

Successful antibiotic treatment of liver abscess in an eight-year-old boy after perforated appendix

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Abstract

We present the case of an eight-year-old boy who was referred to our Clinic with acute abdomen. After ultrasound, which showed a perforated appendix, an urgent appendectomy was initiated. When the peritoneum was opened, the abdomen was full of pus. The appendix was positioned retrocecal and subhepatic, extensively coupled with the ascendant colon. Partial omentectomy and appendectomy were performed. On the tenth postoperative day, a contrast-enhanced ultrasound (CEUS) was performed. A subcapsular lesion of the right liver lobe of 30 mm diameter was observed. It was a liver abscess. Three weeks after intravenous therapy (clindamycin/gentamicin, piperacillin/tazobactam), the abscess has completely regressed.

Keywords

Acute abdomen, appendicitis, liver abscess, children.

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Introduction

Pyogenic liver abscess is rare in healthy children, especially in developed countries. It occurs mainly in immunocompromised children. In the world, there are only a few cases after appendicitis in healthy immunocompetent children (**Tab. 1**) [1-7]. One way of forming a liver abscess is to spread intra-abdominal contents via portal circulation after perforated appendix. Approximately 2/3 occurs in the right lobe of the liver and the majorities are solitary. The preference for the right hepatic lobe can be attributed to the volume of the right portal vein flow. A large number of cases have been found without any apparent cause and have been labeled as cryptogenic [5, 8].

Case presentation

We present the case of an eight-year-old boy who came to the Clinical Hospital Center because he had abdominal pain for the last 2 days. He was examined by a pediatrician. The first day of the illness, he was subfebrile (37.8°C), while the following day was afebrile. He had diarrhea and vomit. The whole time he had a bad appetite. The abdomen was at the level of the thoracic, soft and painless. The complete blood test was the following; leukocytes $10.6 \times 10^9/L$, segmented neutrophils $8.10 \times 10^9/L$ (76.3%), lymphocytes $1.4 \times 10^9/L$ (13.1%), C-reactive protein (CRP) 12.4 mg/L. The boy got an iDRATA® stick and his pediatrician recommended an oral rehydration solution and a *Lactobacillus rhamnosus GG* (WAYA®) probiotic. If the boy

did not feel better in the next few days, the parents were advised to go to the Infectious Disease Clinic, which they did the next day. Upon arrival to the Infectious Disease Clinic, axillary temperature was 37.5°C, rectal 39.2°C. The complete blood test was the following; leukocytes $15.9 \times 10^9/L$, segmented neutrophils 84.8%, lymphocytes 8.9%. The abdomen was diffusely painful with peritoneal irritation and the child was urgently referred to our Clinic. He was admitted to our Clinic with an acute abdomen. The abdominal ultrasound showed the perforated appendix in retrocecal and subhepatic position (9 mm in diameter) with the appendicolith inside the lumen. An urgent appendectomy was initiated. Clindamycin (3 x 300 mg i.v.)/gentamicin (2 x 80 mg i.v.) therapy was started immediately preoperatively. When the peritoneum was opened, the abdomen was full of pus, which was taken for microbiological analysis (**Tab. 2**). The following bacteria were isolated: *Escherichia coli*, *Klebsiella oxytoca*, *Peptostreptococcus anaerobius*, *Prevotella melaninogenica*, all sensitive to clindamycin/gentamicin therapy. The appendix was positioned according to the ultrasound finding (extensively coupled with the ascendant colon). Partial omentectomy and appendectomy were performed. The abdomen was abundantly washed and an abdominal drain was placed. The boy was in the Intensive Care Unit for 3 postoperative days. On the first postoperative day, CRP was 182.3 mg/L, while procalcitonin (PCT) was 21.97 ng/mL. On the fourth postoperative day, the abdominal drain was removed. One week after the operation, a control abdominal ultrasound was performed.

Table 1. Patients with liver abscess after appendicitis.

Case	Sex/age (y)	Presenting symptoms and signs	Location and no. of abscesses	Organisms
Pineiro-Carrero and Andres, 1989 [1]	Female, 12 y	Fever, abdominal pain, vomiting	Right lobe, multiple	<i>Bacteroides spp.</i> , <i>Propionibacterium spp.</i>
Nasir et al., 2009 [2]	Female, 12 y	Fever, respiratory distress	Right lobe, solitary	-
Salahi et al., 2011 [3]	Female, 6 y	Fever, abdominal pain, vomiting	Right and left lobe, multiple	<i>Escherichia coli</i>
	Female, 4 y	Fever, abdominal pain, anorexia, vomiting	Right lobe, two abscesses	
Hsu et al., 2015 [4]	2 patients ^a < 18 y	Fever, abdominal pain	Right lobe, solitary	<i>Klebsiella pneumoniae</i> , <i>Streptococcus spp.</i>
Piqueras et al., 2016 [5]	Female, 14 y	Fever, right upper quadrant abdominal pain	Right lobe, solitary	<i>Streptococcus constellatus</i> , <i>Bacteroides ovatus</i> , <i>Bacteroides thetaiotaomicron</i>
Tannous et al., 2018 [6]	Female, 11 y	Fever, abdominal pain, weight loss	Right lobe, solitary	<i>Streptococcus gallolyticus</i>
Ayers et al., 2019 [7]	Male, 11 y	Fever	Right lobe, solitary	<i>Bacteroides fragilis</i> , <i>Escherichia coli</i>

^a Sex not specified.

Table 2. Abdominal aspirate (antibiogram).

Antibiotics	<i>Escherichia coli</i>	<i>Klebsiella oxytoca</i>	<i>Peptostreptococcus anaerobius</i>	<i>Prevotella melaninogenica</i>
Penicillin			R	S
Ampicillin	S	R	I	S
Amoxicillin/clavulanic acid	S	R	S	S
Piperacillin/tazobactam	S	S	S	S
Cefoxitin		S		
Ceftazidime	S	S		
Ceftriaxone	S	S		
Cefepime	S	S		
Imipenem/cilastatin	S	S	I	S
Meropenem	S	S		
Gentamicin	S	S		
Amikacin	S	S		
Ciprofloxacin	S	S		
Clindamycin			S	S
Trimethoprim/sulfamethoxazole	S	S		
Vancomycin			S	
Chloramphenicol			S	S
Metronidazole			R	S

S: susceptible; I: intermediate; R: resistant.

The radiologist described a longitudinally-shaped anechogenic structure (35 mm long), with no signs of pathological flow corresponding to the subhepatic abscess. On the tenth postoperative day, a contrast-enhanced ultrasound (CEUS) was performed, showing the newly discovered subcapsular lesion of the right lobe of 30 mm diameter corresponding to liver abscess. Also, a subhepatic abscess was displayed, which was in regression (diameter 24 mm). Clindamycin/gentamicin therapy was replaced with piperacillin/tazobactam therapy (3 x 3.7 g i.v.). Control ultrasounds showed regressive dynamics of hepatic and subhepatic abscess. Two weeks after piperacillin/tazobactam therapy initiation, the abscesses had almost completely disappeared. After release from the hospital, the boy continued to oral therapy (amoxicillin/clavulanic acid [2 x 9 mL per os], trimethoprim-sulfamethoxazole [2 x 10 mL per os]) for the next 2 weeks. Six months after the appendectomy, the boy is healthy, without other complications.

Discussion

Pyogenic liver abscess was first well-characterized as a potential complication of appendicitis by Dieulafoy in 1898 [9]. In the period of powerful antibiotics, this complication

of appendicitis has become extremely rare. The appearance of liver abscess is greater in the less developed countries [10]. This is the first case of liver abscess in a child described in our country and in this part of Europe. Clinical signs and symptoms of liver abscess are usually nonspecific (with variable duration of fever, abdominal pain, loss of appetite and nausea), which often delays the diagnosis. By timely ultrasound diagnostic and antibiotic therapy, we prevented the development of symptoms in our case. As for diagnostics, an abdominal ultrasound with a sensitivity greater than 90% is the first choice. It also provides real-time assistance for abscess drainage [11]. The right hepatic lobe is more commonly affected. If abscesses are too small to be effectively drained (typically less than 2 cm), then only antibiotic treatment is required. In the work of Kumar et al., 66% of cases were treated with antibiotics, while only 16.7% subsequently required drainage [12]. There are other studies where small abscesses (which did not need to be drained) were treated with intravenous antibiotics only [8, 13]. For the purpose of treating pyogenic liver abscess, there are no randomized controlled trials that have evaluated the regimen for antibiotic administration. Treatment must be based on the causative agent of the infection and on the basis of its resistance to antibiotics. Depending upon the source of the

abscess, common pathogens include *Staphylococcus aureus*, *Streptococcus spp.*, *Escherichia coli* and anaerobes. As with the antibiotic regimen, there are no randomized controlled trials to answer how long therapy should last. The duration of therapy is usually estimated by the size of the infection and the patient's clinical response. Given that strategies for the treatment of pyogenic liver abscess have been understood based on the treatment of adult patients, there is still controversy as to what is the best treatment strategy for children. Despite the known etiopathogenesis of the disease, a possible treatment is still being discussed in developed countries [10]. The treatment of non-immunosuppressed children must be further discussed in terms of parenteral antibiotic therapy, percutaneous drainage and the possibility of surgical treatment depending on the location and progression of the abscess [14]. According to the literature, ultrasound-guided percutaneous drainage is the first line of treatment. It is a minimally invasive method that is easy to perform and has little potential for complications. It should be made as soon as the indication is present. In addition, we can find out the pathogen by the drainage, so that we can administer adequate therapy according to the antibiogram. As in our case, Piqueras et al. suggested that abscess could occur directly by spreading from the retrograde position of the appendix. They argued that it was a late complication, but we are witnessing that it was an acute complication in our case. It is important to note that in their case it was not a perforated appendix [5]. In the case of Ayers et al., it is important to note that liver abscess can be difficult to treat if intravenous therapy with appropriate antibiotics is not long enough [7]. Analogous to our case, in Hsu et al.'s study, patients received parenteral antibiotics for an average of 3 weeks, followed by oral antibiotics for another 2 weeks [4]. It is important to note that the duration of antibiotic therapy depends on the regression of the abscess.

Declaration of interest

The Authors declare that there is no conflict of interest. Financial support and sponsorship: nil.

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