

# IMPROVING THE PRINCIPLE OF DIAGNOSTICS AND TREATMENT OF PURULENT INFLAMMATORY DISEASES IN CHILDREN BASED ON CLASSIFICATIONS

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**Abstract.** *Comparison and improvement of the principles of diagnosis, treatment of purulent-inflammatory diseases of the skin and soft tissues based on the classifications of surgical infections used in the countries of the Union and Europe.*

*From 2018 to 2023, the results of diagnosis and treatment of patients with purulent-inflammatory diseases of the skin and soft tissues in the surgical infection department of the ToshPMI clinic were studied based on classifications adopted in the CIS countries and Europe.*

*Results. If purulent-inflammatory diseases of the skin and soft tissues are identified at an early stage and the necessary surgical interventions are performed in a timely manner, then complications after the diseases will be prevented, and the effectiveness of treatment will be high. Despite the fact that there is evidence of surgical infection, there is still an increase in the number of patients with these diseases and complications after the disease, severe scars, sepsis and a number of other complications.*

**Keywords:** *purulent-inflammatory diseases of the skin and soft tissues, Dead (necrotic) tissue, Acute infection, Chronic infection.*

**Materials and styles.** 2018 - 2023 The study material included 2,144 children out of 3,500 patients with purulent-inflammatory diseases of soft tissues of various parts of the body who were treated in the surgical infection department of the ToshPMI clinic. In the surgical infection department, children from 1 month to 18 years were treated, of which 514 children from 1 month to 1 year, 512 from 1 to 3 years, 574 from 3 to 5 years, 381 from 5 to 10 years, from 10 to 18 years -308. The remaining 1211 were treated for various secondary complications on the skin surface, trauma diseases, complications after surgical operations and other diseases.

The influence of changes in the inflammatory field on the circulatory, lymphatic network and the immunobiological state of the body has been established. Most patients were diagnosed with a primary surgical infection. It has been confirmed that the main causes of purulent inflammation in childhood are infection, the entrance gate - the surface of damaged skin and the navel. Dead (necrotic) tissue at the site of infection is food for infection and causes disruption of general and local circulation. Purulent inflammation, necrotic phlegmon, mastitis, especially in young children, infancy, pseudofurunculosis, postomphalitis, sepsis and subsequent complications, sometimes leading to death. The majority of patients diagnosed with necrotizing phlegmon were children under two months of age. Cellulitis in patients aged three months and older was observed on the chest, abdomen, thighs, calves and other parts of the body.

By combining surgical skin and soft tissue infections into one group, significant differences in clinical manifestations were studied. When obvious similarities were identified in a number of parameters important from a surgical point of view, the tactics and volume of antibacterial therapy

were changed. For clinical studies, patients were treated in the surgical infection department of the TashPMI clinic in 2018-2023, patients with burns, abscesses, diseases with deep abscesses, soft tissue infections, peripheral vascular diseases, phlegmon, adenophlegmon and a number of other purulent diseases. (Figure 1-2).



**Figure - 1. False abscess (pustule). Figure-2. Adenophlegmon**

Several classifications of purulent surgical diseases have been proposed. Mostly at the CIS level, the diagnosis was made according to the hitherto accepted classification in childhood:

Surgical infection is divided into acute and chronic;

1. Acute infection: a) purulent infection; b) putrefactive infection; c) anaerobic infection; g) specific infection (tetanus, anthrax, diphtheria).

2. Chronic infection: a) nonspecific infection; b) specific infection (tuberculosis, syphilis, actinomycosis) and others.

In European countries, there are 5 types of surgical infections: superficial, complex infections, infections transmitted by animals; after infectious diseases, infections after surgical interventions. This classification is still widely used today. Our primary goals are to identify surgical soft tissue infections, avoid prescribing strong antibiotics to patients with mild infections, and refine treatment protocols. Surgical infections are divided into skin and soft tissue infections. Another classification (1991) was proposed by D.H. Ahrenholtz and is indicated for soft tissue infections; in which the degree of damage and shape are distinguished, it is classified according to the degree of damage as follows:

- 1st degree - actual skin damage (furuncle, lymphangitis, superficial, erysipeloid).
- II degree – purulent inflammation of skin tissue (carbuncle, abscess, phlegmon, hidradenitis).
- III degree – superficial fascia (necrosis).
- IV degree - muscular and deep interfascial (pyomyositis, muscle infections, clostridial myonecrosis, etc.).

In many literature sources there are disagreements in classification; experts have proposed a unified classification that takes into account different criteria for infections of the skin and soft tissues. The main classifications are based on the development of the disease, anatomical level, depth of destruction and the presence of severe conditions (characteristic of primary infections), mono- and polyinfections. Infections of the skin and soft tissues can be primary and secondary, as well as other diseases that develop as a result of complex and independent diseases. Primary ones include uncomplicated, shallow, in the skin and subcutaneous fat layer (furuncle, carbuncle). Surgical infections are complex and deep. localization - boils in the facial area, as well as those consisting of complex abscesses and phlegmons. Complex infections include superficial cutaneous

and deep inflammations, an inflammatory necrotic component (necrotizing cellulitis, fasciitis, pyomyositis and myonecrosis).

1. Necrotizing cellulite: necrosis is localized mainly in the skin tissue, not reaching the subcutaneous fat layer and muscles or deep layers.

2. Necrotizing fasciitis: necrosis affects the formation of fascia and is superficial. To determine the depth of injury, it is necessary to determine the anatomical location of the destruction interval in the fascia and deep tissues. The fascia is gray in color, its anatomical integrity cannot be determined, and a purulent-smelling discharge is characteristic.

3. Pyomyositis is an abscess that develops as a result of the spread of infection, resulting from hematogenous or secondary immunodeficiency in the muscles, adjacent bones or soft tissues.

4. Myonecrosis: The necrotic process affects muscle tissue.

As a result of infection of tissues (or existing injuries) in primary diseases, trophism, their anatomical integrity, innervation activity (diabetes mellitus or chronic venous insufficiency). The main causes are burns, traumatic injuries, and infections caused by surgical interventions. It should be noted that against the background of certain degrees, primary and secondary infections and a number of other complications (cellulitis, phlegmon, fasciitis or myonecrosis) can conditionally develop. Various purulent (abscess, phlegmon) and necrotic (fasciitis, myonecrosis) processes can complicate the random process (Figure 3.a-b-c).



**Figure– 3.a-b-c. Myonecrosis, necrectomy, skin grafting.**

When diagnosing skin infections, purulent inflammation of soft tissues (skin, subcutaneous tissue, deep fascia or muscles), it is important to check for the presence of a lesion. Clinical assessment of diseases is based on: 1) collected medical history data (injuries, surgical interventions, chronic diseases, duration of antibacterial treatment, taking large doses of steroids, etc.). 2) Local clinical manifestations (erythema, blister, pustule, crepitus, odor, pain or anesthesia, etc.) and general (systemic syndromic inflammation, sepsis, metabolic diseases) are included. The infection passes through the wound, from the outside to the hair follicles, and then the process deepens. The body's immune system, especially the skin's immune barrier, plays an important role in the development of the disease. In addition, the circulatory system and metabolism, which include various endocrine diseases, play an important role. With recurrent complications, lymphangitis, lymphadenitis, phlegmon, reactive arthritis, progressive thrombophlebitis and sepsis may occur. For infection, an entry gate is required—a “skin microtrauma.” Determine the degree of damage to the skin and subcutaneous tissue, changes in the localization area during a general examination; focus on swelling, redness, bruising, darkening of the infiltrate, fluctuation, etc. The protective activity of the tissues of the macroorganism against the penetration of microorganisms through the skin is weakened, the pathogenicity of the microorganism has a stronger effect. It is necessary to constantly clean the upper layers and mechanically remove microorganisms from the

epidermis. As a result of a violation of the integrity and function of the epidermis, microorganisms move into deep tissues. Unfavorable factors - hypothermia and overheating of the body negatively affect metabolic processes in the skin. The main causative agents of pyoderma are *Staphylococcus aureus* and *Streptococcus pyogenes*. Cellulitis is a diffuse purulent inflammatory process of the skin-subcutaneous tissue or cellular spaces, which is an acute infection (Fig. 4).



**Figure - 4. Purulent inflammation of the skin, bones and joints.**

According to the results of bacteriological examination (bakpassev), in most cases, microorganisms from phlegmon enter deep tissues by hematogenous route:

- \* Infections affecting only the skin - the specific composition of pathogens includes mainly *S. aureus* and *S. pyogenes*.

- \* Most skin and subcutaneous tissue infections are also caused by *S. aureus* and *S. pyogenes*.

- \* Infections of the skin, subcutaneous fat, fascia and muscles, as well as bones and joints are caused by polyinfection

**Result and discussion.** All purulent-inflammatory diseases in children cause severe complications and in most cases lead to death. According to various literature, this figure is 25-30%. The main part of them are complications of purulent-inflammatory diseases of soft tissues: necrotic phlegmon of children, omphalitis, mastitis, pseudofurunculosis, etc. When treating these diseases, active surgical intervention and rapid follow-up should be used. It is necessary to start based on the general condition of the patients who applied and the above-mentioned symptoms of the diseases. In subsequent years, the range of antibiotics has increased and expanded, but there is no information about how they are used. Therefore, treatment of bacteriological diseases must be carried out according to the results of bacterial culture. Antibacterial therapy is carried out until a stable condition is achieved, manifested by an improvement in the patient's general condition, dynamics and disappearance of the main symptoms. Due to the absence of pathogenic signs of infection, antibacterial therapy does not have to be stopped. Usually, the issue of stopping taking an antibiotic is decided individually based on the dynamics of the disease and a comprehensive assessment. In general, the criteria for the adequacy of antibiotics depend on the following: persistent normalization of body temperature; positive dynamics in reducing the main symptoms of infection; no signs of a systemic inflammatory response; normalization of the gastrointestinal tract; normalization of the leukocyte formula in the blood; positive blood culture. Only one sign of bacterial infection (fever) or the duration of leukocytosis is not an absolute indication for antibiotic therapy. Isolated low-grade fever (temperature within  $37.9^{\circ}\text{C}$ ) can be post-infectious. Postoperative asthenia or non-bacterial inflammation does not require continued antibacterial treatment. In the absence of changes in the area of purulent inflammation, moderate persistence of

leukocytosis (9-12x10<sup>9</sup>/l) indicates the presence of a bacterial infection in another organ. The usual conditions for antibacterial treatment of surgical infections are 5 to 10 days at different sites. In some cases, due to the development of long-term antibacterial-treatable complications, antibiotic therapy leads to the selection of unwanted, resistant strains and the development of superinfection. After 5-7 days of bacterial therapy, if there are no changes in the clinical and laboratory response, there is no need to change or supplement it. To determine complications of the disease, additional diagnostic methods are used (ultrasound, CT, etc.). In some cases, if additional diseases are identified, antibacterial therapy can be continued for a longer time. In addition, the reasons for continuing antibacterial therapy are complex staphylococcal and infectious diseases of soft tissues, other localizations, sites of secondary infection, or persistent bacteremia. Regardless of which path is chosen, complications of these diseases cannot be ruled out after late treatment. In such cases, an individual approach to patients is necessary.

For patients visiting the surgical infection department, we recommend the following comprehensive procedures.

1. Surgical intervention (sending pus for bacteriological examination), antibacterial, detoxification procedures, etc.

2. Bifidum-Bactrium 2.5 doses 3 times a day.

3. A 5% glucose solution, vitamins, and blood plasma 10-15 ml/kg are administered intravenously as needed.

4. Antistaphylococcal gammaglobulin 2-3 times, immunoglobulin No. 5.

5. Physiotherapeutic procedures begin depending on the child's body temperature, hemogram and some other changes. Based on the results of our examination and observation, in order to prevent and reduce the noted complications, pediatricians and children in clinics

In collaboration with surgeons, we have developed measures for early diagnosis and joint treatment of diseases.

**Conclusion.** Any complications can be prevented if diseases are identified at an early stage and the necessary procedures are carried out in specialized surgical departments.

2. For the treatment of such patients, 10-12 days will be enough. Sepsis, septicemia, roughness and a number of other complications are prevented. For this reason, the focus of these recommendations is on the extent of empirical antibiotic therapy. These diseases should be treated with aggressive surgery and rapid treatment.

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