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Research Article

Paediatric appendicitis scoring: a useful guide to diagnose acute appendicitis in children

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ABSTRACT

Background: Pain in abdomen is common reason for which a child is brought to a surgeon and acute appendicitis is one of the common differential diagnoses in these children. In spite of availability of modern radiological and pathological investigations, even today the diagnosis of acute appendicitis depends mainly on clinical grounds and simple blood count. Pediatrics appendicitis scoring (PAS) which is based on clinical symptoms and sign along with WBC count is a good guide in diagnosis of acute appendicitis. The patient with scoring more than 7, were found to have acute appendicitis and required surgical intervention while those with score <5 could be treated conservatively without any squeal. The Paediatric appendicitis scoring could be helpful to diagnose acute appendicitis early thus reducing morbidity and mortality of the condition by early surgical intervention on one hand and reducing unnecessary exploration on the other.

Methods: Patients of acute abdomen admitted in paediatric surgical ward of Kamla Nehru Hospital, Gandhi Medical College, Bhopal, MP, India during the period 14 October 2002 to 03 October 2003 were studied. All the case (25) of acute abdomen suspected to be acute appendicitis were included in this series. A uniform prospective data form was completed which included Demographic data, duration of symptoms, Physical signs, Laboratory, Histopathological examination. Patients were classified into two groups, group I with appendicitis and group 2 nonappendicitis according to final score obtained by each variable. Patients with scoring >7 were included in group I while those with >5 scoring were in group 2. Treatment was given accordingly. (Operative or Non-operative) outcome of the study was noted.

Results: In the study, children of age group from 4 to 12 years were included; peak incidence was between 8-10 years, with male: female ratio of 3:1. The size of incidence in both the sex is maximum between 9 to 12 years of age. Tenderness in the rt. Lower quadrant of abdomen on cough/percussion/hopping and tenderness over right iliac fossa has the highest incidence. Leucocytes also has the sensitivity of >75% while anorexia is least sensitive. The patients were grouped in two categories as per the paediatric appendicitis scoring, those patients with PAS >7 were grouped under group I, 10 out of 15 patients underwent appendectomy.

Conclusions: Pediatric appendicitis score is a simple relatively accurate diagnostic tool for accessing an acute abdomen and diagnosing acute appendicitis in children. According to this study, PAS is of value in the preclinical evaluation of patients with suspected acute appendicitis and may be instrumental as a quality control tool and in clinical guidelines.

Keywords: Acute appendicitis, Pas score, Appendicectomy

INTRODUCTION

Pain in abdomen is common reason for which a child is brought to a surgeon and acute appendicitis is one of the common differential diagnoses in these children. Although acute appendicitis is less common in Indian children as compared to their Western counterparts, however regardless of where and with what frequency it occurs' appendicitis remains an enigma, a simple disease that despite our best efforts remains the most commonly misdiagnosed surgical emergency.

The condition has to be distinguished from that in adults by variability of symptoms producing errors in diagnosis especially in infants and its more rapid course due to poorly developed systematic and local resistance.[1-3]

In spite of availability of modern radiological and pathological investigations, even today the diagnosis of acute appendicitis depends mainly on clinical grounds and simple blood count. Pediatric appendicitis scoring (PAS) which is based on clinical symptoms and sign along with WBC count is a good guide in diagnosis of acute appendicitis. The patient with scoring more than 7, were found to have acute appendicitis and required surgical intervention while those with score <5 could be treated conservatively without any squeal.[4,5]

The Paediatric appendicitis scoring could be helpful to diagnose acute appendicitis early thus reducing morbidity and mortality of the condition by early surgical intervention on one hand and reducing unnecessary exploration on the other.[6] With the above background the present study was conducted to see the usefulness of PAS in diagnosis of pediatric acute appendicitis cases.

METHODS

Acute appendicitis still remains the most important cause of acute abdominal conditions. The causes of acute appendicitis are several but only two of them are main namely obstruction and enterogenous infection.

The present study is about the clinical vigilance regarding the prompt diagnosis and treatment of this acute abdominal condition in pediatric age group.

Patients of acute abdomen admitted in paediatric surgical ward of Kamla Nehru Hospital, Gandhi Medical College, Bhopal, MP, India during the period 14 October 2002 to 03 October 2003 were studied. All the case (25) of acute abdomen suspected to be acute appendicitis were included in this series. A uniform prospective data form was completed which included Demographic data, duration of symptoms, Physical signs, Laboratory, Histopathological examination. Out of these variables, eight variables were selected for this study, which are most commonly found in acute abdominal cases in children. They are as follows;(a)Cough/ percussion/ hopping tenderness in right lower quadrant of abdomen ;(b) Anorexia; (c) Pyrexia; (d) Nausea and vomiting;(e) Tenderness in right iliac fossa; (f)Leucocytosis; (g)Poly morphonuclear Neutrophilia ;(h)Migration of pain.

Each of these variables were assigned a score of 1 except for physical signs i.e. (a) & (e), which were assigned a score of 2 as (a) and (e) has good diagnostic index.

This study also included patients who had appendicular mass with peri appendicular abscess. Patients were classified into two groups, group I with appendicitis and group 2 nonappendicitis according to the final score obtained by the score of each variable. Patients with scoring >7 were included in group I while those with >5 scoring were in group 2. Treatment was given accordingly. (Operative or Non-operative) outcome of the study was noted. Data was compiled in MS excel and checked for its completeness, correctness and then it was analyzed. Suitable statistical test was applied and p value <0.05 was considered as a statistical significant.

RESULTS

This study also included the patients who had appendicular mass with peri-appendiceal abscess. In the study, children of age group from 4 to 12 years were included; peak incidence was between 8 to 10 year, with male: female ratio of 3:1. The size incidence in both the sexes is maximum between 9 -12 years of age (Table1 and 2).

Table 1: Age, sex incidence.

Age group (years)	Total number of cases	
	Male	Female
1-4	1	-
5-8	6	1
9-12	12	5
Total	19	6

The above table is showing the incidences of each sign and symptom beside the sensitivity and specificity of each variable. Tenderness in the right Lower quadrant of abdomen on cough/percussion/hopping and tenderness over right iliac fossa has the highest incidence. Leucocytes also have the sensitivity of >75% while anorexia is least sensitive as shown in Table 3, Figure 1.

The above table is showing the Paediatric Appendicitis scoring (PAS) of each patient as per the clinical sign and symptoms presented at the time of admission .The treatment modalities were decided as per the final PAS scoring. Association between these 2 variables was found significant Table 4, Figure 2.

Table 2: On admission incidences of various signs and symptoms.

Age (years) /Sex	Tenderness in Rif on cough percussion/hopping	Anorexia	Pyrexia	Nausea/ Emesis	Tenderness in Rif	Leuko cytosis	Polymorpho nuclear neutrtophilia	Migratio n of pain
10/M	A	+	A	+	+	A	A	+
9/F	+	A	+	+	+	A	A	+
12/M	+	A	+	+	A	+ +	A	A
10/M	A	+	A	+	+	+	A	A
11/F	+	A	+	A	+	+	+	+
12/M	+	+	A	A	+	A	A	A
9/F	+	A	A	+	+	+	+	A
11 1/2F	+	+	+	A	+	+	A	+
8/M	+	A	+	+	+	+	A	A
11/M	+	+	A	+	+	+	+	+
11/F	A	A	+	+	A	+	+	+
8/M	+	A	+	+	+	+	+	A
8/F	+	+	A	+	A	+	A	A
10/M	+	+	A	+	+	+	+	+
7/M	+	A	+	+	+	+	+	+
10/M	+	A	+	+	+	+	A	+
10/M	A	A	+	+	A	A	+	+
12/M	+	+	A	A	+	+	+	+
9/M	+	A	+	A	+	+	+	A
3 1/2/M	A	A	+	+	+	+	A	A
7/M	+	+	+	A	A	+	A	A
12/M	+	+	+	+	+	A	A	+
12/M	+	A	A	+	+	A	A	A
5/M	+	A	+	A	+	+	+	+
8/M	+	+	+	+	+	+	A	+

Table 3: Incidence of clinical features with sensitivity and specificity.

Variable	No. of Patient	Incidence (%)	Sensitivity (%)	Specificity (%)
Cough/Percussion hopping tenderness in Right lower quadrant of abdomen	20	80	75	40
Anorexia	11	44	20	60
Pyrexia	16	64	86.6	60
Nausea/Vomiting	17	68	66.6	40
Tenderness over the Right Iliac fossa.	20	80	60	50
Leucocytosis	19	76	80	44
Polymorpho nuclear Neutrophilia	11	44	66.6	40
Migration of pain	17	52	66.6	70

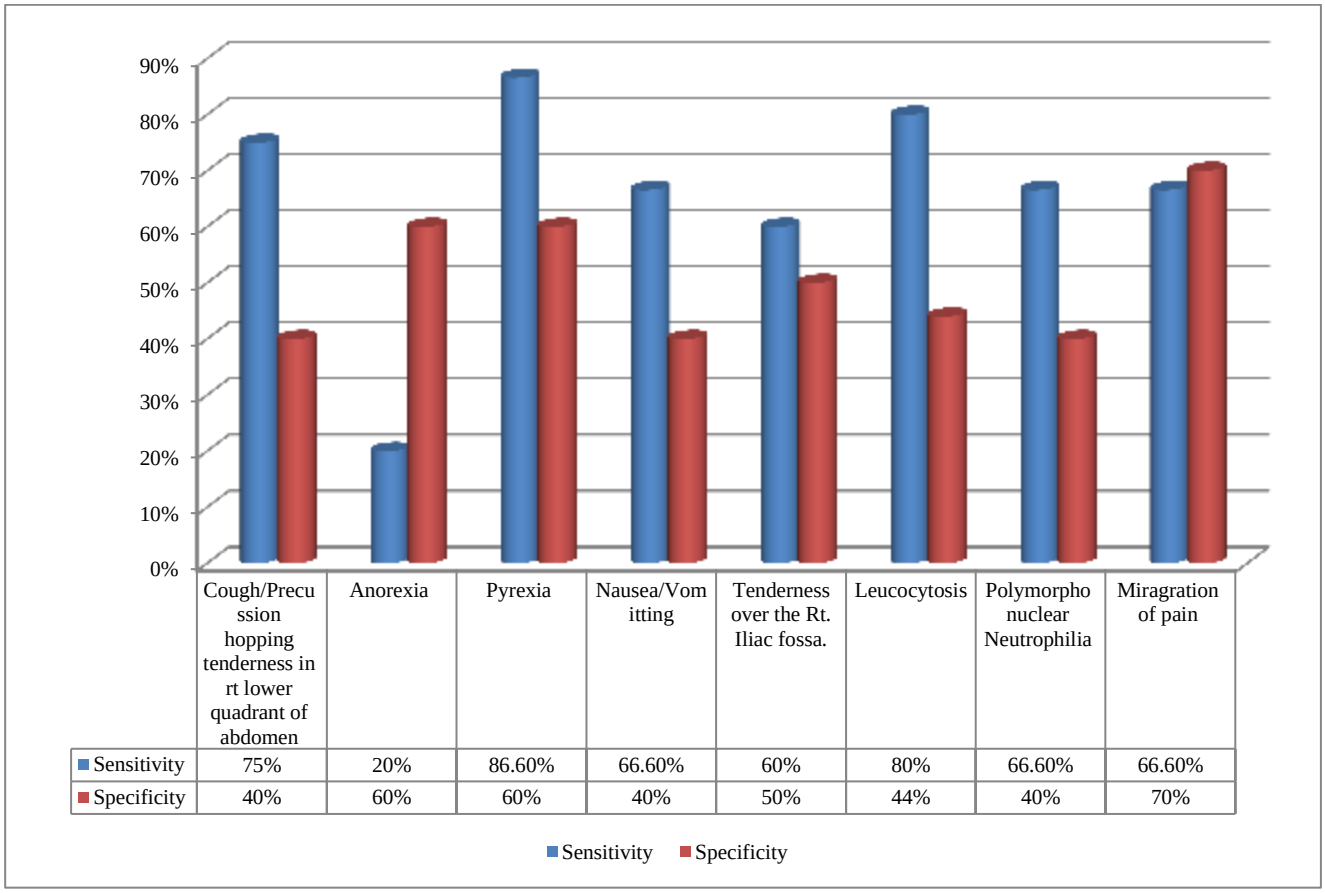
Table 4 : Management modality according to PAS score.

PAS score	Management modality	
	Conservative	Appendicectomy
5	10	0
6	1	0
7	1	4
8	2	3
9	1	3

Chi square test value 13.542, d.f.=4, p value <0.01 [Significant].

The patients were grouped in two categories as per the paediatric appendicitis scoring, those patients with PAS >7 were grouped under group I, 10 out of 15 patients underwent appendectomy. While the other five patients

whose PAS was >7, two of them developed appendicular lump, two patient were drained for appendicular abscess, the 5th patients was lost from the follow up study who was advised interval appendicectomy later on. Group II patients were those whose PAS was >5. These patients were treated conservatively without any further complication as shown in Table 5.



	Cough/Precussion hopping tenderness in rt lower quadrant of abdomen	Anorexia	Pyrexia	Nausea/Vomitting	Tenderness over the Rt. Iliac fossa.	Leucocytosis	Polymorpho nuclear Neutrophilia	Miragration of pain
Sensitivity	75%	20%	86.60%	66.60%	60%	80%	66.60%	66.60%
Specificity	40%	60%	60%	40%	50%	44%	40%	70%

Figure 1: Incidence of clinical features with sensitivity and specificity.

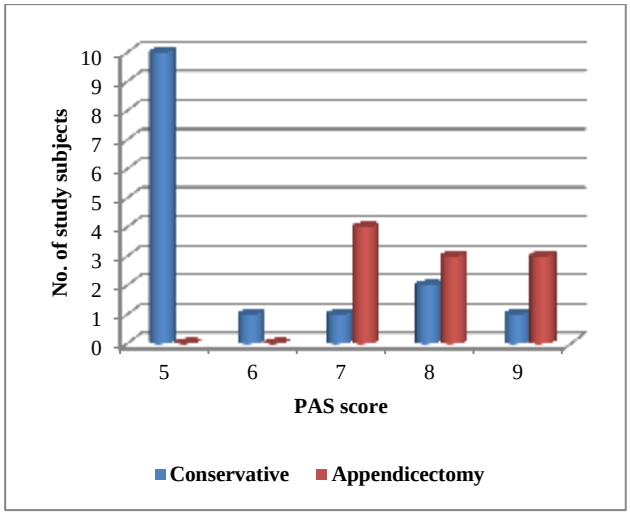


Figure 2: Management modality according to PAS score.

Table 5 : Categorization of patient according to PAS score.

Type of patients	No of patients	PAS
Group I (Appendicitis)	15	≥7
Group II (Non appendicitis)	10	≤5

DISCUSSION

Appendicitis is common acute surgical emergency especially in pediatric age group the early diagnosis of this condition is important in order to decrease the morbidity and mortality.[7]

In the present work we have studied the signs and symptoms along with laboratory findings most commonly presented by a patient of acute abdomen suspected to be acute appendicitis.

Pediatric appendicitis scoring specially addresses Symptomatology and physical signs unique to children. Physical signs such as couth, percussion tenderness, and hopping tenderness in the right iliac fossa had significant correlation and hence were assigned as a single variable with a score of two. Tenderness in the right iliac fossa especially over MC-Burney's point in combination with the above physical signs had a good diagnostic index, and therefore was assigned score of 2. Rebounds tenderness is a particularly painful clinical feature and results in unique pain, loss of confidence and trust, and particularly leads to loss of co-operation. Hence this physical sign should not be elicited in children. Pyrexia, Leucocytosis and polymorph nuclear leucocytosis are valuable variables in diagnosis of appendicitis.[8]

Our study has a good correlation of total white blood cell count and had sensitivity (>80%) and specificity (>90%) and was selectively accurate in the diagnosis of appendicitis in confusion with other symptoms and signs.[9]

An ideal test should be 100% sensitive and specific with a predictive value of 100% with no false positive or negative results, so that the joint probability is 100%. However the 8 variables in the pediatric appendicitis do overlap with other disease as seen in this study, hence single PAS does not give 100% certainly. These are not symptoms, sign of laboratory test that is 100% reliable in the diagnosis of appendicitis. Hence, a simple recurrent clinical examination using PAS as a guide may be more helpful than a single investigation.

This scoring system allows us to approach a child with abdominal pain rationally using, common symptoms, signs, and full blood count result to arrive at decision whether to operate or observe. In patients with uncertain diagnosis of acute abdominal pain, a policy of active observation in the hospital is usually practiced. PAS can be used as a simple guide for repeated clinical examination to decide if the patient needs observation or surgery.[8]

If there is doubt in the diagnosis, the patient should be re-evaluated after 4 hrs. After adequate intravenous fluid resuscitation, and if the score remains the same or increases the patient may need laparotomy. PAS is flexible to allow +1 bias on an individual basis and a score of >6 show a high probability of acute appendicitis.

PAS can be used in regular critical clinical audit of appendectomies so as to reduce the negative appendicectomy rates <5%, as shown in this study and can be used as an ongoing stimulus to good clinical practice.

Mild Leucocytosis, ranging from 10000 to 18,000/ mm^3 is usually present in patients with acute appendicitis also it has polymorph nuclear predominance.[9]

Other investigations such as pain X-ray abdomen although it was frequently performed but as a part of general evaluation of a patient with an acute abdomen, are rarely helpful in diagnosis of acute appendicitis.

Ultrasonography though is a helpful modality for the diagnosis of acute appendicitis having sensitivity up to 78 to 96% and specificity of 85 to 98%; it is not included in the present study.[10]

Unlike earlier studies for evaluating symptoms and signs in the patients of acute appendicitis the present study is prospective and fully integrated.

In these study 25 cases of acute abdomen with prospective diagnosis of acute Appendicitis was studied.

In this study, 15 cases were patients with acute appendicitis, out of 15, 10 cases underwent appendectomy and all had positive findings. Rest of the 5 patients had developed either appendicular mass or appendicular abscess which was treated likewise. Thus the rate of negative appendectomy in our study is 0%. Other studies reported incidence of negative appendectomy was ranged from 0% to 21%.

In our study the peak incidence of acute appendicitis is between 8-12 years, the sex incidence trend is same as found by the other authors.

In our study, Leucocytosis and poly morphonuclear neutrophilia were equally sensitive, with sensitivity of 0.8 and 0.6 respectively.

With the present work we confirm the utility of the scoring system in the preoperative diagnosis of acute appendicitis and in our opinion it is useful system for a first, rapid and economic evaluation in the pediatric emergency department.

CONCLUSION

Pediatric appendicitis score is a simple relatively acute diagnostic tool for accessing an accurate abdomen and diagnosing acute appendicitis in children. Based on the present study, appendicectomy can be recommended to the patients with PAS >7, surgery can be deferred in non-appendicitis group with PAS <6. According to this study, PAS is of value in the preclinical evaluation of patients with suspected acute appendicitis and may be instrumental as a quality control tool and in clinical guidelines. Therefore scoring may be used in primary care of patients suspected of acute appendicitis to help decide on early referral to hospital.

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