

ORIGINAL RESEARCH

Evaluation of diagnostic accuracy of lintula score in acute appendicitis patients

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ABSTRACT

Acute appendicitis is the most common cause of acute abdominal pain requiring emergency abdominal surgery. The clinical presentation is most commonly atypical and symptoms overlap with other abdominal conditions making the diagnosis difficult. There are several scoring systems available in the literature developed by several authors for the diagnosis of acute appendicitis. The variables of Lintula scoring system is purely dependent on physical examination so it can be easily used in rural hospitals where imaging techniques and laboratory tests are not available. Prospective observational study conducted at Department of General Surgery in hospitals which included 130 patients who were clinically diagnosed cases of acute appendicitis who underwent emergency open appendicectomy. The sensitivity, specificity, positive predictive value and negative predictive value of lintula score were 93.1%, 44%, 95.7%, 33.3% respectively. The negative appendicectomy rates were 1.3%. The use of Lintula score has improved diagnostic accuracy compared to that of unaided clinical methods and helps in reducing negative appendicectomy rates.

Key words: Lintula score, acute appendicitis, appendicectomy

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INTRODUCTION

Appendicitis means inflammation of the appendix. Incidences of acute appendicitis peaks in second decade of life. It is one of the most common diseases encountered by a surgeon.¹

Acute appendicitis is one of the most common abdominal emergencies and requires the surgeon to have utmost clinical skills and case and good clinical judgment. Early diagnosis and prompt operative treatment should be done to prevent complications.²

The estimated lifetime risk of developing acute appendicitis is reported to be 8.6% -12% in males and 6.7% – 23.1% in females. Despite the advances in biological markers and imaging modalities, clinical history and examination still remain the mainstay of diagnosis.³

The diagnosis becomes difficult in very young, elderly and females of reproductive age group, who may have atypical presentation of certain conditions that may mimic acute appendicitis. Although imaging techniques and laboratory tests are helpful in the diagnosis, scoring systems have been reported in literature and have reduced the number of negative appendectomies. Diagnostic delays and management

of appendicitis is associated with prolonged hospitalisation, increased rate of perforation, wound infection, abscess formation and late intra-abdominal adhesions.⁴

Appendicectomy is the treatment of choice and early surgical intervention is advocated after accepting a significant negative appendicectomy rate of about 15-20. The economic burden increases if negative appendicectomy rates are high which necessitates for better ways for supporting the diagnosis of acute appendicitis.

Abdominal ultrasonography is widely used for diagnosis of acute appendicitis as it is easily available, portable, repeatable and non-invasive.⁵

There are many scoring systems in literature that facilitate the diagnosis of acute appendicitis and Lintula score is one of them. The variables of Lintula scoring system is purely dependent on physical examination. It contains nine variables and a total score of 32 and patients with score of 21 or more are recommended to undergo appendectomy and less than or equal to 15 are amenable to discharge and ones with the score of 16-21 being equivocal need other diagnostic modalities for diagnosis of the condition. The sensitivity of the score being 92%.⁶

As Lintula scoring system is purely based on physical examination findings it can be easily used in rural hospitals where imaging techniques and laboratory tests are unavailable.

METHODOLOGY

Source of data

A cross sectional study was conducted on patients presenting to hospitals with features suggestive of acute appendicitis.

Inclusion criteria

1. Patients above 18 years of age.
2. Patients willing to give informed consent.
3. Patients undergoing appendectomy after being diagnosed with acute appendicitis based on clinical features, blood investigations and ultrasound scan.

Exclusion criteria

1. Patients not willing to give consent.
2. Patients under the age of 18 years.

Results

Table 1: Presentation to hospital after onset of symptoms

Presentation since onset of symptoms(days)	Number of patients
<1 day	62
1-2 days	48
2-3 days	20
4-5 days	4
total	130

Most of the patients presented with right iliac fossa pain (99.2%)

Table 2: Frequency of symptoms

Symptomatology	Number of patients with positive symptoms	Percentage (%)
Right iliac fossa pain	129	99.2
Anorexia	89	68.4
Nausea and vomiting	80	61.5
Fever	83	63.8
Dyspepsia	4	3.07
Diarrhea	8	6.1
Constipation	2	1.5
Urinary frequency	4	3.07

Most of the patients had right iliac fossa tenderness (87.6%) and rebound tenderness (52.3%)

Table 3: Frequency of signs

Signs	Number of patients with positive signs	Percentage
Right iliac fossa tenderness	129	99.2
Rebound tenderness (blumberg's sign)	91	70
Guarding	95	73.2
Psoas sign	22	16.9
Obturator sign	6	5.3
Rovsing's sign	18	13.8

Table 4: Parameters of Lintula score

Parameters of lintula score	Positive in number of patients	Percentage
Sex	84	64.6
Intensity of pain	94	72.3
Relocation of pain	80	61.5
Vomiting	80	61.5
Pain in rlq	129	99.2
Fever	83	63.8
Guarding	95	73.1
Bowel sounds	64	49.2
Rebound tenderness	91	70

Table 5: Association between Lintula Score and acute appendicitis

Lintula score	HPE		total
	Acute appendicitis	Normal appendix	
<15	8	4	12
15-21	35	4	39
>21	78	1	79
Total	121	9	130

Sensitivity of lintula score =93.3%

Specificity of lintula score =44.4%

Positive predictive value of lintula score=95.7%

Negative predictive value of lintula score=33.3%

Diagnostic accuracy of lintula score=90%

Negative appendicectomy rate in accordance to lintula Score=1.3%

DISCUSSION

Acute Appendicitis is one the commonest surgical emergency and it can mimic a variety of different intra abdominal conditions, making it difficult for the surgeon to make a clear diagnosis.⁷ An early and accurate diagnosis of important as the delay in the diagnosis and treatment may result in complications. Even the too active surgical approach will significantly increase the negative appendicectomy rates and the rates were higher in the past which was about 15% to 25% and was accepted in order to avoid complications.⁸ Negative appendicectomy had lower mortality rate and the surgery was associated with morbidity and complications like surgical site infections, faecal fistula, adhesions and hernia. Hence the negative appendicectomy can be reduced by increasing diagnostic accuracy. The clinical manifestations, blood investigations indicating inflammation and radiological investigations like ultrasound or CT and even diagnostic laparoscopy are used to diagnosis acute appendicitis. These investigations have increased diagnostic accuracy and helped to lower the rate of negative appendicectomy. There are several diagnostic scoring systems that improve diagnostic accuracy by supplementing clinical judgment. Lintula score is one such scoring system and is purely based on the history and physical examination. The sensitivity of the test was about 92% with positive predictive value of 97% in previous studies.^{9,10}

In the current study the sensitivity of lintula score was 93.3% with positive predictive value of 95.7% which is consistent with the previous studies. Our study showed lower specificity which was around 44% and negative predictive value of 33.3% which could be attributable to the the parameters of the scoring which is purely clinical and physical examination based scoring system. The negative appendicectomy rate was 1.3% in our study on application of lintula score. The mean duration of presentation was 1.6 days and most common presenting feature being right iliac fossa pain. As a conclusion, this study supports the use of lintula scoring system as a diagnostic tool in suspected acute appendicitis patients specifically in

areas where radiology investigations are not available. However the current study suggests that the the diagnostic score could be a useful aid in the diagnosis and managing the patients with acute appendicitis. It is specially helpful in the areas where imaging investigations are not available and based on the clinical judgment and by increasing the diagnostic accuracy by clinical methods and appropriate referral of the patients to the higher centres for imaging and management of the patients with suspected acute appendicitis.

CONCLUSION

In conclusion, the study shows that proper and repeated clinical examination has significantly increased the diagnostic accuracy in patients with suspected acute appendicitis. The use of Lintula scoring system has improved the positive predictive value of the disease compared to that of unaided clinical diagnosis. It is specially useful in areas where imaging facilities are not available and selected patients can be referred to higher centres for imaging investigations which help reduce the financial burden on patients with low socioeconomic status.

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