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STUDY ON ABDOMINAL PAIN IN CHILDREN

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ABSTRACT

Introduction: Acute abdominal pain is one of the most common problems in children admitted to the pediatric casualty and often presents a diagnostic dilemma for primary physicians. Acute abdominal pain in pediatric patients has been a challenge because of the nonspecific nature of symptoms and difficulty in the assessment and physical examination due to the poor ability to express and uncooperative nature of the children. In the present study, we analyzed the etiologies, imaging findings and clinical course of pediatric patients with acute abdominal pain and also analyzed the prevalence of various etiologies of acute abdominal pain in different age groups in children admitted to the pediatric emergency room.

Aim of the study: This study is to analyze the etiology and clinical spectrum in children of different age groups and in different months of a year and role of different imaging modalities in the diagnosis and management of acute abdominal pain in Paediatric emergencies.

Materials and Methods: From January 2017 to December 2018, we retrospectively analysed 2880 case records of pediatric patients who presented to the pediatric emergency room with abdominal pain. Of these patients, 288 were identified as having acute abdomen. These patients were divided into three age groups: less than 2 year, 2 to 5 years and 6 to 12 years. The prevalence, clinical presentations and imaging findings, and hospital courses were analysed. All patients with abdominal pain due to trauma were excluded from this study.

Results: Acute abdomen had a non-traumatic etiology in 245 out of the 288 patients and was due to trauma in 43 patients. There were 157 boys and 131 girls whose age ranged from 1 month to 12 years (mean age 5.7 years) in non trauma group children. The most common etiology in less than 2 years group was intussusception (23), followed by obstructed inguinal hernia (13). Acute appendicitis was the major cause in children 2 to 5 years (37) followed by mesenteric adenitis (21). Dilated bowel loops and local ileus were the two most common findings demonstrated by plain film X-rays. Children with acute abdominal pain are subjected for abdominal ultrasonogram and CAT scan. Patients with bowel perforation or intestinal obstruction had the longest durations of hospitalization.

Conclusion: The etiology of acute abdomen varied depending on the age of the patient. Acute appendicitis was the most common cause of acute abdomen in children older than 2 year of age, followed by mesenteric adenitis and in less than two years intussusception is the commonest cause. Ultrasonogram was the important screening tool in acute abdomen. Abdominal CT scanning was a useful diagnostic imaging modality in patients with normal sonographic findings but with positive clinical findings.

KEYWORDS : Acute abdominal pain, surgical abdomen

INTRODUCTION:

Acute abdominal pain is one of the most common complaints in children admitted to the pediatric casualty and often presents a diagnostic dilemma for primary physicians. The most common non surgical cause is acute gastroenteritis and most common surgical cause is appendicitis. Acute abdominal pain in pediatric patients has been a challenge because of the nonspecific nature of symptoms and difficulty in the assessment and physical examination due to the poor ability to express and uncooperative nature of the children. Acute abdominal pain in patients presenting to the casualty is often diagnosed as a disorder that does not require surgical intervention. However, abdominal emergencies requiring surgery must be diagnosed by primary pediatric physicians in the pediatric casualty because of the potentially life threatening complications. In the present study, we analyzed the etiologies, laboratory test results, imaging findings and clinical courses of pediatric patients with acute abdomen and also analyzed the prevalence of various etiologies of acute abdomen in different age groups and in different months, in children admitted to the pediatric emergency room.

Aim of the study:

This study is to analyze the etiology and clinical spectrum in children of different age groups and in different months of a year and role of different imaging modalities in the diagnosis and management of acute abdominal pain in Paediatric emergencies.

MATERIALS AND METHODS:

The patient's age, gender, chief complaints, and clinical symptoms and signs were recorded from the case sheets of the children admitted from January 2017 to December 2018 at Raja Mirasdhar Hospital attached with Thanjavur Medical College, Thanjavur. Residential status of the patients was obtained from hospital case sheets. We also noted the etiologies of acute abdomen, duration of symptoms, and imaging studies like x-ray abdomen, ultrasonography abdomen and computed tomography and the time of admission and their condition at discharge.

All patients in our study were divided into three age groups: less than 2 years, 2-5 years and 5-12 years. The etiologies of acute abdomen were divided into eight major categories: 1. Acute appendicitis, 2. Hollow organ perforation, 3. Obstructed inguinal hernia, 4. Intussusception, 5. Intestinal obstruction other than due to the diseases described above, 6. Mesenteric adenitis, 7. Torsion of gonads and 8. Miscellaneous causes like constipation, infantile colic and medical causes.

OBSERVATION:

Acute abdomen had a non-traumatic etiology in 245 of the 288 patients, and was due to trauma in 43 patients. Patients with history of trauma were excluded from this study. There were 132 boys and 113 girls who ranged in age from 1 month to 12 years (mean age 6.7 years). The etiology of the acute abdominal pain in relation to age group is depicted in Table 1.

Demographics:

The most common etiology of acute abdomen in infants less than two years was intussusception (23/49, 50%) followed by obstructed inguinal hernia

Table.1. Disease incidence according to age group

Age Group	Appendicitis	Mesentric adenitis	Perforation	Obstructed Hernia	Intussusception	Intestinal obstruction	Torsion	Miscellaneous	Total
< 2 years	0	3	2	13	23	4	1	3	49
2-5 years	37	21	6	14	10	2	2	4	96
6-12 years	104	39	2	3	0	6	2	7	163
Total	141	90	10	30	33	12	5	14	308

(13/49, 28%). These etiologies were uncommon in school-age and older children. In contrast, acute appendicitis was the major cause of surgical abdomen in children in 2 to 5 years group (37/96, 49.3%) and 6 to 12 years group (104/163, 63.8%). The next common etiology was mesenteric adenitis which accounts for 21(21.8%) cases in 2 to 5 age group and 39 (23.9%) cases in more than 5 years age group. All appendix specimens were sent for histopathological examination. Based on the pathology reports, 17.7% (25/141) of patients with appendicitis presented with early appendicitis, 63.8% (90/141) with suppurative changes, and 18.4% (26/141) with perforated appendicitis. Two cases of ovarian torsion were diagnosed in children of 6 to 12 years age group. All the three testicular torsion are noticed in less than 5 years. In addition, among the 30 cases of obstructed inguinal hernia 20 were right-sided (66.6%), 8 cases were left-sided (26.6%), and 2 cases involved both sides (6.6%). Obstructed inguinal hernias were diagnosed in 43.3% of infants, 46.6% of children 2 to 5 years of age and 10% in older children.

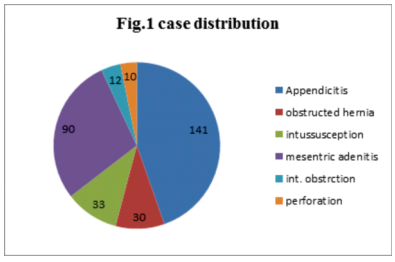
During the study period, 33 pediatric patients were diagnosed to have intussusception. Out of this, 23 (69.6%) cases were in the age group of less than 2 years, 10 (30.3%) cases were in the age group of 2 to 5 years. None of the cases were diagnosed as intussusception in children of 6 to 12 years.

Intestinal obstruction was noted in 12 patients. In the age group of less than two years 4 (33.3%) cases were reported, 2 (16.6%) cases in 2 to 5 years and 6 (50%) cases in 6 to 12 years. The etiologies were intra abdominal abscess (2), foreign body ingestion (button batteries) (1), band obstruction (3) and adhesive obstruction (6). Perforated appendicitis with intestinal obstruction was excluded in the causes of intra-abdominal abscesses. The case of adhesive intestinal obstruction was due to a previous surgical complication and was unresponsive to conservative management.

The distribution of the cases month wise in a year revealed that the peak of appendicitis occurred in June to August, while the peak incidence of intussusception occurred in the month of May. Other diseases as a cause of abdominal pain did not show any seasonal trend.

Clinical Spectrum:

Patients with intussusception commonly presented as pain (92%), vomiting (71%) and red currant jelly stools (38%). Patients with appendicitis commonly presented with rebounding tenderness (92.1%), vomiting (69.5%), fever (53.1%), and diarrhea (22.6%). Most of the obstructed inguinal hernia patients presented with swelling and pain over inguinal region. Intestinal obstruction patients presented with pain and bilious vomiting and abdominal distension. All patients with intestinal perforation presented with rebounding tenderness and abdominal distension. Patients with Mesentric adenitis patients presented with vague abdominal pain with no signs of tenderness or distension. Patients with torsion of gonads presented with pain and vomiting. Among the 33 cases of intussusception 17 cases with ileo-colo-colic type, 14 with ileo-colic type and 2 with ileo-ileal type. Hydrostatic reduction was done in 8 of 14 cases of ileo-colic type. Surgical reductions were performed in 17 cases of ileo-colo-colic type, 6 cases of ileo-colic type and 2 cases of ileo-ileal type. Both ileo-ileal intussusceptions had Meckel's diverticulum as pathological lead point. There are 11 patients with intestinal perforations. Patients with perforations due to appendicitis are excluded in this study. The locations of the perforations included the stomach (1), the small bowel (7), caecum (1) and colon (1).



Imaging studies:

In our study, plain radiographs were available for 75% (225/300) of patients; USG was done for 95.7% (295/300) of patients and CT scan for 9.7% (30/308) of the patients. Dilated bowel loops and localized ileus were the two most common findings on plain x- ray abdomen in children with acute abdominal pain. Fecoliths seen only in two cases and account for 0.6% of patients with appendicitis. Free air was seen in x ray abdomen in patients with perforations. All patients with intussusception were diagnosed using abdominal ultrasonogram (100%). 85 % of appendicitis, 72 % of mesenteric adenitis and 100 % of torsion of gonads were diagnosed by USG. In addition, abdominal CT scans were taken in 9.7% (30/308) of the patients in our study.

DISCUSSION:

Abdominal pain is one of the most common complaints in childhood. Although most of these complaints arise from self-limiting conditions, abdominal pain might herald a surgical or medical emergency. This retrospective study aimed to help primary pediatricians to better understand the clinical spectrum of acute abdomen in children, including the demographics, clinical presentations, imaging, and course of the diseases. This study also provides detailed information on the epidemiologic variations of the disease in children presenting to the pediatric casualty. Intussusception (Fig.3) and obstructed inguinal hernia were the major causes of acute abdomen in children less than 2 years old, and acute appendicitis (Fig.2) was the major etiology of surgical abdomen in children more than 2 years old. Based on other investigations and studies, intussusception occurs frequently between the ages of three months to five years. But 60% of cases occurring in the first year of life and a peak incidence is at 6−12 months. A study (Eshel G et al.) recorded the following anatomic sites of intussusceptions found during open reduction: one (4.5%) was ileo-ileo-colic, three (13%) in the ileo-caecal and 19 (82.5%) in the ileo-colic region. In our study, 25(32%) patients with intussusception underwent surgery. In addition, 6 cases (18.1%) with ileo-colic type of intussusception, 17cases (100%) of ileo-colo-colic type, and two(100%) ileo-ileal type underwent surgery (100%). Based on our analysis, we found that surgical reductions were needed in all cases of ileo-colo-colic and 42 % cases of ileo-colic type. In cases of ileo-ileal type intussusceptions if not improved with non operative methods all cases needs surgical correction because most of the time it is associated with pathological lead point. Primary pediatric physicians should therefore pay particular attention to patients who are diagnosed with ileo-colo-colic type intussusception, because these patients are more likely to require surgical reduction.

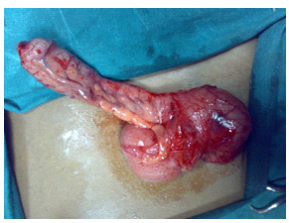


Fig.2 Acute Appendicitis in a child

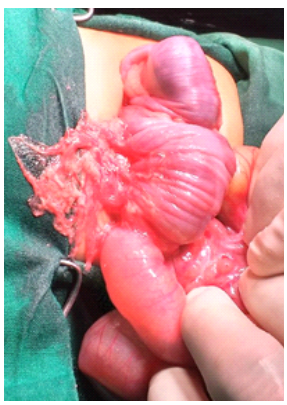


Fig.3 Intussusception in an infant

In our study, 56.6% (17/30) of patients with obstructed inguinal hernias were older than 1 year. But a North America study showed that 60% of cases of obstructed inguinal hernia occurred during the first year of life, with a male predominance of 6:1. Another study reported that nearly 50% of obstructed inguinal hernias occurred before the age of 6 months. This is in contrast to our study. In our study right side (20/30) obstructed hernia is more common than left (8/30). The male female ratio in our study was 5:1, and the ratio of right sided to left sided hernias was almost 3:1 (20:8). This is similar to other studies.

Our study revealed that the incidences of appendicitis more in children

with age group 6 to 12 than 2to 5 years age group with a ratio of 3:1and there was a male preponderance in both groups (105:36). The perforation rate in our study was 18.4% (26/141). Other studies also have reported a slight male predominance for appendicitis, with a peak incidence at 9−12 years old, and a perforation rate of about 30−65%. The lower perforation rate in our study might reflect the easy availability of medical care, early referral by primary physicians and timely intervention. Studies revealed that the seasonal incidence of intussusception peaks in spring and autumn and that the correlation between intussusception and adenovirus infection is high. In our study, we found that cases of intussusception requiring surgery peaked in May, where as acute appendicitis peaked during June to August. No seasonal variations were seen in other diseases.

In our study, imaging studies performed in children with acute abdominal pain includes plain radiographs, contrast studies, abdominal ultrasound, and abdominal CT scans. Bowel loop dilation and local ileus were the most common findings on plain abdominal films. But an accurate diagnosis could not be made based on the plain x-ray abdomen in most of these patients. One prospective study reported that the presence of prior abdominal surgery, history of foreign body ingestion, abnormal bowel sounds, abdominal distension or peritoneal signs were 93% sensitive and 40% specific for confirming diagnostic or suggestive radiographs in patients with major disease. In the absence of any of the above clinical features, the sensitivity and specificity of plain film may be low. In comparison, ultrasonography is a better imaging modality for establishing a diagnosis in patients with acute abdomen. In our study, the diagnostic rates for intussusception and torsion of ovaries were both 100%. For appendicitis it was 73.2% and for intestinal obstruction it was 66.7%. The accuracy of ultrasonography for diagnosing pediatric appendicitis was relatively low, compared with a previous study in adults, which showed that ultrasonography had 96% sensitivity and 94% specificity for establishing a diagnosis of appendicitis. A lack of compliance and the relatively small size of the appendix in children may be the primary reasons for this discrepancy.

Primary physicians in the pediatric emergency room therefore need a better diagnostic tool when doubt exists about the need for surgical intervention. In our study most of the cases the diagnosis was clinched by abdominal ultrasonography. CT scan was done in only in 9.7 % of cases when plain X-rays and abdominal ultrasound finding were inconclusive. We propose that abdominal CT should be used by primary emergency clinicians for the early differentiation of surgical emergencies in patients whose conditions cannot be confirmed by plain x-ray or abdominal ultrasonography in the emergency room.

CONCLUSION:

From our study we conclude that the etiology of acute abdomen varied depending on the age.Intussusception (46.93%) was the most common etiology of acute abdomen in less than two years age group followed by obstructed inguinal hernia. Acute appendicitis was the commonest etiology in 2 to 5 (38.54%) years age group. Acute appendicitis was also the most common etiology in the 6 to 12 (63.8%) years age group. Seasonal variation was seen only in intussusception and acute appendicitis cases. The most common associated symptom in acute abdominal pain is vomiting and most common sign is tenderness. Ultrasonogram was the most useful imaging modality in the diagnosis of the etiology of acute abdominal pain. 27.59% of acute abdomen cases managed conservatively and 72.41 % managed surgically.

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