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Original Research Article

Diagnostic efficacy of Fenyo-Lindberg scoring system in patients of acute appendicitis a one-year cross sectional study

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ABSTRACT

Background: Diagnostic scores have been found to be very efficient. The present study was taken up to calculate diagnostic efficacy of Fenyo-Lindberg (FL) scoring system in patients of acute appendicitis.
Methods: A one-year cross sectional study was done on 100 patients in patients with right lower quadrant pain. Group I had patients with score of -2 and above and group II with score below -2. The groups were compared with histopathological diagnosis. Then, the sensitivity, specificity, positive predictable value (PPV) and negative predictable value (NPV) were calculated.
Results: In this study, the males were 52 and females were 48.15 patients, Total leucocyte count (TLC) had more than 14,000 whereas 16 patients had onset of pain in less than 24 hours. 47 patients had vomiting. Tenderness was present in all cases, while rebound tenderness was present in 54% of cases. 98% of patients had progression of pain, whereas migration was seen in 76%. 56% patients had increased pain on coughing. 54 patients had acute appendicitis on histopathology. The study shows that this scoring system has sensitivity of 72% and specificity of 71% in diagnosing acute appendicitis. The PPV was 75% and NPV was 68%.
Conclusions: The FL score is an inexpensive clinical tool that may help the diagnosis of acute appendicitis. The results are comparable to previous studies but as the sample size is small, study has to be done in higher sample size to get the data necessary to generalize the findings and the fact that this study was first on this scoring system in India should also be considered.

Keywords: Appendicitis, Fenyo-Lindberg scoring system, Diagnostic efficiency

INTRODUCTION

Acute appendicitis is an acute inflammatory condition of appendix. Failure in early diagnosis of disease can result in progression and increased severity of disease. It is a very common surgical emergency seen in clinical practice.[1] It affects around 7% of general population and studies shows highest incidence in the age group of 10-30 years.[2,3] With advancement in technology there is increased use of Ultrasound sonography (USG) and Computed tomography (CT), but still the rate of misdiagnosis remains high (15.3%). The misdiagnosed cases are seen more in females than males (22.2% versus 9.3%). Operating on the basis of clinical suspicion alone can result in negative appendicectomy in 15 to 30 % of cases.

In developing countries like India, as early identification of the disease in the first instance is important as good number of people may be working away from home stations, in rural areas or in places where expert clinical advice is not available. These factors can result in missing the diagnosis, and the patient end up in complications like, perforation peritonitis, abscess formation, mass formation, and hence increases the morbidity.[4] As higher radiological

investigations are costly, clinical examination findings remains the mainstay of diagnosis. Diagnostic scores have been found to be very easy and useful, which help in decision-making.

So a clinical scoring system that mainly takes into account the clinical signs and symptoms is important, so that even a doctor working in the remotest area can accurately diagnose appendicitis and can timely refer the patient to a higher surgical center with facilities and can prevent complications and thus reduce the morbidity.

Fenyo-lindberg (FL) scoring system relies mainly on clinical examination and basic investigation i.e. Total leucocyte count (TLC) and can be carried out easily. This study aims to calculate its diagnostic efficacy in cases of acute appendicitis.

Aim

The aim of the study was to evaluate the diagnostic efficacy of FL scoring system in acute appendicitis.

METHODS

This study was done in department of general surgery of KLES Dr. PKH and MRC, Belgaum over a period of one year, from January 2018 to December 2018.

It was a cross sectional study and study period was between January 2018 to December 2018. Sample size was taken as 100 patients.

All consecutive patients fulfilling the inclusion and exclusion criteria and who give informed consent during the period of study will be sample of this study.

Table 1: Fenyo-Lindberg scoring system.[10]

Gender:	Male: 8; Female: 8
TLC	<9,000 microL: 15; 9000 to 13,999: 2; ≥14000: 10
Duration of pain	<24 hours: 3; 24 to 48 hours: 0; >48 hours: 12
Progression of pain	No: 4; Yes: 3
Aggravation of pain by coughing	No: 11; Yes: 4
Vomiting	No: 5; Yes: 7
Migration of pain	No: 9; Yes: 7
Rebound tenderness	No: 10; Yes: 5
Rigidity of abdominal wall	No: 4; Yes: 15
Tenderness outside of RLQ	No: 4; Yes: 6

All the patients were scored by the scoring system and were put into two groups. In 1st group, patients with a total of -2 or more were put and in 2nd group, patients scoring less than -2 were put.

The higher the score the more likely acute appendicitis is present.

Management

- ≥–2: Consider surgery.
- –3 to –16: Observation with repeated examination.
- ≤–17: Observe or discharge home.

After appendicectomy the samples were sent for histopathological examination.

Inclusion criteria was patients presenting with right lower quadrant pain attending surgery Outpatient department (OPD), getting admitted and under treatment at KLES, Dr. PKH and MRC Belgaum. Age group taken was 17 to 65 years, both male and female.

Exclusion criteria included patients not fit or willing for surgery. Appendicular perforation, peritonitis, appendicular abscess, appendicular mass. Pregnant females. Patients who didn't give consent for study.

Ethical clearance for this study was given by the Ethical and research committee, JNMC, Belgaum.

The patients were informed in detail about the risks and benefits of the procedure and a written informed consent was taken before enrollment.

Demographic data such as age and sex were recorded and patients were examined. According to examination findings FL scoring was done. These findings were recorded on a predesigned proforma. TLC was the only investigation required.

RESULTS

This one-year hospital based, cross-sectional study was conducted on hundred patients with right lower quadrant pain in Department of General Surgery, KLES Dr. PKH and MRC, Belgaum over a period of one year, from January 2018 to December 2018.

Demographic data such as age and sex were recorded and patients were examined. According to examination findings FL scoring was done.

The data obtained was entered in Microsoft excel spreadsheet. The data was analyzed and the observations were interpreted as below.

In our study 64% of patients were of age between 16-30 years. Out of 100 patients, the total number of males were 52 and females were 48.

Table 2: Demographic data.

Age groups (in years)	No. of patients	% of patients
≤20	25	25.00
21-30	39	39.00
31-40	21	21.00
≥41	15	15.00
Total	100	100.00
Mean age	28.77	

Table 3: Distribution of patients according to TLC.

WBC count	Number	Percentage
<9,000	47	47
9000 to 13,999	38	38
≥14000	15	15
Total	100	100

Table 4: Distribution according to duration of pain.

Duration of pain (Hours)	Number	Percentage
<24	16	16
24-48	20	20
≥48	64	64
Total	100	100

Table 5: Distribution according to progression of pain.

Progression of pain	Number	Percentage
Yes	98	98
No	2	2
Total	100	100

Table 6: Distribution according to aggravation of pain on coughing.

Aggravation of pain by coughing	Number	Percentage
Yes	56	56
No	44	44
Total	100	100

Table 7: Distribution according to no. of patients who had vomiting.

Vomiting	Number	Percentage
Yes	47	47
No	53	53
Total	100	100

In our study 47 out of 100 patients had total leucocyte count less than 9000, whereas 38 patients had it in the range of 9000-13999 and only 15 patients had total count above 14000.

Table 8: Distribution according to no. of patients who experienced migration of pain.

Migration of pain	Number	Percentage
Yes	76	76
No	24	24
Total	100	100

Table 9: Distribution according to no. of patients who experienced rebound tenderness.

Rebound tenderness	Number	Percentage
Yes	54	54
No	46	46
Total	100	100

Table 10: Distribution according to no. of patients who experienced rigidity of abdominal wall.

Rigidity of abdominal wall	Number	Percentage
Yes	12	12
No	88	88
Total	100	100

Table 11: Distribution according to no. of patients experiencing tenderness outside RLQ.

Tenderness outside of RLQ	Number	Percentage
Yes	6	6
No	94	94
Total	100	100

Table 12: Comparison between F-L scoring system and histopathology.

FL scoring system	Positive	Negative	Total
>-2	39	13	52
<-2	15	33	48
Total	54	46	100

In our study 16 patients presented in less than 24 hours of onset of symptom, whereas 20 patients presented within 24 to 48 hours of symptom. Majority of patients i.e., 64 out of 100 presented after 48 hours of onset of symptom.

Majority of patients i.e., 98 out of 100 had progression of pain. In our study 56 out of 100 patient's complaint of increased pain on coughing.

In our study 47 patient's complaint of vomiting. In our study 76 patients experienced pain initially in umbilical region which later shifted to right iliac fossa. A total of 54 patients had rebound tenderness on palpation. Only 12 patients had rigidity of abdominal wall indicating

peritonitis. Only 6 patients were involved of abdomen other than right lower quadrant.

All the patients were given scores according to the variables of this scoring system and were put into two groups.

Patients with a total of more than 2 i.e. those who had more chances of having acute appendicitis, were put in group 1 and patients with score of less than 2 i.e. those who had less chances of having acute appendicitis were put in group 2.

Using this data, efficacy of FL scoring system was assessed by calculating sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV).

- Sensitivity=72.22%
- Specificity=71.74%
- PPV=75%
- NPV=68.75%

DISCUSSION

A cross sectional study of 100 patients presenting with right lower quadrant pain to surgery OPD at KLES Dr. PKH and MRC Belgaum was undertaken to evaluate the diagnostic efficacy of FL scoring system in appendicitis.

Acute appendicitis is still a common abdominal emergency throughout the world. Its diagnosis mainly depends upon the clinical examination.

So a thorough clinical examination with basic investigations is one of the best diagnostic tools for acute appendicitis The FL score only uses history, clinical examination findings and total leucocyte count, so it can be easily applied, even in remote areas where facilities are less and can help in reaching diagnosis before complications can occur.

The present study was undertaken to evaluate the usefulness of FL scoring system in diagnosing acute appendicitis and reducing the number of negative appendicectomy.

All the patients having right lower quadrant pain were scored according to the scoring system and were taken up for surgery. Histopathology was considered the gold standard for the confirmation of the diagnosis. A total of 54 patients had acute appendicitis on histopathology, while 36 patients had chronic appendicitis.[10] patients were further evaluated, and surgery was not considered.

In our study of 100 patients, the total number of males were 52 and females were 48. In 1992 Pillar in his study on acute appendicitis, found more incidence of this disease in males in comparison to females.[5] Walker et al in their study conducted on 248 patients found this ratio to be 1.3:1.[6]

In our study 47% patients had vomiting. According to review of literature, 51-69% of patients who suffer from appendicitis experience vomiting.[7]

In a study done by Ohmann et al, more than 95% of patients experienced right lower quadrant pain whereas nausea and vomiting were experienced by more than 65% of patients.[8]

In 15 patient's TLC was more than 14,000 whereas a total of 16 patients duration of onset of symptom was less than 24 hours, suggesting association of more severity of appendicitis with high TLC counts.

The TLC is used regularly to diagnose acute appendicitis. A raised TLC is considered sensitive for acute appendicitis but has low specificity. According to studies upto 80% to 85% of patients of acute appendicitis have total count above 10,000/mm^3.[9] In our study 53% of patients had TLC over 9000/mm^3.

In 98% of the patient's progression of pain was seen, whereas migration of pain was seen in 76% of patients and in 56% of patients there was increased sensation of pain on coughing indicating involvement of parietal peritoneum.

On clinical examination of the patients, tenderness at right lower quadrant was present in all cases, while rebound tenderness was present in 54% of cases.

In our study sensitivity was 72% and specificity was 71%. The results of our study were similar to results of previous studies. Fenyo et al conducted a study in which they applied this scoring system in a total of 1167 patients with suspected appendicitis were taken, the sensitivity of scoring system at a cut-off point of score −2 or more was 73% and the specificity was 87% .[10]

Fenyö et al did a study in which 259 patients with suspected acute appendicitis were prospectively taken and scoring system was applied. The scoring system had 90.2% sensitivity, 91.4% specificity, 82.5% PPV and 95.4% NPV.[11]

In a study done by Chong et al, on Raja isteri pengiran anak saleha appendicitis (RIPASA) score, sensitivity was 88% and specificity was 67%, suggesting that RIPASA score has better sensitivity in diagnosing acute appendicitis.

In a study done by Dey et al on Alvarado scoring system, found sensitivity and specificity of 94.2 and 70% respectively.[12] The sensitivity and specificity of MASS in study done by Kanumba et al was 94.1% (males 95.8% and females 88.3%) and 90.4% (males 92.9% and females 89.7%) respectively.[13] These studies show that Alvarado and modified Alvarado scoring system have very high

sensitivity and specificity in diagnosing appendicitis, when compared to our scoring system.

The FL scoring system has a moderate diagnostic efficacy for acute appendicitis

In our study this scoring system had a sensitivity of 72% and specificity of 71% in diagnosing acute appendicitis.

Though it is less sensitive than more widely used Alvarado scoring system. It can be applied on a larger sample size to know the extent of its diagnostic accuracy. Also this study being the first one in Indian population, the results can vary in comparison to previous studies.

The sensitivity and specificity are comparable to previous studies but as the sample size is small, study has to be done in larger sample size to get the data necessary to generalize the findings and if deemed necessary modifications can be done and it can be supplemented by other means leading to better accuracy.

CONCLUSION

The present study revealed that males were affected more than females and the commonest age group affected was 16-30 years of age. It is simple to use and easy to apply since it relies only on history, clinical examination findings and basic laboratory investigations. A raised TLC is regarded as a sensitive test for acute appendicitis but is of limited diagnostic value by itself in doubtful clinical picture because of low specificity. Its significance is in its use with clinical examination and other investigations, not as a separate entity. Pain in right iliac fossa of duration less than 24 hours, of progressive nature, which increases on coughing appears to be the most important symptom while diagnosing appendicitis. Right iliac fossa tenderness along with rebound tenderness appears to be most reliable for diagnosing acute appendicitis. The Fenyo-Lindberg scoring system has a moderate diagnostic efficacy for acute appendicitis. In our study this scoring system has a sensitivity of 72% and specificity of 71% in diagnosing acute appendicitis. Though it is less sensitive than more widely used Alvarado scoring system. It is cost-effective and can be used in all set ups with basic laboratory facilities. The sensitivity and specificity are comparable to previous studies but as the sample size is small, study has to be done in higher sample size to get the data necessary to generalize the findings.

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