Use of Ultrasound in Pediatric Patients with Suspected Acute Appendicitis in a General Hospital: Analysis of 3.5 Years

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Abstract

Introduction: Acute appendicitis is the most common cause of abdominal pain in the pediatric population requiring surgery. However, the classic signs are not always present and symptoms may be nonspecific and overlap with other causes of abdominal pain.

Material and Method: A retrospective cohort study type in the pediatric population of 1-12 years of age with a diagnosis of acute appendicitis over a period of 3.5 years in a referral hospital was performed second level.

Results: During the study period 43 patients were analyzed between 1 and 12-years-old with abdominal ultrasound diagnosis; the most difficult group to diagnose: 1 to 4 years, presented 9 cases (21%); male female ratio was 1:1; the most affected age group was 10 to 12 years with 14 cases (32.56%); the duration of symptoms between 13-24 hours was the highest with 18 cases (41.86%); the postoperative hospital stay was increased from 2 to 3 days with 24 cases (55.81%); the degree of macroscopic appendicitis corresponded to grade II 20 cases (46.52%) and 4 minor postoperative complications (9.30%) occurred. The number of perforated appendices (grade IV) with 14 cases (32.56%).

Discussion: The diagnosis of appendicitis can be challenging particularly in patients younger than 4 years. Abdominal pain only corresponds to 2% of cases of acute appendicitis.

Keywords
Paediatric, Ultrasonography, Appendix, Appendicitis, Appendectomy

Introduction

Acute appendicitis is the most common cause of abdominal pain in the pediatric population and requires surgery. Its diagnosis is suspected on the basis of clinical findings widely known. However, the classic signs are not always present and symptoms may be nonspecific and overlap with other causes of abdominal pain. The clinical presentation is also complicated in the pediatric population for their limited communication skills.

In the pediatric population, acute appendicitis is a condition requiring emergency abdominal surgery and this usually occurs in children between 10-18 years old and is very rare in children younger than 2 years, but can occur at any age. As the incidence of acute abdominal pain is common in children, differentiation of acute appendicitis from other self-limiting non-surgical abdominal diseases is important [1].

Historically it has been computed tomography study of choice in cases of acute abdomen with high sensitivity and specificity, however, in this population it is contraindicated for obvious reasons. Therefore, ultrasonography should be the primary diagnostic imaging modality for the evaluation of acute abdomen in children with suspected acute appendicitis [2-5].

Materials and Methods

In order to know the importance of abdominal ultrasound in the evaluation of acute abdomen in pediatric population with clinical suspicion of acute appendicitis, a retrospective cohort study type in the pediatric population of 1-12 years of age with a diagnosis of acute appendicitis was made and appendectomy during a period of 3.5 years on a second referral hospital level. We included patients aged between 1-12 years old with full file and performing abdominal ultrasound diagnosis. We excluded patients with appendicitis but abdominal ultrasound and those over 13 years regardless of their gender or incomplete file. Descriptive statistical analysis with measures of central tendency and dispersion were used.

Results

During the study period 166 appendectomies were performed in pediatric patients aged 1 to 17 years old with and without ultrasound which were analyzed 43 patients aged 1 to 12 years (25.90%) diagnosed with acute appendicitis and appendectomy with abdominal ultrasound and intra-hospital diagnosis, 74.10% had no ultrasound for diagnostic purposes; The youngest patient was one year and older than 12 years, the most difficult group to diagnose: 1 to 4 years showed 9 cases (21%) one-fifth of patients; male female ratio was 1:1; the most affected age group was 10 to 12 years with 14 cases (32.56%); in the time of evolution of symptoms the period from 13-24 hours was the highest with 18 cases (41.86%); Most postoperative hospital stay was between 2-3 days with 24 cases (55.81%); the degree of
Aims

The outcome of this study was to analyze the accuracy of the ultrasound for the diagnosis of acute appendicitis in children in the emergency department. The ultrasound was performed in all children with acute abdominal pain by medical radiologists, with no definition of normal and pathological findings. To do this, a descriptive analysis of the images obtained, the surgical sample, and the clinical history of the patients was performed. In addition, sensitivity, specificity, and accuracy were calculated.

Material and methods

The study population was formed by 43 pediatric patients with acute appendicitis aged from 1 to 12 years old. The study was conducted from January 2010 to June 2012 at the pediatric emergency department of the ‘Hospital Universitario de Alcalá de Henares’, Alcalá de Henares, Madrid, Spain. The study was approved by the local ethics committee.

Results

Table 1: Epidemiologic dates of 43 pediatrics patients with acute appendicitis and ultrasound diagnostic.

<table>
<thead>
<tr>
<th>Gender</th>
<th>n</th>
<th>%</th>
<th>Age Groups (anos)</th>
<th>n</th>
<th>%</th>
<th>Evolution Time (hours)</th>
<th>n</th>
<th>%</th>
<th>MHS (days)</th>
<th>n</th>
<th>%</th>
<th>Clinical Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>22</td>
<td>51.17</td>
<td>1 - 4</td>
<td>9</td>
<td>20.93</td>
<td>6 - 12</td>
<td>14</td>
<td>32.55</td>
<td>2 - 3</td>
<td>24</td>
<td>55.81</td>
<td>I</td>
</tr>
<tr>
<td>Female</td>
<td>21</td>
<td>48.83</td>
<td>5 - 6</td>
<td>11</td>
<td>25.58</td>
<td>13 - 24</td>
<td>18</td>
<td>41.86</td>
<td>4 - 6</td>
<td>14</td>
<td>32.55</td>
<td>II</td>
</tr>
<tr>
<td></td>
<td>7</td>
<td>9</td>
<td>20.93</td>
<td>7</td>
<td>9</td>
<td>25 - 48</td>
<td>7</td>
<td>16.77</td>
<td>&gt; 7</td>
<td>5</td>
<td>11.62</td>
<td>III</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>12</td>
<td>32.56</td>
<td>14</td>
<td>49 - 72</td>
<td>3</td>
<td>1</td>
<td>6.97</td>
<td>&gt; 73</td>
<td>1</td>
<td>2.32</td>
<td>IV</td>
</tr>
<tr>
<td>Total</td>
<td>43</td>
<td>100</td>
<td></td>
<td>43</td>
<td>100</td>
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<td>43</td>
<td>100</td>
<td></td>
<td>43</td>
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</tr>
</tbody>
</table>

MHS: M Hospital Stay

Table 2: Statistical Analysis of 43 patients with acute appendicitis.

<table>
<thead>
<tr>
<th>Descriptive Statistics</th>
<th>Age (years)</th>
<th>Clinic Classification</th>
<th>Evolution (hours)</th>
<th>EIH</th>
</tr>
</thead>
<tbody>
<tr>
<td>Median</td>
<td>7</td>
<td>3</td>
<td>30</td>
<td>4</td>
</tr>
<tr>
<td>Mediana</td>
<td>7</td>
<td>2</td>
<td>24</td>
<td>3</td>
</tr>
<tr>
<td>Moda</td>
<td>6</td>
<td>2</td>
<td>24</td>
<td>3</td>
</tr>
<tr>
<td>Standard Deviation</td>
<td>3.18</td>
<td>0.97</td>
<td>26.37</td>
<td>1.96</td>
</tr>
<tr>
<td>Coefficient of variation</td>
<td>48.43</td>
<td>35.12</td>
<td>38.78</td>
<td>49.66</td>
</tr>
<tr>
<td>Rango</td>
<td>11</td>
<td>3</td>
<td>138</td>
<td>9</td>
</tr>
<tr>
<td>Minim</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Maxim</td>
<td>12</td>
<td>4</td>
<td>144</td>
<td>11</td>
</tr>
</tbody>
</table>

Discussion

Acute appendicitis is a disease entity that usually requires emergency abdominal surgery. Abdominal pain is actually one of the main symptoms that lead to infant to the emergency room where finally only corresponds to 2% of appendicitis cases aguda [6]. The diagnosis of appendicitis can be a challenge particularly in patients younger than 4 years [7]. Moreover, early diagnosis and surgical management can prevent complications especially in cases of patients younger than 4 years [7].

Surgical management can prevent complications especially in cases of patients younger than 4 years [7]. Moreover, early diagnosis and surgical management can prevent complications especially in cases of patients younger than 4 years [7].

Conclusions

1. The diagnosis of acute appendicitis in minors is difficult.
2. The use of ultrasound in our hospital is limited and its widespread use would improve preoperative diagnostic accuracy.
3. CT studies (to reach) must be used judiciously.

References


