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Emergency diagnostic laparoscopy for multisystem inflammatory syndrome in a child

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ABSTRACT

COVID-19 and multisystem inflammatory syndrome in children (MIS-C) can mimic and cause acute abdominal diseases such as intestinal obstruction, terminal ileitis, colitis, internal necrotizing mesenteric lymphadenitis, acute appendicitis, and sometimes bowel perforation. We report a case of a 6-year-old female with MIS-C and acute purulent pelviperitonitis, who was successfully treated by laparoscopy and an antibiotic without intravenous immunoglobulin and aspirin therapy. We believe that the case description should help to find a worthy place for early laparoscopic and other minimally invasive procedures for the management of similar MIS-C cases.

1. Introduction

Multisystem inflammatory syndrome in children can mimic [1,2] and/or provoke acute abdominal diseases: intestinal intussusception/obstruction [3], terminal ileitis and/or colitis [4], internal hernia, necrotizing mesenteric lymphadenitis, acute appendicitis [5–7] and intestinal perforation [8], which can lead to a life-threatening condition called “inflammatory peritonitis” [9] and, as a result, an inflammatory syndrome that resembles septic shock, or, in some cases, septic shock itself

2. Case presentation

A 6-year-old female was admitted to a tertiary hospital with fever (up to 39°C) and intermittent two days' long diarrhea, as well as a six-hour history of abdominal pain that began after single vomiting. At home the child had been examined twice by a surgeon, who identified a sudden classic clinical presentation of appendicitis, 3 h before hospitalization, and then pelviperitonitis, which appeared 2 h later.

Five weeks before, she had had a mild form of COVID 19 with a runny nose, a sore throat and a fever of 37–38 °C on the first day. Having recovered, the patient spent a lot of time among other children, which entailed a high risk of re-infection. About a year before, she had also easily overcome COVID 19 without any abdominal symptoms. Since the age of two, the patient has had a chronic streptococcal infection with recurrent localized skin rashes and a sore throat once or twice a year, which have always been easily managed with oral antibiotics and/or local application of antiseptics.

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At admission, she presented with drowsiness, eyelid edema and rash, as well as with increasing pain and signs of defense in the lower abdomen, predominantly on the right. Thorax X-ray was without pathology (Fig. 1). Laboratory tests showed white blood cell count 20800/ μ L (neutrophils 94%, lymphocytes 1.0%), Hb 16.0 g/dl, hematocrit 44,7%, erythrocyte sedimentation rates 4 mm/h, platelets 191000/ μ L, C-reactive protein 70.8 mg/dl, rheumatoid factor 18 IU/ml, fibrinogen 610 mg/dl, albumin 4.3 g/dl, bilirubin 14 mEq/L, direct bilirubin 2,6 mEq/L, antistreptolysinO 7 IU/ml, Na⁺ 140 mEq/L, K⁺ 4.5 mEq/L.

Given the progressive clinical pattern of acute peritonitis, it was decided to perform an emergency laparoscopy. The laparoscopy revealed the absence of inflammatory changes in the appendix but pronounced peritonitis with purulent (yellow, cloudy and viscous) liquid of about 150 ml in the lower abdominal cavity. The fluid was aspirated, the cavity was rinsed with saline, and afterwards the surgical wounds were sutured. Overnight, the patient had a fever and tachycardia. The postoperative period was uneventful with intravenous administration of ceftriaxone and paracetamol. The temperature (37-38°C) returned to normal on the second day, and oral nutrition was started 12 hours after the operation. The patient was discharged on the third day after the surgery (by that time, the control ultrasound examination showed the absence of intraperitoneal fluid, with a recommendation to extend the course of intravenous ceftriaxone by seven days and keep to a diet rich in vitamins and proteins. The microbiological report for intraoperative abdominal fluid was “negative culture”, but serum IgG antibodies to Sars-Cov-2 were positive.

On the seventh postoperative day, ultrasonography did not reveal any pathological changes in the organs of the abdominal cavity and the heart.

Two weeks after hospitalization, all laboratory parameters returned to normal, and only a slight edema and rash remained on the right eyelid – the β -hemolytic streptococcus “gateway” at the age of two years.

3. Discussion

A similar case of a 4-year-old patient with MIS-C was described by Engelis A. et al. [6], but the said patient underwent diagnostic laparoscopy with the exudate evacuation (also yellow, cloudy, viscous liquid) on the fourth day after symptom onset. Unfortunately, the authors did not indicate the onset time of the first peritonitis symptoms, but the treatment outcome was also successful after 17 days of hospitalization, although steroids, aspirin and respiratory support were additionally used in the postoperative management, which is certainly justified, since the patient had a more advanced form of MIS-C (bilateral polysegmental pneumonia with minimal pleural effusion and increased pericardial effusion).

In our case, there were laparoscopic signs of pelvioperitonitis without signs of acute appendicitis, so we considered it unnecessary to perform appendectomy, although a similar case with this “abdominal form” of MIS-C and negative appendectomy was described by Hwang M. et al. A 16-year-old female [1] presented with a four-day history of abdominal pain, vomiting, fever, and positive IgG for SARS-CoV-2 on admission, underwent laparoscopic appendectomy on the second day in hospital as she reported increased pain in the right lower quadrant and demonstrated new abdominal rebound tenderness in the abdominal region despite the empiric treatment of appendicitis with piperacillin tazobactam. The postoperative period, after the completion of immunoglobulin therapy, revealed a deterioration in the patient’s condition, resembling a relapse of MIS-C, and corticosteroid therapy and hemodynamic support within 24 hours were successfully applied. Similar to our case (on the third day), she was discharged in the early postoperative period (on day seven of hospitalization) but with recommendations to complete a course of low dose aspirin and steroids.

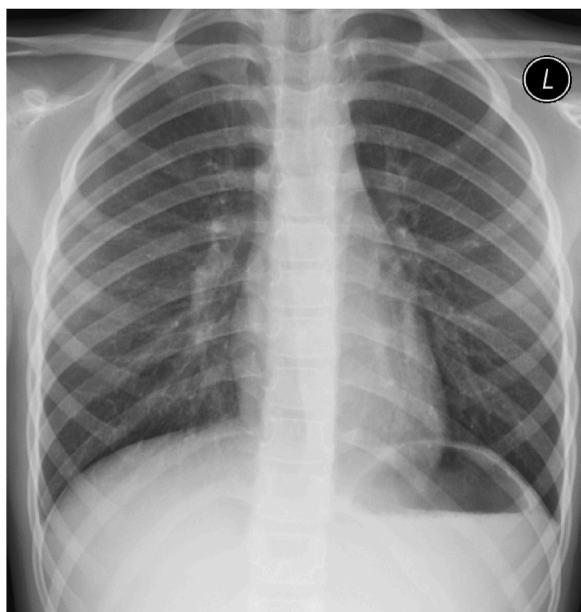


Fig. 1. Thorax X-ray on admission with no apparent pathology.

All three cases of successful “abdominal MIS-C form” treatment at its initial stage point to the safety of diagnostic laparoscopy, while our case also demonstrates its possible therapeutic effect.

The presented case allowed us to suggest that the early evacuation of the exudate by laparoscopy (<12 hours from the “acute abdomen”/peritonitis symptoms onset) interrupts, without the use of steroids and intravenous immunoglobulins, the vicious block-chain, when the inflammatory cytokines contained in the peritoneal exudate cause inflammatory (sometimes micro-necrotizing) changes in the abdominal organs, making them permeable for intestinal microorganisms, which, as a result, can cause purulent peritonitis and inflammatory-septic shock. Early laparoscopy should, at least, be a therapeutic and possible prophylactic procedure for purulent peritonitis with “thick fibrinous-purulent ascites diffusely adjacent to the abdominal organs” [9], which is rare, but, unfortunately, occurs in children with COVID-19. One case, albeit successful, does not give full confidence concerning the need for extensive use of laparoscopic or another minimally invasive method – ultrasound-guided laparocentesis for early evacuation of cytokine-toxic peritoneal exudate in patients with similar clinical profiles.

However, medical evidence is constantly accumulating during the COVID 19 pandemic, and it is possible that data from animal experiments [10] will also provide an answer to the question about the place of minimal invasive evacuation of “toxic/inflammatory” ascites in the diagnosis and treatment of MIS-C.

In conclusion, multisystem syndrome requires a multidisciplinary approach, and it is perfectly correct that most protocols for the management of patients with MIS-C recommend receiving advice from a multi-disciplinary team of professionals [11], but, as reiterated in the case report, treatment approaches should be personalized according to patient characteristics, symptoms, response to follow-up treatment and new clinical evidence, as well as, in the longer term, animal model data for COVID-19/MIS-C.

4. Informed consent

Informed consent was obtained from the mother and the patient.

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Authorship

All authors certify that they meet the current ICMJE criteria for authorship.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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