Misdiagnosed Appendicitis in Children

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Abstract

Background: Appendicitis is the one of the most common emergency abdominal operation in children. It is estimated that appendicitis is diagnosed in about 2 % of children who present to emergency department because of acute abdominal pain[1]. Timely diagnosis and appendectomy can prevent abscess formation, perforation as well as reducing early and late postoperative complication.
Methods: This study is a retrospective review of all children diagnosed with acute appendicitis in our emergency department between January 2015 – 2018. We have compared the clinical features and the results of examinations between two group of patients - those who were diagnosed correctly and have been operated, and those who were misdiagnosed and operated later respectively more than 24 hours after initial control.
Results: This study includes fifty-nine children less than sixteen years old, admitted in our clinic and operated due to acute appendicitis. Fifty three (89.9%) of them were hospitalized after the first control, whereas the remining six (10.1 %) were discharged home after the initial control. The misdiagnosed patients were returned in our department less than twenty hours after the first control. Compared with the patients in which the diagnosis was made correctly the misdiagnosed patients in general had lower levels of leukocytes, CRP and temperature.
Conclusion: The diagnosis of appendicitis in children can be very difficult because of the atypical features. According to our experience and the data from other studies, still there is not a single test or combination of clinical and laboratory examinations, able to discriminate children with and without acute appendicitis with a high percentage of accuracy.
Keywords: Children, appendicitis, misdiagnosed

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Introduction

Appendicitis is the most common abdominal emergency which demands the surgical intervention. Despite the relatively high incidence of this emergency and a great knowledge about appendicitis, sometimes the diagnosis can be a true challenge even for an experienced surgeon especially in the case of elderly patients and children[1,2]. Early diagnosis can prevent perforation as well as decrease the rate of postoperative complications. The rarity of acute appendicitis among children is the main reason for the difficulty in diagnosis and the increased rate of perforation[3,4,5].

Aim of the study: The aim of this study is to to present our experience in the management of acute appendicitis in children focusing on pathogenesis, diagnosis, and current management strategies.

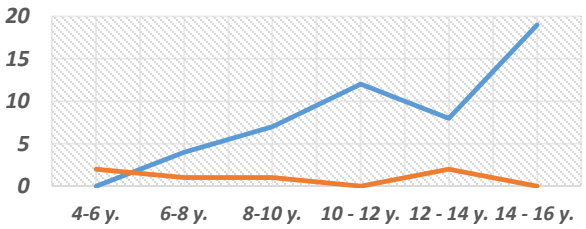
Material and methods

In this retrospective study we've included all the children less than 16 years, admitted in our clinic between January 2015 – 2018 with the diagnosis of acute appendicitis. The diagnosis was confirmed after surgical intervention and histopathological examination. The patients that were sent home after the first control and afterwards hospitalized and operated within 24 hours of their discharge were considered to be misdiagnosed. All the important datas, such as age, gender, signs and symptoms during initial control, clinical examination and interval between the initial visit and the surgical intervention were analyzed and processed.

Results

From fifty-nine children included in this study 31 of them (52 %) were girls and 28 boys (48 %). The mean age of children was 9.6 years (range, two to fifteen years). Most of the children respectively 47 of them (79 %) were over five years of age.

Distribution of patients by age



After the first control in our department fifty-three patients (89.9 %) were diagnosed correctly with acute appendicitis and operated, whereas six of them (10.1 %) have been sent home with the advice that they should immediately come back in the event of a deterioration of their condition – (misdiagnosed patients).

The misdiagnosed patients were controlled twice or more in our clinic before the diagnosis of acute appendicitis was confirmed.

In all misdiagnosed children the interval between first control and surgical intervention was more than 24 hours.

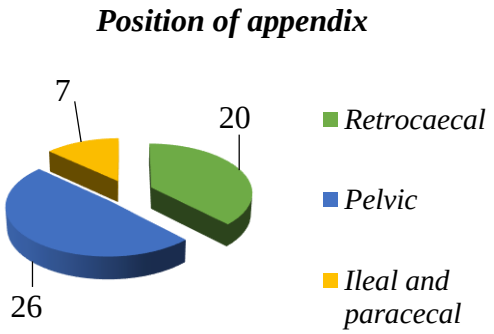
The main complaint of the patient correctly diagnosed were abdominal pain and pain in the RLQ, whereas in case of misdiagnosed patients the pain was localized in the epigastric region or scattered diffusely into the abdominal cavity.

The signs of acute tonsillopharyngitis were present in three of misdiagnosed patients at their first control.

Complaints	*Misdiagnosed group*	*%*	*Correctly diagnosed group*	*%*
Abdominal pain	50	94 %	4	67 %
Migrating pain	44	83 %	3	50 %
RLQ tenderness	46	86 %	1	17 %
Muscle guarding	21	40 %	0	0 %
Fever	19	36 %	1	17 %
Vomiting	25	47 %	3	50 %
Diarrhea	10		2	33 %
Duration of symptoms	< 12 h		> 18 h	

Table 1

Abdominal ultrasonography was performed in 29 correctly diagnosed children and in 14 of them free periappendicular or pelvic fluid collection was detected. Abdominal ultrasound was normal in three misdiagnosed patients.
In correctly diagnosed patients, position of appendix was retrocaecal in 20 (37 %) of them, pelvic in 26 (49 %) patients, whereas ileal and paracecal position was found in 7 (13 %) patients. In five misdiagnosed children the appendix was in retrocecal position whereas in one of them in pelvic position.



Postoperative complications have been observed in both groups of patients although their incidence was greater in the misdiagnosed group of children. Wound infection was the most common complication in both groups respectively in eight correctly diagnosed patients (15 %) and in two misdiagnosed patients (33 %). Pelvic abscess was found only in one misdiagnosed patients and was treated by open drainage.

Length of hospital stay was shorter in correctly diagnosed patients (about 4 days) compared to misdiagnosed patients (about 8 days).

Discusion

Recent advances in the management of appendicitis seem to be not sufficient for accurate diagnosis of this condition in children. For these reasons, despite the multiple diagnostic modalities, misdiagnosis of acute appendicitis still remains a problem in pediatric surgery. The data from many studies report that the misdiagnosis rates vary from 7.5% to 37% for children[5,8,9] respectively nearly 100 % for those younger than two years[6,7,12]. In our study most of the patients were aged between 7 and 15 years old with an average age of 10.5 years[10,11]. Abdominal pain especially in RLQ was the most common complaint of children with acute appendicitis in our study, whereas in the misdiagnosed group the most frequent complaint was epigastric or diffuse abdominal pain. In many others studies, RLQ pain is the most common complaint of children with acute appendicitis[13]. CRP

and white blod cell count are very helpful in establishing the diagnosis of acute appendicitis [14,16,17,18]. In our study about 90 % of well diagnosed patients had leukocytosis (< 12.5 x 10^4 L) while in the misdiagnosed groups the high level of leukocytes was found only in 60 % of children (> 11 x 10^4 L). We always have to consider the fact that increased white blood cell count (WBC)[15,26,29] is also present in other conditions such as gastroenteritis, mesenteric lymphadenitis, pelvic inflammatory disease and certain other infections, and that the the WBC count alone without other investigations cannot differentiate between a complicated and an uncomplicated acute appendicitis[29]. In different studies the sensitivity of increased white blood cells to diagnose acute appendicitis varies from 65 to 85%[19,20,21,22,23], whereas a normal count of WBC cannot exclude the diagnosis of acute appendicitis[26,29].

Although C-reactive protein (CRP) is a good indicator for bacterial infection and rises earlier than WBC count, most studies show that leukocyte level had a better diagnostic value in the diagnosis of acute appendicitis[26,15,29].

One of the most characteristic signs of acute appendicitis is the presence of pain and tenderness in right lower abdominal quadrant[11,25]. In our study this sign was present in approximately 86 % of patients, whereas only in 17 % of misdiagnosed children group. Our results are similar to most of other studies from literature[11]. Our experience shows that the misdiagnosed children alongside the lack of characteristic pain in the RLQ had a shorter duration of symptoms. Several authors also stress this data in their studies[10,11].

Postoperative wound infection was the most common complication in our study. It was present in 7.6 % of correctly diagnosed patients and 16.6 % of misdiagnosed ones. Pelvic abscess occurred in only one misdiagnosed patient. According to different studies the rate of this complication ranges from three to eight percent[1,2]. Although C-reactive protein (CRP) is a good indicator of bacterial infection and rises earlier than WBC count, most studies show that leukocyte level has a better diagnostic value in the diagnosis of acute appendicitis.

Conclusion

The diagnosis of acute appendicitis in children remains a challenging and difficult procedure. Nowadays, no single test or combination of clinical and laboratory examinations can be reliable in differentiating children with and without acute appendicitis. Misdiagnosis predominantly was associated with a shorter duration of symptoms, failure to elicit physical signs in irritable children, atypical presentation, less relevant physical findings, and more often happens in children less than five years old. Diagnosis of children in this age often requires a serial physical and laboratory examinations and a high level of suspicion, which aid to
establish the correct diagnosis at the initial visit.

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