical presentations that require emergency surgery is appendicular perforation^(1,2). It is rare amongst the elderly, but is common in children, teenagers and young adults⁽⁶⁾. Much effort has been directed towards early diagnosis and intervention as approximately 6% of the population will suffer from this disease during their life time⁽³⁾. Delay in diagnosis leads to increase morbidity and costs.

The usual picture of appendicular perforation is often not classical, leaving many cases a diagnostic problem. It is well known fact that nothing can be so easy, or so difficult, as the diagnosis of appendicitis, it is because the clinical features and special investigations which are all nonspecific and the list of differential diagnosis are too long. Again the diagnosis is particularly difficult in women of reproductive age group and elderly adults due to associated gynecological problems and uncharacteristic abdominal pains respectively. CRP because of its easy availability, cost effectiveness plays a definitive role in the diagnosis of these patients with suspected appendicular perforation and helps in reducing the number of negative laparotomies.

Until now, in our hospital no one has done a study to evaluate the role of CRP, TLC, Neutrophil Count and Alvarado scoring for early diagnosis of appendicular perforation. This study is not a substitute for clinical judgment and just an aid in early diagnosing appendicular perforation and assist in arriving at a conclusion whether a particular case should be operated or not, so that the number of negative laparotomies will be reduced.

Material and methods:

This was a prospective clinicopathological study with included 100 cases. This study included randomly all operated patients (100) suspected of appendicular perforation between 17th September 2016 to 16th September 2018 in the Department Of Surgery.

PATIENTS SELECTION:

INCLUSION CRITERIA:

- All cases diagnosed as acute appendicitis clinically on admission.
- All patients diagnosed as appendicular perforation clinically on admission.
- All patients diagnosed on laparotomy.
- Patients ready to give informed written consent.

EXCLUSION CRITERIA:

- All cases with either primary peritonitis or that due to anastomotic dehiscence.
- All patients with Intestinal perforation.
- All patients not willing for operative procedure.

Clinical signs of appendicular perforation determined by the surgeons and the duration of the symptoms were documented on admission. An informed consent was obtained from all registered cases.

In all patients with pain in right iliac fossa the provisional diagnosis of appendicular perforation was made on the basis of history, clinical signs and relevant clinical data.

Among 100 cases of operated appendectomy in this study patients age group ranged from 0-10 to 90 years. Maximum group of patients belonged to 11 to 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 total 100 operated patients 90 patients diagnosed as HPE positive (90%) Rest 10 patients had HPE negative (normal appendix) i. e, 10%. The negative appendectomy rate in this study is 10%

RESULTS:

TABLE NO 1. CORRELATION OF CRP LEVELS WITH HPE POSITIVE AND NEGATIVE CASES:

CRP	HPE		TOTAL
	POSITIVE	NEGATIVE	
RAISED	69	1	70
NORMAL	20	10	30
TOTAL	89	11	100

Sensitivity:77. 5% Specificity: 90. 9%

PPV: 98. 57. 0% NPV: 33. 33%

By applying Fischer 's exact test there is a significant association between CRP levels and HPE positive/negative cases(p<0. 0001)

TABLE NO 2. CORRELATION OF TOTAL LEUKOCYTE COUNT WITH HPE POSITIVE AND NEGATIVE CASES:

TLC	HPE		TOTAL
	POSITIVE	NEGATIVE	
TLC-RAISED	69	1	70
TLC-NORMAL	20	10	30
TOTAL	89	11	100

Sensitivity: 77% %Specificity: 90%

PPV: 98 %NPV: 33. 33%

Value of $\chi^2 = 8. 5$, p<0. 05, significant

By applying Chi-Square test there is a significant association between Total leucocyte count and HPE positive /negative cases (p<0. 05)

TABLE NO. 3. CORRELATION OF NEUTROPHIL COUNT WITH HPE POSITIVE AND NEGATIVE CASES:

NEUTROPHIL COUNT (NC)	HPE		TOTAL
	POSITIVE	NEGATIVE	
NC-RAISED	53	01	54
NC-NEGATIVE	36	10	46
TOTAL	89	11	100

Sensitivity: 59. 5% Specificity : 90. 9%

PPV : 98. 6%NPV : 21. 7%%

Value of $\chi^2 = 6. 551, p<0. 0044$, significant

By applying Chi-Square test there is a significant association between neutrophil count and HPE positive /negative cases ($p<0. 0044$).

TABLE NO. 4 CORRELATION OF TOTAL LEUKOCYTE COUNT AND CRP LEVELS IN COMBINATION WITH HPE POSITIVE AND NEGATIVE CASES.

WBC/CRP	HPE Positive	HPE Negative	Total
Increased WBC>10, 000cells/mm ³ CRP>6mg/dl	62	4	66
Normal WBC<10, 000cells/mm ³ CRP<6mg/dl	4	10	14
Total	66	14	80

Sensitivity: 93. 9%Specificity: 71. 4%

PPV: 93. 9% NPV : 71. 4%

Value of $\chi^2 = 5. 781, p<0. 05$, significant

By applying Chi-Square test there is a significant association between total leukocyte count and CRP levels in combination and HPE positive /negative cases ($p<0.05$).

TABLE NO. 5 CORRELATION OF NEUTROPHIL COUNT AND CRP WITH HPE:

NC/CRP	HPE Positive	HPE Negative	Total
Increased NC>75 CRP>6mg/dl	66	6	72
Normal NC<75 CRP<6mg/dl	4	10	14
Total	70	16	86

Sensitivity: 83. 33%Specificity : 62. 5%

PPV: 92. 1% NPV : 71. 4%

Value of $\chi^2 = 38. 049, p<0. 05$, significant

By applying Chi-Square test there is a significant association between NC/CRP in combination and HPE positive /negative cases ($p<0. 05$).

TABLE NO. 6: USG FINDINGS:

TOTAL NO. OF CASES	100	PERCENTAGE%
USG POSITIVE	86	86%
USG NEGATIVE	14	14%

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

Discussion:

In our study total 100 patients underwent appendicectomy out of which 9% developed complication. Most common POC – wound infection (in 5 patient), 2% had soakage and 2% had paralytic ileus. This study was done in Department of General Surgery, Pravara Institute of Medical Sciences, Rural Medical College from September 2016 to September 2018. A total of 100 patients were included in this study.

Out of 100 patient 28 were female and 72 were male. Maximum group of people belong to 11-20 years (40 patients) i. e. 40%. Appendicular perforation is mainly a disease of adolescents and young adults⁽⁴⁾. Clinical diagnosis was found to be correct in 90% of cases and negative appendectomy rate was 10% in this study. The sensitivity, specificity, predictive value of positive test and predictive value of negative test of TLC in our study is 80. 9%, 75%, 94%, and 42. 85 respectively. These results were in accordance with study by Yang et al⁽⁶²⁾ including high association between TLC and acute appendicitis (Chi-square= 12. 80, P< 0. 0001)

On correlating TLC with HPE positive and negative cases it was found that the sensitivity and specificity of the TLC count was 80. 9% and 75%. It was comparable with the studies done by Hoffmann⁽⁵⁾ (81-84%) Peltola⁽⁶⁾ (76%) (71. 4%) indicating high association between TLC count and acute appendicitis(p= 0. 011439>0. 025). The present study sensitivity and specificity are well correlating with above mentioned studies. Neutrophils and appendicular perforation: In this study, Neutrophilia of more than 75% was seen in 54% of cases. It is comparable with other studies done by Verma⁽⁷⁾(75%), Hoffman⁽⁸⁾ (78%), Marchand⁽⁹⁾(81%) and Yang (53)(88%)

Sensitivity and specificity of neutrophil count in present study was 83% and 62. 5%, which shows it has better sensitivity then TLC and is less specific then TLC. In our study we correlated the Total leukocyte count and CRP, Neutrophil count with CRP, TLC, Neutrophil count and CRP in combination with 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%. When combined value of CRP, TLC and raised Neutrophil count is taken into consideration sensitivity was 100% and specificity was 83. 3 predictive positive value was 96. 7 while negative value was 100%. showing combination of these test will be effective in early diagnosis of appendicitis while Avoiding surgery in these cases can reduce negative appendectomy rate considerably. (p= 24. 92 p<0. 0001).

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.

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