Appendicitis in infancy

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Abstract Acute appendicitis is the most common cause of abdominal pain requiring surgery in children. But it is an uncommon entity in young children and rare in infants. During a 10-year period, between January 1991 and December 2000, 7 infants (age from 17 days to 8 months) were treated for acute appendicitis at Changhua Christian Hospital. All of the preoperative symptoms and signs, the duration between admission and operation, pathology reports, and laboratory data were reviewed. There were no specific clinical signs and symptoms. The duration between admission and operation ranged from 2 hours to 5 days (mean: 31.4 hours). The pathology reports revealed 3 were gangrenous, 3 were gangrenous with perforation and one was suppurative. There was one death. Pseudomonas aeruginosa was cultured from blood, ascites, bile or stool in 6 cases (85.7%). Early diagnosis of acute appendicitis in infants is still difficult. Although the mortality has declined, the morbidity still remains high. The high percentage of infection by Pseudomonas aeruginosa should be further evaluated in infantile appendicitis.

Keywords Appendicitis · Infancy · Pseudomonas aeruginosa

Introduction

Acute appendicitis is the most common cause of abdominal pain requiring surgery in children. It is an uncommon entity in young children and rare in infants. There are no specific clinical symptoms and signs in infants. Therefore, appendicitis in infancy is difficult to diagnose, easily perforated, and associated with significant morbidity and mortality. The difficulty and delay in making the diagnosis is usually due to failure to consider this disease in the infant.

Materials and methods

Seven infants under the age of 12 months with acute appendicitis were treated at the Changhua Christian Hospital from January 1991 to December 2000. There were 4 boys and 3 girls. Age at admission ranged from 17 days to 8 months.

Symptoms

Vomiting was the most common presenting symptom (Table 1). Anorexia and diarrhea were also noted. Duration of symptoms prior to admission ranged from 2 to 7 days (mean 3.4 days).

Signs

Abdominal tenderness and fever were the most frequent findings on physical examination and found in all 7 patients. Abdominal distension was the second most common finding. A bulging umbilicus with erythematous change (umbilical cellulitis) was found in 2 patients and it was an important sign for deciding to operate.

Laboratory data

There were 2 infants with leukocytosis, 1 infant with normal white cell count and 4 infants with leukopenia. Anemia was noted in all 7 infants (ranged from 7.2 to 10.2 g/dl) and thrombocytopenia was noted in 3.

Abdominal roentgenograms

Roentgenograms revealed ileus in 5 infants (I, II, IV, V, VI) and normal in 2 (III, VII). No appendicoliths were found.

Treatment

The duration between admission and operation ranged from 2 hours to 5 days (mean: 31.4 hours). All 7 infants underwent laparotomy for peritonitis and all underwent appendectomy.
Antibiotics, usually ampicillin and gentamycin, were given pre-operatively and post-operatively. The antibiotics were changed to amikacin and ceftazidime in 3 patients due to the growth of Pseudomonas aeruginosa (case III, VI, VII).

Results

The pathology reports revealed gangrenous appendicitis in 3, gangrenous appendicitis with perforation in 3 and suppurative appendicitis in one. Pseudomonas aeruginosa was cultured from blood, ascites, bile or stool in 6 cases. There were 2 complications: one stitch abscess that healed after removal of the residual stitch; and one ileus on the 11th day post-operatively which recovered after conservative treatment. There was one death of a 5 month 25 day old male infant who was referred to us with persistent fever and diarrhea lasting for 3 days. On arrival, vital signs were unstable and an endotracheal tube was inserted for airway support. Physical examination revealed abdominal tenderness and severe abdominal distension. A large amount of bile-stained gastric fluid was drained via nasogastric tube. Laboratory data revealed: white cell count 1800/uL (neutrophil: 2%, band: 1%); hemoglobin 7.2 g/dl; and platelet $44 \times 10^3$/uL. Abdominal roentgenograms revealed multiple dilated bowel loops. After resuscitation, emergent laparotomy was performed for peritonitis with sepsis. Acute appendicitis with gangrenous change was found and appendectomy was performed. The child’s condition deteriorated quickly after surgery. Cardiopulmonary resuscitation, performed at the operating table was unsuccessful, and the infant died. The other 6 infants had uneventful recoveries. The period of hospitalization ranged from 6 to 27 days (mean 13.8 days).

Discussion

Appendicitis in infancy is very rare. Less than 2 percent of children treated for appendicitis are under 2 years of age. The organisms cultured in our patients were: E coli, Citrobacter amalonaticus, Pseudomonas aeruginosa, Gr D nonentercoccus, Bacteroid fragilis. Antibiotics, usually ampicillin and gentamycin, were given pre-operatively and post-operatively. The antibiotics were changed to amikacin and ceftazidime in 3 patients due to the growth of Pseudomonas aeruginosa (case III, VI, VII).

Table 1  Acute appendicitis under 1 year of age

<table>
<thead>
<tr>
<th>Case no</th>
<th>Age</th>
<th>Symptom duration</th>
<th>Symptoms and signs</th>
<th>Pre-OP duration</th>
<th>WBC</th>
<th>Platelet ($\times 10^3$)</th>
<th>Pathology</th>
<th>Culture</th>
<th>Hospital stay</th>
<th>Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>3M 11D</td>
<td>2D</td>
<td>Vomiting, Anorexia, Fever, Tenderness, Distension</td>
<td>16 Hr</td>
<td>5210</td>
<td>568</td>
<td>Gangrenous, ruptured</td>
<td>No growth</td>
<td>10D</td>
<td>Lived</td>
</tr>
<tr>
<td>II</td>
<td>17D</td>
<td>3D</td>
<td>Vomiting, Diarrhea, Fever, Tenderness, Distension</td>
<td>6 Hr</td>
<td>10160</td>
<td>311</td>
<td>Gangrenous, ruptured</td>
<td>Ascites: I, II Stool: III</td>
<td>8D</td>
<td>Lived</td>
</tr>
<tr>
<td>IV</td>
<td>5M 16D</td>
<td>4D</td>
<td>Vomiting, Diarrhea, Fever, Tenderness, Distension</td>
<td>9 Hr</td>
<td>2800</td>
<td>314</td>
<td>Gangrenous</td>
<td>Ascites: III, IV, V</td>
<td>6D</td>
<td>Lived</td>
</tr>
<tr>
<td>V</td>
<td>5M 25D</td>
<td>3D</td>
<td>Vomiting, Diarrhea, Fever, Tenderness, Distension</td>
<td>2 Hr</td>
<td>1800</td>
<td>44</td>
<td>Gangrenous</td>
<td>Blood: III</td>
<td>1D</td>
<td>Died</td>
</tr>
<tr>
<td>VI</td>
<td>5M 8D</td>
<td>3D</td>
<td>Diarrhea, Anorexia, Fever, Tenderness, Umbilical cellulitis</td>
<td>17 Hr</td>
<td>1100</td>
<td>75</td>
<td>Gangrenous</td>
<td>Blood: III</td>
<td>16D</td>
<td>Lived</td>
</tr>
<tr>
<td>VII</td>
<td>4M 17D</td>
<td>2D</td>
<td>Diarrhea, Fever, Tenderness, Distension, Umbilical cellulitis</td>
<td>31 Hr</td>
<td>1300</td>
<td>166</td>
<td>Gangrenous, ruptured</td>
<td>Ascites: III</td>
<td>16D</td>
<td>Lived</td>
</tr>
</tbody>
</table>

I. E coli
II. Citrobacter amalonaticus
III. Pseudomonas aeruginosa
IV. Gr D nonentercoccus
V. Bacteroid fragilis

Antibiotics, usually ampicillin and gentamycin, were given pre-operatively and post-operatively. The antibiotics were changed to amikacin and ceftazidime in 3 patients due to the growth of Pseudomonas aeruginosa (case III, VI, VII).