E.Yu. Dyakonova[1], I.V. Poddubnyi[1], L.S. Namazova-Baranova[1,2,3], M.D. Bakradze[1], A.A. Gusev[1], A.S. Bekin[1]

[1] Scientific Center of Children Health, Moscow, Russian Federation

[2] I.M. Sechenov First Moscow State Medical University, Moscow, Russian Federation

[3] N.I. Pirogov Russian National Research Medical University, Moscow, Russian Federation

Acute Intestinal Infection as a Mask of Acute Appendicitis in Children

Author affiliation:

Dyakonova Elena Yurievna, MD, Deputy Chief Physician in Surgery SCCH

Address: 2-Lomonosovskii pr. Bldg. 1, Moscow, 119991, **tel**.: +7 (495) 134-14-55, **e-mail**: rytella@mail.ru

The article received: 18.12.2015**. Accepted for publishing**: 04.02.2016

The problem of differential diagnosis of acute appendicitis and acute intestinal infections in modern medicine remains a topical problem in clinical practice of surgeons and pediatricians. If appendicitis is not diagnosed in time, it can lead to the development of complicated forms of inflammation of the appendix, which prolongs the surgery and the duration of antibiotic therapy, increasing the child's stay at hospital. The article presents the clinical observation of the three children, who were treated on perforated appendicitis, diffuse purulent peritonitis. The described cases demonstrate the need for multidisciplinary approach and comprehensive diagnosis of the patients with such complaints as abdominal pain, fever and diarrhea.

Keywords*: acute appendicitis, peritonitis, intestinal infection, laparoscopy.*

(***For citing****:* Dyakonova EYu, Poddubnyi IV, Namazova-Baranova LS, Bakradze MD, Gusev AA, Bekin AS. *Pediatric pharmacology*. 2016;13(1):51-53. (In Russ.)) doi: 10.15690/pf.v13i1.1515.

INTRODUCTION

Despite the large number of works, focused on acute appendicitis and its complications in children, the incidence of acute appendicitis, not timely diagnosed, remains high.

Acute appendicitis continues to hide behind the mask of acute intestinal infections [1]. The similarity of clinical symptoms of appendix inflammation and infectious diseases of the gastrointestinal tract makes is significantly difficult to make a timely diagnosis [2].

Delayed diagnosis of surgical complications can have irreparable consequences due to the development of advanced forms of peritonitis, and, consequently, the development of endotoxin shock and the multiple organ dysfunction syndrome in children [3].

Appendicular peritonitis develops on the background of destructive forms of appendicitis and is a consequence of the spread of inflammation in the peritoneum. The frequency of peritonitis in acute appendicitis, according to the literature, is 4-8% [4].

Perforation of the appendix can occur after 6 hours of the manifestation of the first symptoms, but most often, the perforation occurs after 12-24 hours after the start of the first clinical manifestations of acute appendicitis.

The speed of the development of the destructive process in the appendix, atypical clinical manifestations and difficulties in diagnosis of this disease in children explain the fact that the appendicular peritonitis remains the most acute problem of emergency abdominal surgery [3, 5].

The description of a series of cases

We have performed a retrospective analysis of 3 children, 2 boys of 3 and 6 years of age and 1 girl of 6 years of age, with appendicular peritonitis; they treated at the Children's Health Science Center (Moscow) in 2015. All of the children either initially applied or were sent to the pediatric departments of the SCCH complaining of abdominal pain, fever, and diarrhea. The duration of the disease was more than 3 days from the start of the first symptoms. The anamnesis contains repeated episodes of applying for the ambulance service with abdominal pain. The diagnosis of acute surgical pathology was excluded for all the children under the examination the ambulance doctor. That is why, patients called for the pediatrician with the clinical picture of acute intestinal infection. After the standard clinical and laboratory examinations, which registered leukocytosis, neutrophil left-shift of leukocyte formula, high figures of inflammatory markers; in addition, the children were examined by the surgeon for the differential diagnosis. The condition of the children was heavy, the pain of all the abdomen and positive peritoneal symptoms attracted attention.

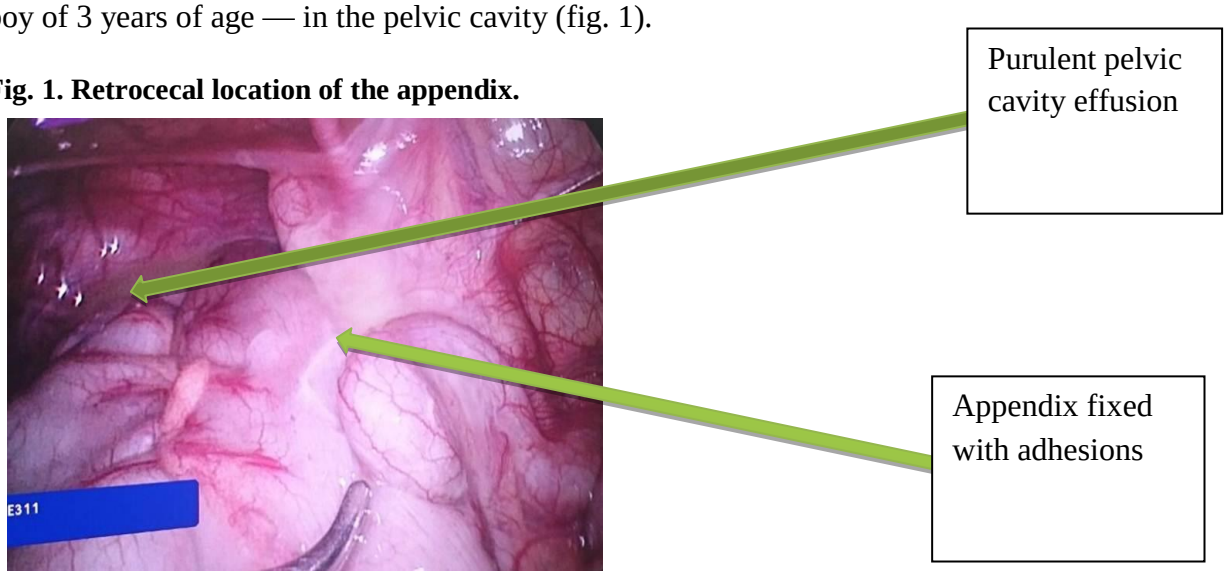
All the patients in the diagnostic phase received transabdominal ultrasound scan. In 2 cases (in boys of 3 and 6 years of age) ultrasound signs of deformation of the gallbladder, reactive changes in the liver and pancreas, ultrasound signs of enterocolitis, mesenteric adenitis were identified. In the third case small bowel loops were visualized, which were partially spasmatic, partially filled with liquid content, peristalsis was moderately expressed, free fluid in the pelvis was not determined, the cecum cupola swollen.

In all cases, the ultrasound diagnosis doctors noted the increase in intestinal gas, which made it difficult to verify the appendix.

Due to inability to exclude acute surgical pathology, diagnostic laparoscopy was performed for all the children.

During the examination of the abdomen, atypical location of the appendix attracted particular attention: in 2 children (a girl and a boy of 6 years of age), retrocecally in subhepatic space, in 1 boy of 3 years of age — in the pelvic cavity (fig. 1).

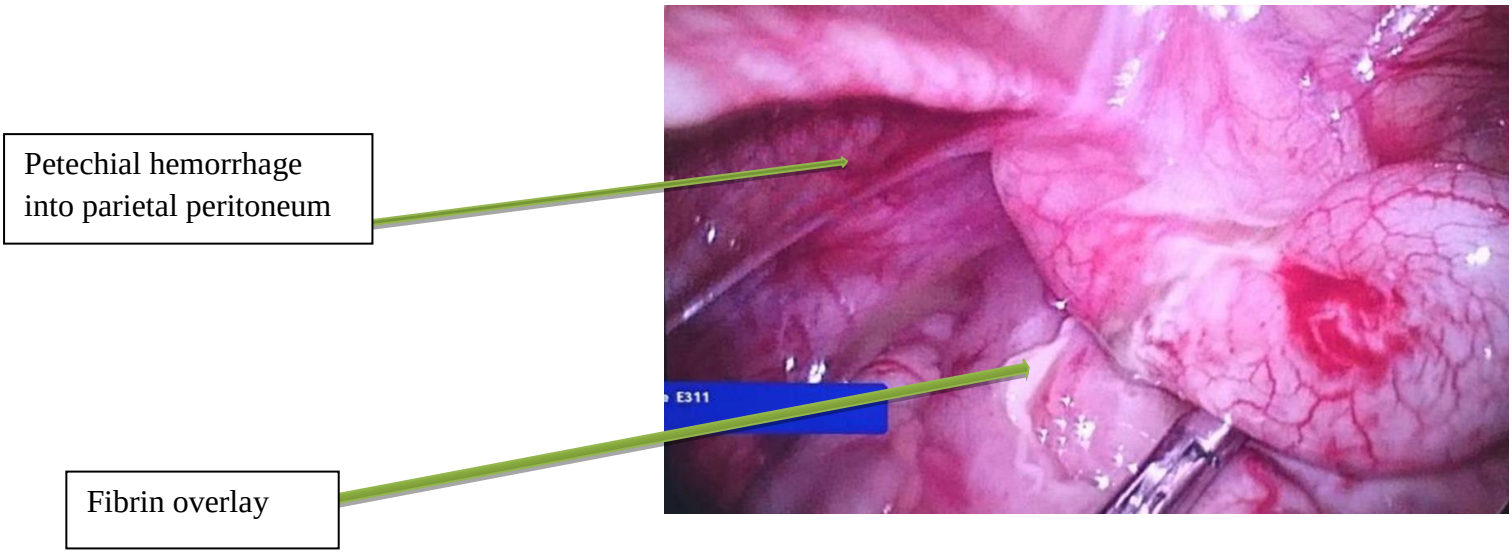
Fig. 1. Retrocecal location of the appendix.



In all cases, complicated forms of appendicitis were indicated. A lot of purulent exudate was detected, which was located on every floor of the abdominal cavity with specific changes in the parietal peritoneum and internal organs (fibrin overlay, edema, petechial changes) (fig. 2).

The appendix was completely isolated and removed in all the children, the abdominal cavity was sanitated. 2 children (a girl and a boy of 6 years of age) had drains installed in underliver space and pelvic cavity, 1 child, 1 boy of 3 years of age — only in the pelvic cavity.

Fig. 2. Complicated form of inflammation of the appendix.



Operational aid was performed on the background of epidural anesthesia, which in the early postoperative period made it possible to avoid intestinal paresis and minimize pain syndrome.
The children received a standard course of antibiotic and probiotics, given the manifestations of digestive syndrome in the preoperative period. The normalization of stool for all the children had been achieved by the 5th postoperative day.
In coprograms only violations of the normal content of bifidobacteria and lactobacilli were found; no pathological microorganisms that cause intestinal disorders were identified.
On average, the children had stayed at hospital for 14 ± 2 days; they were discharged in satisfactory condition.

DISCUSSION

In pediatric practice, intestinal infections continue to occupy leading positions among acute bacterial diseases in children [2]. It is interesting, that a large number of pediatric diseases occur under the mask of acute diarrheal infections [6]. There is a difficult problem of differential diagnosis of acute intestinal infections and acute surgical pathology for the practicing physicians, especially the diagnosis of acute appendicitis and its complicated forms. Unfortunately, we have not found data in the literature, which is focused on late diagnosis of acute appendicitis in children in infectious hospitals.
In the differential diagnosis of acute appendicitis and acute diarrheal infections, particular attention is paid to the first signs of disease manifestations. Acute intestinal infections manifest themselves by dyspeptic disorders, and only after or simultaneously, the patients begin to feel pain in the abdomen. Such symptoms of toxicity, as vomiting and intestinal dysfunction, are growing rapidly. After vomiting, children celebrate relief, which is rare in the case of acute appendicitis. During severe intoxication, clinical symptoms during abdomen examination are minor. Palpation shows that the abdomen is soft, with a non-active muscle tension of the anterior abdominal wall, which occurs during palpation when inhaling. The localization of the disease is indicated in epigastric or paraumbilical area. The symptoms of peritoneum irritation are negative. The atypical manifestations of the clinical picture of appendicitis are often connected with atypical (pelvic) anatomical location of the appendix, the early prescription of antibiotics, antipyretics (non-steroidal anti-inflammatory drugs), prokinetics, which "blur" the clinical picture, and only the development of peritonitis, when the peritoneal symptoms are prominent and abdominal pain cannot be stopped, forces to re-apply to the surgeon.

In modern medicine, numerous researches are conducted to improve the quality of the diagnosis of acute appendicitis, particularly, in the early stages of its development [7, 8]. Most of them are aimed to study the diagnostic possibilities of additional research methods (computed tomography, ultrasound and electromyography). The application of these research methods undoubtedly enhances the quality of the diagnosis of acute appendicitis, but it does not solve the problem as a whole, that is why, the "gold standard" in the diagnosis of acute appendicitis remains laparoscopy [4, 9].

The reasons for making mistakes in the diagnosis of acute appendicitis, as shown in our clinical examples, is the absence of pathognomonic symptom of acute appendicitis and the presence of clinical signs and symptoms, specific both for acute diarrheal infection and for the acute surgical abdominal pathology.

The reason for the incorrect diagnosis in all cases was atypically localized pain in the abdomen. Mistakes in the diagnosis of acute intestinal infections lead to incorrect treatment and useless surgery, however, the delayed diagnosis of acute appendicitis leads to the development of its complicated forms, furthermore, a threat of endotoxin shock and multiple organ failure appears. All these consequences aggravate the postoperative period significantly, requires high costs on rehabilitation, and, in neglected cases, can lead to death.

It is important to remember, especially for novice doctors, both for pediatricians and surgeons, that in case of questionable diagnosis or suspected acute appendicitis, the child is subjected to day and night surveillance at a hospital in the surgical department. If there is no effect from conservative therapy, aimed to treat intestinal infections, it is necessary to add instrumental and laboratory methods for researching in dynamics and broaden the indications for diagnostic laparoscopy. This will prevent diagnostic errors and complicated forms of appendicitis in children.

CONCLUSION

Children with suspected intestinal infection and the clinical picture of abdominal pain syndrome should be hospitalized for the joint observation by a pediatrician and a surgeon with dynamic laboratory control of inflammation indicators.

In questionable cases indications for diagnostic laparoscopy should be broadened, thus avoiding the development of complicated forms of appendicitis, peritonitis.

A multidisciplinary approach to the treatment of patients with abdominal pain syndrome allows timely suspecting and excluding acute surgical disease.

Availability of high-tech equipment in the hospital provides timely diagnosis and therapeutic laparoscopy, which allows verifying the diagnosis in time. That is why every hospital must have specialists with skills in laparoscopy, which will help to avoid medical errors and improve the quality of life of children.

Source of funding
Not stated.

Conflict of interests
The authors of the article stated there is no conflict of interest to report.

REFERENCES

1. Горелов АВ, Усенко ДВ. Ротавирусная инфекция у детей. *Вопросы современной педиатрии*. 2008;7(6):72–78. [Gorelov AV, Usenko DV. Rotavirus infection in children. *Current Pediatrics.* 2008;7(6):72–78. (In Russ).]
2. Куличенко ТВ, Бакрадзе МД, Патрушева ЮС. Острая инфекционная диарея у детей. *Педиатрическая фармакология*. 2009;6(3):97–103. [Kulichenko TV, Bakradze

MD, Patrusheva JS. Acute infectious diarrhea in children. *Pediatric Pharmacology*. 2009;6(3):97–103. (In Russ).]
3. Карасёва ОВ, Рошаль ЛМ, Брянцев АВ, Капустин ВА, Чернышёва ТА, Иванова ТФ. Лечение аппендикулярного перитонита у детей. *Детская хирургия*. 2007;3:23–27. [Karaseva OV, Roshal LM, Bryantsev AV, Kapustin VA, Chernysheva TA, Ivanova TF. Treatment of appendicular peritonitis in children. *Pediatric Surgery*. 2007;3:23–27. (In Russ).]
4. Дронов АФ, Поддубный ИВ, Дедов КА, Чундукова МА, Залихин ДВ, Аль-Машат НА, Ярустовский ПМ. Видеолапароскопические операции в неотложной детской хирургии. *Детская хирургия*. 2000;4:15–17. [Dronov AF, Poddubny IV, Dedov KA, Chundukova MA, Zalihin DV, Al-Mashat NA, Yarustovsky PM. Videolaparoscopic operations in the Emergency Children's Surgery. *Pediatric Surgery*. 2000;4:15–17. (In Russ).]
5. Коровин СА, Соколов ЮЮ. Лапароскопия при лечении детей с острым аппендицитом и перитонитом. *Русский медицинский журнал*. 2011;22:20–22. [Korovin SA, Sokolov YY. Laparoscopy in the treatment of children with acute appendicitis and peritonitis. *Russian Medical Journal*. 2011;22:20–22. (In Russ).]
6. Гумеров АА, Миронов ПИ, Викторов ВВ, Викторова ТВ. Метаболические и иммунологические изменения при аппендикулярном перитоните у детей, осложненном полиорганной недостаточностью. *Вестник хирургии*. 1997;5:61–64. [Gumerov AA, Mironov PI, Viktorov VV, Viktorova TV. Metabolic and immunological changes in appendicular peritonitis, complicated with multiple organ failure in children. *Surgery Newsteller*. 1997;5:61–64. (In Russ).]
7. Кригер ДГ, Федоров АВ, Воскресенский ПК, Дронов АФ. *Острый аппендицит*. М.: Медицина. 2007. С. 92–93. [Krieger DG, Fedorov AV, Voskresenckii PK, Dronov AF. *Acute appendicitis*. Moscow: Medicine; 2007. pp 92–93. (In Russ).]
8. Фёдоров ВД, Гостищев ВК, Ерломов АС, Богницкая ТН. Современные представления о классификации перитонита и системах оценки тяжести состояния больных. *Хирургия*. 2000;4:58–62. [Fedorov VD, Gostishev VK, Ermolov AS, Bognitskaya TN. Modern views on the classification of peritonitis and the systems of assessment the patients' conditions. *Surgery*. 2000;4:58–62. (In Russ).]
9. Щитинин ВЕ, Коровин СА, Дворовенко ЕВ. Хирургическая тактика при аппендикулярном перитоните у детей. *Детская хирургия*. 2000;4:13–15. [Schitinin VE, Korovin SA, Dvorovenko EV. Surgical tactics in appendicular peritonitis in children. *Pediatric Surgery.* 2000;4:13–15. (In Russ).]