Accuracy of Diagnosis of Appendicitis and Its Relation to Perforation in Hospitalized Children in Surgery Department of Imam Khomeini Hospital-Ahwaz

Shahnam Askarpour, Ferdos Forouzesh Pour, Soraya Kkhaje Rezaei

School of Medicine, Ahwaz Jundishapur University of medical sciences, Iran

Background/ Purpose: The diagnosis of appendicitis is based on history, clinical examination, laboratory investigations, and imaging studies. Since history and clinical examination are not so reliable in children, and because of immune system immaturity in this age group, some complications such as perforation are more likely to occur. So, paying more attention to this disease seems necessary.

Materials & Methods: This descriptive cross-sectional study included all hospitalized sick children with primary diagnosis of appendicitis in Imam Khomeini Hospital of Ahwaz during one year. A total 152 cases were evaluated. A significant level of 0.05 was considered significant for the statistical analysis. The software SPSS 13.0 was used to conduct the statistical analysis.

Results: Accuracy of the diagnosis of appendicitis was 81.57%. The ratio of boys to girls was 2/1 and the most frequent incidence was at the age group of 10-15 years. Fifty percent of patients with appendicitis underwent surgery in less than 24 hours from the onset of pain. Perforation happened in 52.9% of patients underwent surgery after 48 hours of starting of symptoms. So, there was a significant relation between the perforation and appendectomy after 48 hours from the onset of pain (P<0.001).

Conclusion: According to the current study, children with suspected appendicitis should underwent surgery earlier than 48 hours from the onset of symptoms. The rate of perforation is much more in children, paying more attention to an accurate diagnosis in such a group seems necessary.

Index Word: Appendicitis, Perforation, Children.

INTRODUCTION

Appendix has a closed-end pipe-like structure that is placed at the beginning of the large intestine and its base attached to the cecum while the tip is free. There are a lot of lymphatic follicles distributed through the appendix structure. The obstruction of the lumen of the appendix may result in appendicitis and hyperplasia of lymphatic follicles in the appendix. Fecolith or parasites and tumors may rarely cause such an obstruction. After obstruction, the inner pressure of lumen and the reproduction of bacteria increase; and continuous secretion of lumen amplifies the act of dilation. As the time pass the pressure goes up gradually and leads to ischemia that follows the gangrene and finally the perforation of appendix.¹ In a more expanded study performed in America in 1997, a number of 33184 children with appendicitis were examined and the incidence of perforation was
32.5%. Another study evaluated 126 children with acute appendicitis during 1998-2001 in which 26% of patients underwent surgery at the first 6 hours and 74% at the first 6-24 hours after the onset of symptoms, but there weren’t any significant differences of perforation between these two groups.

Another research in America, was conducted on 219 persons underwent appendectomy during 1996-1998 and was found that the risk of rupture in those who have been operated in less and more than 36 hours, was respectively ≤2% and ≥5%.

The aim of the current study was investigating the presentation of acute appendicitis in various pediatric age groups, and the risk factors for appendicular perforation in children.

PATIENTS AND METHODS

This is a descriptive cross-sectional study included all hospitalized patients with primary diagnosis of appendicitis in Imam Khomeini Hospital of Ahwaz during the period from March 2003 through February 2004. The cases with imperfect details of symptoms and signs or with no pathology reports were omitted to obtain an accurate results. One hundred fifty two cases were included. Data were collected using a data entry form that consists of 6 parts:

1- Personal information, such as first name, last name, age, sex and the address.
2- The symptoms as nausea, vomiting, fever (more than 37.8 °C), diarrhea, constipation, abdominal pain, urinary symptoms, onset of pain, location of pain, shift of pain, the history of catching cold in the last 10 days and the loss of appetite, with which one has presented to the hospital.
3- The signs as abdominal tenderness and its location, rebound tenderness, Rovsing’s sign and guarding which were diagnosed through clinical examination.
4- The findings that relate to surgery, including the time of operation after admission and the appendix status during surgery.
5- Pathological results that based on the samples, classified into normal, acute appendicitis and gangrene.
6- The findings of the period of hospitalization after the operation.

At this study we classified the children into three groups of 0-5, 5-10 and 10-15 years respectively. A significant statistical level of 0.05 was considered for the tests, and the software SPSS 13.0 was used to accomplish the statistical analysis.

RESULTS

Twenty eight of the totally 152 (81.57%) patients, who undergone appendectomy proved to have normal appendix on both gross appearance as well as microscopic histopathological examination. So that the accuracy of diagnosis was 81.57%. Among 124 cases with confirmed appendicitis, the ratio of boys (n=83) to girls (n=41) was 2/1. This male preponderance was noted in all the three groups. The highest frequency of acute appendicitis was noted in the age from 10-15 years (66.9%), while the lowest incidence was noted at the age group 0-5 years (5.6%). At the age group of 5-10 the incidence was 35.4%. The most common symptom was abdominal pain, which was noted in 100% of patients The pain was located initially at the epigastrium and periumbilical in almost half of the patients (50.8%) (Fig. 1). The most frequent physical sign was tenderness at right iliac fossa (RLQ) that was noted in all patients (Fig. 1). The pathological examination of the removed appendix revealed: acute appendicitis (56.57%), gangrene and perforation (25%), and normal cases (18.4%).

Twenty seven of the 124 patients with proved appendicitis (21.7%) had perforation during the surgery and 97(78.2%) had inflamed appendix with no perforation. It was also shown that 50% of patients with appendicitis had undergone surgery in less than 24 hours, 22.5% within 24-48 hours, and 27.4% after 48 hours from the onset of pain respectively. Only 10% of the inflamed appendix that had been operated in less than 48 hours had perforation, while more than half of those who had been operated after 48 hours had perforation. So, there was a significant relationship between the rate of perforation and time of surgery when it was delayed after 48 hours from the onset of symptoms (P<0.001).

Accuracy of diagnosis of appendicitis in age groups of 0-5, 5-10, and10-15 was respectively 63.6%, 88%, 80.2% and the rate of perforation in the above mentioned groups was 28.5%, 20.4%, and 21.9% respectively.

The percentage of perforation in females was more than males. As 12 (29.2%) of 41girls with appendicitis had perforation, in comparison with 15 (18.07%) of 83
boys. The rate of diagnosis of appendicitis in boys to girls was 86.4% to 73.2% respectively, since 15 of 56 girls and 13 of 96 boys who underwent surgery had a normal appendix.

Table 1. Clinical data.

<table>
<thead>
<tr>
<th>Sign &amp; Symptoms</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abdominal pain</td>
<td>100%</td>
</tr>
<tr>
<td>Tenderness at RIF</td>
<td>100%</td>
</tr>
<tr>
<td>Lack of appetite</td>
<td>90.7%</td>
</tr>
<tr>
<td>Nausea</td>
<td>89.51%</td>
</tr>
<tr>
<td>Rebound tenderness</td>
<td>84.42%</td>
</tr>
<tr>
<td>Vomiting</td>
<td>78.2%</td>
</tr>
<tr>
<td>Shift of pain</td>
<td>66.1%</td>
</tr>
<tr>
<td>Fever</td>
<td>41.9%</td>
</tr>
<tr>
<td>Abdominal muscle guarding</td>
<td>26.22%</td>
</tr>
</tbody>
</table>

RLQ: right Iliac fossa.

Fig 1. Initial location of pain & the frequency of various clinical signs.

DISCUSSION

The frequency of appendicitis in children aged 10 years or younger has been reported more at the age group of 6-10. In this study, the highest frequency was noted at the age group 5-10 years. In a study performed based on the sex, the incidence of appendicitis in children was more in males than in females (2:1 ratio), which is similar to the present study. One of the probable reasons can be the more occurrence of constipation in boys which causes fecolith that is one of the most common reasons of appendicitis.

Abdominal pain occurred in 100% of the cases that confirms the previously published results in which it was reported 99-100%, so it can be said that there was no attention to the cases with abdominal pain. In this study the most common physical sign was tenderness in RLQ and then rebound tenderness that goes with the previous studies.

The incidence of ruptured appendix at the time of diagnosis was 21.7%, while it was 4.40-17% in the previously published reports. There is also a significant relation between the perforation and a time >48 hours from the onset of symptoms (P<0.001), that in the latest studies the perforation was reported 36-48 hours from the onset of symptoms.

In this study the error of diagnosis of appendicitis in children was 18.4% that agreed with the previous studies which reported it 15-20%.

The highest accuracy rate of diagnosis of appendicitis was at the age group of 5-10 (88%), then in 10-15, because in the former the history and clinical examinations are not so reliable, and in the latter most of the children are in maturity age and the problems relate to the genitourinary tract (specially in female) interfere the differential diagnosis of abdominal pain and reduce the accuracy of diagnosis.

The rate of perforation in the age group of 0-5 (28.57%) is more than in the other two groups and it is probably due to the immaturity of omentum and the reduction of defense mechanism that result in as much higher perforation rate, the accuracy of diagnosis in this age group is also less (63.6%) and it is clear that the less accurate diagnosis increase the risk of perforation. Because of the various differential diagnoses at the age group of 10-15 compared with 5-10, the accuracy of diagnosis of appendicitis decreases and the rate of perforation increases. In this study the accuracy of diagnosis of appendicitis in girls and boys is 73.2% and
86.4% respectively, that can be related to the various differential diagnosis(specially in females).

**CONCLUSIONS**

1. Children with suspected appendicitis should undergo surgery in <48 h from the onset of symptoms.

2. Since the rate of perforation is much more in younger children, high index of suspicion is needed for achieving an accurate diagnosis and avoiding appendicitis-related complications in this specific age group.

**REFERENCES**


