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Diagnosis and Treatment of Sepsis in a Fourteen-year-old Patient: A case study of pulmonary inflammatory discharge without typical features of respiratory tract infection.

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ABSTRACT

Introduction and aim. Sepsis is a set of symptoms caused by the body's uncontrolled inflammatory response to infection, leading to damage to more than one organ and homeostasis disorders. Symptoms of sepsis in children may be non-specific, making it difficult to diagnose quickly and effectively.

Description of the case. This article presents the case of a 14-year-old patient who was admitted to the Paediatric Unit due to a high fever (up to 42 degrees Celsius) lasting from five days and severe pain in the area of the lower ribs on the left side, at the site of an injury that occurred two weeks earlier.

Conclusion. In the case of unclear symptoms of high fever and indicators of inflammation, a broad diagnostic spectrum is necessary, including imaging and laboratory tests and specialist consultations. It is also important to consider the possibility of pulmonary congestion in case of postural pain and elevated levels of D-dimers. Regular patient monitoring and controlled laboratory studies are crucial in assessing the effectiveness of therapy and the progress of treatment.

Key words: sepsis; diagnosis; inflammation; pneumonia

Introduction

Sepsis in children presents a significant clinical and epidemiological challenge, often leading to serious health consequences and increased mortality in this population [1], estimated

at between 11 and 19% [2]. According to international guidelines, sepsis is a condition of organ dysfunction caused by a deregulated inflammatory response of the host to a pathogen [3].

The main etiological factors of sepsis in children include a variety of microorganisms, including bacteria, viruses, fungi and, less commonly, primates. Gram-positive bacteria, including Streptococcus pneumoniae and Staphylococcus aureus, as well as Gram-negative bacteria such as Escherichia coli and Neisseria meningitidis are particularly often responsible for sepsis in children [4].

Symptoms of sepsis in children can be varied and often non-specific, making it difficult to diagnose quickly and effectively. Typical symptoms include fever, tachycardia, tachypne, impaired consciousness, irritability, anemia, and metabolic disorders.

Diagnosis is based on a comprehensive clinical assessment, laboratory tests including blood morphology, inflammatory markers and blood culture (Table 1). It is also important to use appropriate imaging tools, such as computed tomography or ultrasound, to identify potential outbreaks of infection.

Treatment of thrush in children is an urgent and multi-step process that includes fluid therapy, immediate initiation of broad-spectrum antibiotic therapy, and the implementation of appropriate supportive measures such as maintenance of airways, hemodynamic stabilization, and adequate metabolic support. In some cases, surgery may also be necessary to eliminate the source of infection.

The complexity of sepsis in children requires interdisciplinary collaboration of the medical team and rapid, individualized clinical intervention to improve negotiations and reduce complications of this serious condition.

Table 1. Criteria for diagnosis of sepsis in children according to the International Paediatric Sepsis Consensus Conference [5]

Infection with 2 of the following 4 criteria, one of which is abnormal temperature or leukocyte count	
Temperature	> 38.5°C lub < 36°C
Number of breaths	*SD above the age norm or the need for mechanical ventilation (acute process excluding neuromuscular disease or general anaesthetic)
Number of leukocytes	increased or decreased according to age (excluding chemotherapy-induced leukopenia) or less than 10% of immature neutrophils
Tachycardia	mean heart rate >2 SD above the age norm (excluding medications, pain, external stimulation) OR bradycardia in children <1 r.g. heart rate <10 percentile (excluding β-adrenolytic drugs, misaligned nerve stimulation, congenital heart defects) OR current increase (0.5-4 hours) or decrease (respiratory depression for 0.5 hours) of unexplained origin

*SD- Standard Deviation

Case report

The 14-year-old girl was admitted to the general ward in moderate to severe condition due to a high fever rising to 42 degrees Celsius and severe pain in the area of the ribs on the left side, where she was injured during a basketball game two weeks ago. The site was painful

during the physical examination, made it difficult to lie down, the patient adopted a forced sparing position, while no features of hepatosplenomegaly were found, and the symptoms of anxiety were absent.

In addition, a day after the onset of fever was accompanied by a severe sore throat that made it difficult to swallow.

In the interview, it was established that the fever persisted for 5 days, responded to anti-fever medications and increased again after a few hours. A single dose of Cephalexin and Metamizole was administered in the Primary Health Care and the girl was referred to the hospital.

During admission, tachycardia was found to be approximately 110/min, marked signs of dehydration and enlarged palate and adrenal amygdala, red throat and a positive symptom of Goldflam on the left side.

Laboratory tests revealed significantly elevated levels of inflammatory indices (CRP 300.11 mg/l), procalcytonins (PCT 76.03 ng/ml), D-dimers reaching almost 12 thousand ng/ml, urea and fibrinogen results were also above the upper limit of normal, platelet levels were lowered (PLT 57000/ml).

Sepsis was diagnosed, which, due to its emergency nature, requires early recognition [6] Diagnosis and treatment of sepsis occurred quickly and without delay. The overall condition of the child was extremely suggestive,
very elevated CRP and PCT inflammation and fever. The next step was to identify the source of the infection.

Blood and urine screening, examination for strep throat and groups A and B were commissioned, chest X-ray revealing a slightly magnified image around the inside that could suggest inflammatory changes, abdominal ultrasound assessing the liver, gallbladder, intrahepatic bile ducts, pancreas, spleen, bladder or presence of free fluids. Surgical and neurological consultations were requested. It was also decided to evaluate heart muscle and valves in the Heart Echo study and to label antibodies in the IgM class EBV. The diagnostic test undertaken, laboratory tests, imaging and specialist consultations did not answer the question of what is the cause of high fever, alarming values of inflammatory indicators and other ailments. Due to the lack of a catchable source of infection, it was decided to perform a computed tomography of the chest. On the other hand, pain of a character that may resemble pulmonary in combination with high parameters of D-dimers led to the ordering of angioTK study in the pulmonary emphysema algorithm. It is worth recalling that pulmonary embolism, first of all pulmonary embolism, can cause pneumonia and manifest itself as a high temperature,

opening of the secretion, and in the X-ray of the chest, difficulties in differentiating with pulmonary embolism [7]. In addition, the patient did not cough, and auditory vesicle was expressed above the lung fields.

It was possible to see on both sides, numerous foci of inflammation and a trace of liquid in the left flush hole (up to 8 mm).

The Transcellular Ultrasound Lung Examination (PBUP) revealed numerous consolidations and confirmed the presence of fluid in the lung.

The therapeutic process included Cephalosporin III generation, amoxicillin with clavulanic acid, analgesics and anti-fever agents as well as fluid therapy, obtaining after 6 days of treatment an improvement in general condition as well as a resolution of fever. In control studies, normalization of inflammatory indicators was noted. After 14 days of hospitalization, the patient was discharged home in good condition. There were no adverse events or effects of the treatment used.

Table 2. Results of tests during reception

CRP	300,11 mg/l, (standard below 5)
Procalcytonin	76,03ng/ml (standard up to 0.1)
Protein in urine	1,4g (standard <150mg)
Urobilinogen	68 mg/dl (standard0-4 mg/dl)
Platelets	57 thousand (standard 150-450.000/ul)
Morphology	advantage of neutrophils

Discussion

Diagnosis and therapeutic intervention of sepsis occurred quickly and without delay. The general condition of the child, very high rates of inflammation and high fever were extremely suggestive. The problem was identifying the source of the infection. Blood testing results were negative, no hearing changes or coughing. No abnormalities were found in chest

X-rays and abdominal ultrasounds. The skin was free of pathological changes or blooms, no signs of neuroinfection, diuretic symptoms suggesting urinary tract infection (UTI), painless joints, middle ear in otoscope examination without changes. Inflammatory pulmonary discharge, which was the source of the ailment, could only be found after a CT scan of the chest and confirmed by a PBUP examination, which was an appropriate course of action in the absence of pathological changes on the X-ray imaging [8]. Chest pain, which could not be clearly assigned to the category of musculoskeletal or pulmonary pain, increased D-dimers and saturation of up to 96% prompted the previously mentioned tomography to be performed additionally enriched with an algorithm of pulmonary congestion. Pulmonary congestion is one of the diagnoses that is directly life-threatening, so if suspected, it should always be ruled out or confirmed [9]. In addition, the resulting clot can be a potential site where bacteria can colonize and cause infection leading to sepsis. On the other hand, pulmonary embolism is much rarer in children than in adults, it should also be remembered that the examination using computed tomography exposes the person being examined to a large dose of x-ray radiation. This exposure after about 20 years can lead to new cancer outbreaks within the lungs. In geriatric patients, this should not be worried, while any decision to perform chest CT in children is difficult and should be considered.

Conclusions

I n the case of a severe condition of the child, unclear symptoms of high fever and septic inflammatory indicators, and chest pain, it is necessary to promptly implement a broad-spectrum antibiotic, detailed diagnostics, including imaging and laboratory tests, and specialist consultations.

Chest pain along with above-normal D-dimers results may raise suspicion of pulmonary emphysema. Chest pain of a purulent nature, shortness of breath, high fever raises suspicion of pneumonia in purulent exertion, is an indication for performing PBUP/ chest X-ray.

Regular patient monitoring and control studies are important in assessing the effectiveness of therapy and the progress of treatment.

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