Acute Appendicitis in Children

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Abstract:

Objectives: This study was planned to show the mode of presentation of children under six years of age with acute appendicitis and to increase the awareness of general, pediatric surgeons and other health care professionals about the magnitude of the problem so that to improve diagnostic accuracy and to avoid detrimental effects of delay in diagnosis and effective surgical management.

Patients and Methods: The study included (67) children with clinical suspicion of acute appendicitis admitted to emergency department of Kirkuk General Hospital from January 2008 - June 2012. Their age ranged (3 – 6) years (Mean age 4.5 years). (39) Males and (28) females. (M: F was 1.4:1). All had appendectomy as an emergency setting. The presentation, diagnostic work up and operative findings were studied.

Results: The main presenting symptom was abdominal pain 62(92%) followed by vomiting which was seen in 53(77%) of our patients. Other symptoms were change in bowel motions, anorexia, abdominal distension and fever. The most common physical sign elicited was localized tenderness at right lower quadrant 64(95%) while guarding was present in nearly half of our patients 36(53%). (41) Children had urgent appendectomy as diagnosis of acute appendicitis was clear and in the remainder (26) children a period of active observation and serial examinations with completion of diagnostic work up were needed before surgical intervention.

Conclusion: Acute Appendicitis in preschool children under six years of age needs special consideration. About one third of them have atypical presentation, physical signs are difficult to be elicited. A period of active observation in needed in most of them to complete diagnostic work up. Every effort should be directed towards improving the diagnostic accuracy and performance of effective surgical management to reduce morbidity and mortality and to decrease negative appendectomy rate and to avoid risks of unnecessary surgery.

Keywords: Appendicitis, Children, Perforation, Negative appendectomy.

Introduction and Objectives:

Acute Appendicitis in children requires special consideration on the part of surgeons and pediatricians and other health care professionals since the problem has its peculiar aspects. Usually the history taking is from the parents which do not describe the child complaints well. There is difficulty in elucidation of physical signs in crying, restless and anxious child. Time interval between the onset of the disease and perforation is shorter than in adults.

There is also problem of localization of the inflammatory process since the omentum is filmy and underdeveloped although good localization may be achieved by loops of bowel in some cases. All these factors put further burden on life of these children and most of them have been seen by more than one health care professional but still the magnitude of the problem is not appreciated well [1, 2, 3]. This study was conducted to show the mode of

presentation of children less than six years of age with acute appendicitis, to increase the awareness of general, pediatric surgeons and pediatricians about the magnitude of the problem, to improve diagnostic accuracy and to avoid risks of unnecessary surgery.

Patients and Methods:

(67) Patients with clinical suspicion of acute appendicitis were admitted to emergency department of Kirkuk General Hospital between the period of January 2008 - June 2012 (39) males and (28) females with M:F ratio of (1.4:1). Their ages were ranged from (3 - 6) years with mean age of (4.5) years.

Initial surgical evaluation consisted of detailed history of complaints and associated symptoms with their duration, and history of previous attacks or previous visits to hospital or clinics. Social history included residence from rural or urban areas and housing conditions. Examination consisted of general and abdominal examination. Laboratory tests, complete blood count, urine analysis and chest x-ray were done in all patients with ultrasound examination in (45) patients. Plain abdominal radiographs were performed in selected cases with suspicion of intestinal obstruction and or peritonitis. All children had appendectomy. (41) Of them as an urgent procedure since the diagnosis of acute appendicitis was clear, in the remaining (26) cases appendectomy was done after a period of observation and completion of diagnostic work up and in three critically ill patients with acute peritonitis after completion of initial supportive measures. Those children who were admitted with suspicion of acute appendicitis during the period of the study and proved to have other diagnosis were excluded from our study.

Results:

Sex distribution of children is shown on (table 1).

Out of (67) children, 47(70.1%) cases are from rural areas and the remaining 20(29.9%) cases which constituted are from urban area (table 2).

35(52.2%) Children have previous visits to emergency department or private clinics for the same complaints hours or days before.

Regarding symptomatology (table 3); the most common presenting symptom is abdominal pain 62(92%) this is describe in very young children by parents as unexplained crying and restlessness.

The second common symptom is vomiting 53(77%). Other symptoms are change in bowel motions (diarrhea or constipation), fever, anorexia or refusal of feeds. On examination local tenderness is the most common sign elicited 64(95%) but rebound tenderness in 41(61%), guarding at right lower quadrant is seen in nearly half of the patients 36(53%) while generalized guarding and tenderness is elicited in only three patients.

Leucocytosis on blood count is seen in 42(62.6%) children, Leucocyte count is ranging between (11000-21000 cell/mm3).

Ultrasound examination of abdomen was conducted in (45) patients, only in seven patients showed distended appendix with increase of wall to wall diameter, in four patients appendix mass and or local abscess are detected. In eight patients ultrasound examination showed presence of free fluid in the peritoneal cavity.

Plain x-ray of abdomen was conducted in six patients with clinical suspicion of intestinal obstruction and or peritonitis and showed distended bowel loops and some air fluid levels.

CT examination of abdomen was not done in any of our patients because all of our patients were seen on an emergency setting and surgical evaluation helped to reach diagnosis and to avoid risk of undue radiation exposure. Results of laboratory and imaging tests were shown on (table 4).

All children had appendectomy. None of our patients had interval appendectomy. Operative and pathological findings were shown on (table 5).

(39) Patients (58.2%) had acute uncomplicated appendicitis. Perforation rate was (31.3%). Normal appendix was found in (7) patients with negative appendectomy rate of (10.4%).

Table (1): Distribution of patients according to their gender

Gender	No. of patients	Percentage
Male	39	58.2%
Female	28	41.8%
Total	67	100%

Table (2): Distribution of patients according to their residence.

Area	No. of patients	Percentage
Rural	47	70.1%
Urban	20	29.9%
Total	67	100%

Table (3): Distribution of patients according to their Symptoms

Symptom or sign	No. of patients	percentage
Abdominal pain	62	92%
Vomiting	53	77%
Diarrhea or constipation	25	37%
Anorexia or refusal of feeds	46	68.6%
Fever	35	53.2%
Abdominal distension	5	7.4%
Local tenderness	64	95.5%
Gaurding	36	53.7%
Rebound tenderness	41	61.1%

Table (4): Laboratory and imaging tests of patients with acute appendicitis.

Test	No. of patients	Type of result	No. of positive result
White cell count	67	leucocytosis	42
Ultrasound of abdomen	45	Specific.	11
		Nonspecific.	8
		Normal findings.	26
Plain x-ray abdomen	6	Nonspecific.	6
CT abdomen	-	-	-

Table (5): Operative and pathological findings in patients with acute appendicitis.

Finding	No. of patients	Percentage
Acute (uncomplicated) appendicitis	39	58.20%
Local perforation	14	20.89%
Appendix mass or abscess	4	5.97%
Generalized peritonitis	3	4.47%
Normal Appendix	7	10.44%
Total	67	100%

Discussion:

Acute appendicitis is not uncommon in preschool children; it is not less than (5%) of all pediatric admissions. It seems to be more common in boys than girls.

Thirty five (52.2%) of children in our series had previous attacks of abdominal pain for which had seek medical advice and visited hospital or private clinic. N. William and L. Kapila reported that (26-36%) of children in their series were seen by more than one health care professionals before their last admissions [(4)].

Forty seven (70.1%) of our patients resided rural areas and the remaining children came from urban areas. This fact was noticed by Gardikis et al. who conducted his study on two different populations and he stated that children who are living in overcrowded housing conditions and lacking sanitary environment have higher incidence of acute appendicitis. The possible factor is higher amount of lymphoid tissue hyperplasia in the wall of appendix caused by repeated infections with enteric flora [(5)].

The most common presenting symptom in our patients was abdominal pain 62(92%). The classic migratory pain may not be present in all cases. Pain duration anyhow should not influence the decision to operate without consideration to other findings [(6)]. Second presenting symptom was vomiting (77%) in our series. History of vomiting does not make the diagnosis of appendicitis, however in combination with abdominal pain and tenderness or guarding, vomiting may help to predict diagnosis [(7)].

Other common symptoms were change in bowel motions (diarrhea or constipation). Diarrhea especially in the very young child may lead to an erroneous diagnosis of gastroenteritis which is common in this age group [(1)]. Anorexia, restlessness, excessive crying and abdominal distension are other possible symptoms in this age group. Fever may not be present but high fever up to (39-40) centigrade may indicate complicated appendicitis with perforation with or without abscess formation. Unfortunately up to one third of children have atypical presentation making the diagnosis more challenging [(8)].

Rebound tenderness was elicited in 41(61.1%) of our patients

Rebound tenderness may be useful predictor of acute appendicitis however lack of guarding may indicate observation rather than operation [(7)].

Leucocytosis was detected in 42(62.6%) children constituting - Leucocytosis with predominance of neutrophils more than (75%). Leucocytosis may be seen in acute appendicitis but normal leukocyte count by no means should not exclude acute appendicitis but it is unlikely when it is low unless the pretest probability of acute appendicitis is high [(8)].

In (26) patients with equivocal abdominal signs a period of active observation with serial examination was needed to accomplish diagnostic work up and to

assess the progress of the disease and appearance of new physical signs. Ultrasound examination of abdomen is non - invasive; it is most helpful in ruling out acute appendicitis in children with equivocal abdominal signs to seek out other causes of abdominal pain in children [9]. Also it helps in diagnosis by certain findings. It was conducted in (45) children, in eleven of them helped to reach diagnosis and in eight of them it showed free fluid in peritoneal cavity. Ultrasound findings in acute appendicitis include fluid filled distended appendix with uncompressible thickened wall and wall to wall diameter of more than 6mm with or without periappendiceal fluid collection.

Plain abdominal radiography is of little help in diagnosis of acute appendicitis. The findings may be localized ileus at right lower abdomen, blurring of psoas border and right sacroiliac joint, gas filled appendix or presence of appendicolith which are nonspecific findings except the last which is highly suggestive of diagnosis [3, 10]. It was conducted only in (6) of our patients with clinical suspicion of intestinal obstruction or peritonitis and showed some air fluid levels and dilated intestinal loops and did not help in diagnosis.

CT examination was not done for our patients because all cases were seen on an emergency setting and to avoid radiation exposure. CT is best avoided in children to reduce radiation exposure however it may be useful in selected cases especially in obese children with excess properitoneal and periappendiceal fat and when there is abdominal distension in whom positive yield rate of ultrasonography in diagnosis of acute appendicitis is lowered. A protocol based on clinical examination by surgeon and selective use of imaging is highly accurate of diagnosis of appendicitis. Low rates of perforation and negative appendectomy are achieved without the potential costs and radiation exposure of excess imaging [11].

Incidence of perforation was (31.3%) in our patients, (14) children had local perforation, four had appendix mass with local small abscess and three children had generalized peritonitis.

Incidence of perforation is directly proportional with hours of delay since the onset of disease and inversely proportional with the age of the child [7]. Perforation rates were approaching (90%) in one series, some suggest that thin wall of appendix in young children and delay in diagnosis is the contributing causes [3].

Negative appendectomy rate was (10.4%) in our cases and approached (25%) in some series [3], however children with appendectomy for normal appendix generally do well postoperatively in the absence of other causes of child symptoms and also appendicitis is excluded from future differential diagnosis of acute abdomen. Appendectomy adds little morbidity and pathologic abnormality may not be apparent on visual inspection [2].

The negative appendectomy rate (NAR) is increased in children less than five years of age and for males than females but length of hospital stay is greater in negative appendectomy versus positive appendectomy. These factors can be incorporated into diagnosis algorithm to improve the accuracy of diagnosis of acute appendicitis in children [12].

None of our patients had interval appendectomy and all had urgent appendectomy.

Interval appendectomy may be a surgical option in children with appendix mass and or abscess but such children are likely to have intra-abdominal abscesses or small bowel obstruction during treatment or unplanned read missions and recurrent appendicitis during treatment period [13].

Conclusion:

(1) Acute appendicitis in preschool children is not uncommon and about one third of them have atypical presentation and most of them have visited emergency department hours or days before their last admission.

(2) Children from rural areas are more prone to have appendicitis than those resided urban areas.

(3) The classic migratory pain may be absent and Fever may not be present. Physical signs are difficult to be elucidated. Rebound tenderness may be useful predictor of acute appendicitis but lack of guarding may indicate observation rather than operation. Normal leukocyte count should not-by any means-exclude acute appendicitis.

(4) Children with equivocal abdominal signs need period of active observation and serial examinations to complete diagnostic work up since diagnosis is more challenging.

(5) Plain radiography of abdomen is of little help in diagnosis of acute appendicitis but presence of appendicolith is highly suggestive of diagnosis. Ultrasonography is of great help in diagnosis of acute appendicitis in children because it is noninvasive and highly sensitive and CT examination of abdomen is best avoided in children because of risk of radiation exposure but may be of help in selected cases.

(6) Every effort should be directed towards improving diagnostic accuracy to start effective surgical intervention, to minimize negative appendectomy rates and to avoid risks of unnecessary surgery.

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