

# Presentation of Acute Appendicitis in Children

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## ABSTRACT

**Objectives:** To identify the presenting symptoms, signs and outcome of management in children with appendicitis

**Study Design:** Retrospective descriptive study

**Place & Duration of Study:** Pediatric Surgery Department, Bolan Medical Complex Hospital, Quetta, From January 2009 to June 2010.

**Methods:** All those patients with diagnosis of Appendicitis were included in this study. A detailed history, clinical examination and relevant investigations were done. Operative findings were recorded. The final diagnosis was determined by operating surgeon's impressions and by histopathology.

**Results:** A total of 79 children under the age of 14 years with a diagnosis of acute appendicitis between January 2009 and June 2010 were reviewed. The average age of the patients was 10.13 years. The most common presenting complaints were pain right lower quadrant 84.84%, anorexia, 72%, nausea/vomiting 67%. The mean duration of pain was 35.92 hours. Maximum tenderness over right lower quadrant and rigidity were important diagnostic signs. Psoas and Rovsing signs could be elicited in up to 1/3 of patients; however presence of these signs was strongly associated with appendicitis. Seven patients presented with generalized peritonitis. At surgery 70/79(88.60%) patients had appendicitis, of these 14(20%) had perforated appendix. Post operative complications included wound infection and dehiscence of wound in 27% patients.

**Conclusion:** Appendicitis is a common surgical condition; a careful history and physical examination are key to diagnosing appendicitis in children. Delay in diagnosis is associated with complications.

**Key words:** Appendicitis, Appendectomy, Children, Perforation.

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## INTRODUCTION

Appendicitis is one of most common condition requiring urgent abdominal surgery<sup>1</sup>. In 1886 Fitz presented his classic paper describing the clinical features of appendicitis and recommended early removal of inflamed appendix<sup>2</sup>. With an estimated incidence of 4/1000 school age children per year it accounts for up to 30% of pediatric presentations with abdominal pain<sup>3</sup>. The diagnosis of appendicitis is difficult in children, particularly in very young children due to overlap of clinical manifestations with many childhood illnesses and the preverbal state of young children<sup>4,5</sup>. In addition the diagnosis of appendicitis in young children is often not consistent with the classical description for appendicitis for adolescents and adults<sup>6</sup>. Delayed diagnoses is associated with increased perforation rates, peritonitis and abscess formation<sup>7,8</sup>. The diagnosis of acute appendicitis is usually based on medical history and clinical examination<sup>9</sup>. Several scoring systems have been devised to increase the sensitivity and specificity in diagnosis of acute appendicitis in children<sup>10,11</sup>, but neither has been validated to be implemented in clinical practice.<sup>12</sup> Attempts to increase the diagnostic

accuracy in acute appendicitis have included computer aided diagnosis, imaging by ultrasonography, helical CT scan, laparoscopy and even radioisotope imaging<sup>13</sup>. Despite an increased use of these modalities, none has demonstrated a clear advantage over a careful clinical examination<sup>14</sup>.

This study was conducted to review the presenting symptoms and signs, management and outcome of children who underwent laparotomy for appendicitis in our setup.

## PATIENTS AND METHODS

This retrospective study was carried out on children admitted with suspected diagnosis of acute appendicitis at Pediatric Surgery Department of Bolan Medical College Quetta, over a period of eighteen months from January 2009 to June 2010. All children under 14 years of age diagnosed with appendicitis who subsequently underwent an appendectomy were included in this study. History, clinical examination, white blood count and differential counts and urinalysis were used as the primary diagnostic tools. Abdominal ultrasound was performed in 53/79(68%) of patients. It was not done in children with evident clinical signs of peritonitis and in children with mild clinical signs whose condition

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improved after observation of few hours. All children received intravenous hydration and antibiotics coverage before operation. Patients were operated by conventional method of appendisectomy. The diagnosis was confirmed at laparotomy and/or on histopathology. Duration of presenting symptoms, signs, laboratory and imaging reports, operative findings and postoperative course in these patients was reviewed.

## RESULTS

During the period of eighteen months 79 children were operated for suspected diagnosis of appendicitis. Their ages ranged from 3 years to 14 years. The mean age of the patients was 10.13 years. There were 54(51.89%) boys and 25(32%) girls. Seventy seven percent of patients presented within forty eight hours of their initial symptoms. It was longer for children s with complicated appendicitis than for those with early appendicitis. There were 8(10.12%) patients below six years age, 30(37.97%) between seven and ten years and 41(51.89%) between eleven and fourteen years respectively (Figure 1).

The most common symptom at presentation was pain abdomen. Sixty seven (84.81%) patients had pain in right lower quadrant. Eight patients had atypical pain involving whole abdomen or it was felt in epigastric region. Four patients were too young to communicate the localization of pain. The classic shift of pain from umbilical region to right lower quadrant was observed in 21(26.58%) patients. Twenty three (29.11%) patients had a history of one or more such episodes of pain in the past. Nausea /vomiting were reported in 53(67%) patients and anorexia was noted in 57(72%) patients. The most consistent physical sign was abdominal tenderness observed in 95% (75/79) patients. Among them right lower quadrant tenderness was noted in 67(84.84%) patients while generalized tenderness was observed in 8 (10.12%) patients. Rebound tenderness could be elicited in 45.56% (36/79) patients. Thirty seven (46.83%) patients had fever ( $\geq 38^{\circ}\text{C}$ ), out of them ten patients had a temperature over  $39^{\circ}\text{C}$ . Full blood count was done in all patients. Sixty five (82.27%) had leucocytosis with a white blood count over  $10,000/\text{mm}^3$ , the other twelve patients had their leucocytes count within normal range (Table 1).

Ultrasonography of abdomen was performed in 54/79 patients. In 42 (77.77%) patients findings were suggestive of acute appendicitis .3 of the 42 patients with positive findings had perforated appendix at the time of surgery whereas 4 patients were found to have normal appendix. Ten patients with false negative diagnosis and three patients with equivocal

findings on ultrasound had to be operated on strong clinical suspicion and laboratory findings. At operation 88.60 % ( 70/79) patients were found to have acute appendicitis, and 9 (11.39%) patients had a normal (negative) appendix. Out of 70 patients, 45 (68.28%) had simple acute appendicitis, 16 (22.85%) patients had advanced/ gangrenous appendicitis without perforation and 14 (20%) had advanced appendicitis with perforation. Pus around appendix and pelvis was found in 27 (38.57%) patients. Postoperative complications occurred in 21 (26.9%) patients. Wound infection occurred in 13(61.90%) patients, 6(28.57%) developed wound dehiscence and 2(9.52%) patients were complicated with prolonged ileus. All complications were managed accordingly. The average hospital stay was 7 days. There was no mortality due to appendicitis.

Fig.1: Number of patients according to age

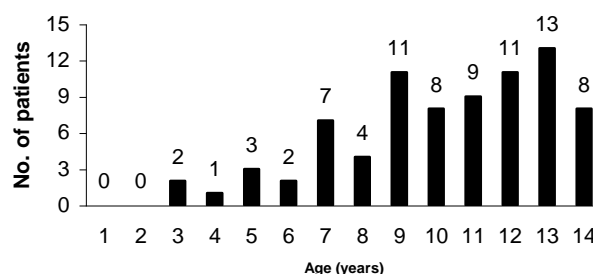


Table 1: Clinical features

Symptoms/Signs	=n	%age
History of focal RLQ pain	67	84.8
History of migration of pain to RLQ	21	26.6
Anorexia	57	72.0
Nausea/vomiting	53	67.0
Fever $\geq 38^{\circ}$	37	46.8
Maximum tenderness at RLQ	67	84.8
Guarding	33	41.8
Rebound tenderness	36	45.6
Rovsing's sign	25	31.7
Psoas sign	17	21.5
Bowel sounds (decreased/absent)	20	25.3
Leucocytosis	65	82.27

## DISCUSSION

Appendicitis is a common surgical emergency. Diagnosis is based primarily on the patient's history and the physical examination. These two are still the most important bases for decision making for the diagnosis of appendicitis. It has been estimated that the accuracy of the clinical diagnosis of acute appendicitis is lying between 76% and 92%, with values correlating with the surgeon's experience.<sup>15</sup> The diagnosis of appendicitis is problematic in young children because many present with symptoms and

signs that mimic other common, but self limited causes of abdominal pain. It is estimated that one third of children with abdominal pain have been evaluated by a physician for their symptoms, resulting in misdiagnosis rates from 28% to 57%<sup>16</sup>.

Appendicitis is reported to be more common in males than females with the ratio of 1.4<sup>17</sup>, while in our series male to female ratio was 2.1:1. Abdominal pain, anorexia and nausea/vomiting were most common symptoms in our patients. The classic shift of pain from umbilicus to right lower quadrant was observed in only 26.58% patients. Our findings are consistent with the literature<sup>7,18,19</sup>. The most frequently elicited sign on abdominal examination was right lower quadrant tenderness in our patients. This was also observed by others in previously published reports<sup>18,19</sup>. Positive Rovsing's, psoas or obturator sign were less frequently elicited in our patients. Marrero et al<sup>20</sup> reported positive Rovsing's sign and psoas sign in over 90% of their patients; however presence of these physical signs in our patients was strongly associated with appendicitis.

Elevations in the peripheral white blood count (WBC) have been noted in children with appendicitis. Consistent to the findings in literature, we observe high white blood counts in 82.27% of our patients.<sup>21</sup> This finding is however non specific<sup>23</sup>. The sensitivity and specificity of increased WBC or elevated neutrophils for appendicitis in literature is up to 80%<sup>24</sup>. Ultrasonography has been studied extensively in the evaluation of children with suspected appendicitis. The reported sensitivity and specificity of ultrasonography for appendicitis is over 90%<sup>21,25</sup>, suggesting that it may be a valuable tool in the diagnosis of appendicitis. In our experience it is very operator dependant, it can only complement clinical judgment because in few cases inflamed appendix can not be visualized due to bowel gases. Hence positive ultrasound as prerequisite for appendisectomy will increase perforation rate and increase morbidity.

The overall appendice perforation rate in our patients was 20%. This compares favorably to other pediatric series, the rates of which have ranged from 19.3% to 47%<sup>19,26,27</sup>. Many different factors are associated with perforation rate, which in general varies inversely with age and directly with duration of illness.<sup>27-29</sup> In preschool age children this is thought to be due to an inability to communicate pain symptoms and to cooperate during physical diagnosis. They commonly suffer from other intercurrent diseases like upper respiratory tract infection, urinary tract infection or gastroenteritis making their clinical picture even more complicated. All these factors lead to confusion and to delay in diagnosis<sup>8,9,29</sup>.

In this study the negative appendectomy rate

was 11.39%. Because a missed diagnosis often leads to perforation and complications, rates of negative appendectomy of 12% to 20% are considered acceptable in children.<sup>30,31</sup> Utilization of advanced diagnostic tools like Laparoscopy and CT scan may increase diagnostic accuracy in suspected cases of appendicitis; however their use has not shown to improve the outcome of negative appendectomies and perforation.<sup>14</sup> Looking into literature it is evident that the diagnosis of appendicitis is essentially clinical even in the presence of advanced imaging techniques. A high level of clinical suspicion and repeated clinical examination is required to decide about the decision of timely surgical intervention in order to avoid the complications of disease<sup>13</sup>.

## CONCLUSION

Acute appendicitis is the most common acute abdominal condition necessitating emergency surgery. A careful history and physical examination are most important diagnostic tools in evaluating a child for appendicitis. The accuracy of clinical diagnosis in suspected cases of appendicitis can further be improved by repeat clinical examination and active observation.

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