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ANALYSIS OF UNSATISFACTORY CONSEQUENCES OF ERYSIPELAS TREATMENT

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Abstract. **The objective of the research** was to determine the cause of unsatisfactory treatment results in patients with destructive forms of erysipelas among the overall disease population.

Materials and methods. 284 case histories of the patients who underwent an inpatient treatment at the center of purulent-septic surgery of Municipal Non-Profit Enterprise "City Hospital №3" in Zaporizhzhia for the period of 2016-2022 were analyzed retrospectively and prospectively.

Results. The local focus was found to be localized the most often on the upper and lower extremities. The most common clinical manifestations of intoxication in case of bullous and phlegmonous forms of erysipelas included general weakness, hyperthermia, muscle pain. Signs of severe intoxication with nausea, vomiting and confused mental state were observed in patients in case of the necrotic form of erysipelas. Early surgical treatment of the pathological process area and antibiotic therapy (ABT) are the most important in the comprehensive treatment of the patients with erysipelas. Determination of procalcitonin indices in the blood serum provides an opportunity to assess the progression of the process generalization and is a sensitive test for the effectiveness of the conducted treatment.

Conclusions. Radical surgery and timely targeted ABT are the main elements of success in the treatment of erysipelas surgical forms and are not subject to revision. The main causes of unsatisfactory consequences in the patients with erysipelas are disease complication by septic shock and multiple organ failure at the time of hospitalization, severe decompensated comorbidities. Procalcitonin is a diagnostic marker that provides an opportunity to predict timely sepsis development.

Keywords: erysipelas, unsatisfactory consequences of treatment, procalcitonin.

Problem statement and analysis of recent research. In recent years, a significant increase in infections caused by group A β-hemolytic streptococcus has been observed. According to the sample data, the average incidence of erysipelas in Europe is 4.3 per 10,000 adults. In the structure of the disease, a tendency to an increase in the number of young and middle-aged patients, as well as an increase in complicated forms of erysipelas and its recurrence has been noted [1,2,6].

Changes in clinical symptoms and course of the disease with the development of severe complications and sepsis are increasingly observed. Mortality ranges from 5.8 to 81% for the necrotic form of the disease and is usually caused by sepsis development [3,4,5,7]. From this perspective, it is important to recognize the development of sepsis timely, to assess the patient's general condition and determine further treatment strategy.

However, unfortunately, a detailed analysis of unsatisfactory results of the treatment of erysipelas complicated forms is absent.

The objective of the research was to determine the cause of unsatisfactory treatment results in patients with destructive forms of erysipelas among the overall disease population.

Materials and methods

284 case histories of the patients who underwent an inpatient treatment at the center of purulent-septic surgery of Municipal Non-Profit Enterprise "City Hospital №3" in Zaporizhzhia for the period of 2016-2022 were analyzed retrospectively and prospectively. The patients were divided into two groups. The comparison group included 138 patients who were treated during 2016-2019 and the main group consisted of the individuals who were treated during 2020-2022 according to our developed algorithm.

Results and discussion

The local focus was found to be localized the most often on the upper and lower extremities.

In our opinion, in order to determine the causes of unsatisfactory results of erysipelas treatment, we must begin with an analysis of the mistakes made by doctors during patients' hospitalization as a result of unsuccessful differential diagnosis between erysipelas and a number of diseases with similar clinical symptoms.

We developed a number of criteria and signs providing an opportunity to make a differential diagnosis.

However, epidemiological anamnesis data were not considered in 3 patients (1.1%), pain syndrome characteristics was not clearly described in 4 patients (1.4%), fluctuation was not correctly assessed (5 patients - 1.8%).

Mistakes were made in the characterization of hyperemia and erythema color (towards overdiagnosis). Overdiagnosis was made in 8 patients (2.8%) when describing the phenomena of lymphangitis and regional lymphadenopathy.

However, these mistakes did not affect the final results of treatment in general. Our mathematical modeling between erysipelas and other diseases with

similar syndromes in their clinical features was useful for making a differential diagnosis between them.

The course and severity of erysipelas depended on the period of patients' hospitalization. We found that the reason for the unsatisfactory results of the disease treatment was the patients' late seeking for medical care (t=2.19227, P=0.032690).

The use of traditional conventional surgical treatments does not always lead to the desired results. Early surgical treatment of the pathological process area is the most important in the comprehensive treatment of the patients with erysipelas. This statement is not applied only to the erythematous form of erysipelas.

Surgical treatment of the patients with bullous erysipelas included the dissection of the bullae with the evacuation of pathological fluid and drainage. Unsatisfactory treatment results were not observed in these patients.

One of the main factors in the treatment of complicated forms of erysipelas is early surgical intervention, which includes individual choice of the method depending on the prevalence, the nature of the skin and subcutaneous tissue changes, the general condition of the patient. It should be as radical as possible and include a wide disclosure of the local infection focus, removal of devitalized tissues, proper drainage.

The neglect of these rules led to untimely surgical correction of purulent-necrotic complications in 4.9% of cases (11 patients) and, thus, to unsatisfactory ultimate consequences.

Patients with circumferential erysipelas require the most common surgical procedure when an autopsy is performed within the area of inflammation with longitudinal and transverse undulating autopsies throughout the pathological focus. This method provides complete drainage, outflow of infected lymph and reduction of pressure deep into the underlying tissues. Repeated surgical interventions were performed in 17 (7.6%) patients, which was also considered by us as unsatisfactory results.

We adhere to the restrained surgical approach in the treatment of such patients in our clinic. The general condition of the patient prevails. The surgery was postponed in case of septic shock and unstable hemodynamics until the condition was stabilized or there was a positive response to infusion therapy. The same principles were used in indicating repeated lavage of purulent lesions without defining a strict time commitment. Moreover, only non-viable tissues were removed in the course of necrectomy, widely opening the leakages.

The clinical effectiveness of treatment in the patients with erysipelas surgical forms was evaluated on the basis of local manifestations of the disease and data on procalcitonin (PCT). Thus, a slight increase in PCT more than 2 ng/ml was observed in patients with necrotic form of erysipelas after a single surgery, its decrease was noted on the 7^{th}-8^{th} day after repeated necrectomies and lavage of purulent lesions, PCT level was usually normalized on the 14^{th}-16^{th} day. It should be noted that significant positive local dynamics was observed.

Extensive purulent-necrotic wounds are one of the urgent and unresolved problems in the purulent surgery. However, meanwhile, proper surgical treatment often leads to the formation of large post-necrotic wounds, the self-healing of which is impossible due to their large size. Moreover, patients undergo repeated lavage and skin-plastic interventions. This determines the long duration of the patients' incapacity and, therefore, the treatment outcome is often unsatisfactory.

It is worth emphasizing that large skin defects significantly prolong the duration of treatment and are a site of hospital-acquired infection entry. The use of highly effective methods of purulent wounds treatment in order to create conditions for earlier autodermoplasty is indisputable for the prevention of possible complications.

One of the effective methods of this category of patients' treatment is the application of local vacuum aspiration. Our research showed that vacuum therapy had a positive effect at all stages of the wound process. This was manifested by a reduction in local edema, decrease in the wound secretion, improved microcirculation. The engraftment of the skin flap constituted 92% of the wound surface in case of vacuum therapy application during the postoperative period and 75% of the surface in the patients without vacuum therapy.

The improvement of postoperative local treatment of patients with phlegmonous and necrotic forms of erysipelas provided an opportunity to reduce significantly the duration of hospital stay by 3.26±0.43 days (t=6.47461; P<0.000001).

The duration of inpatient treatment constituted 5.8 ± 1.3 days for the patients with erythematous form of erysipelas and 10.2 ± 1.7 days for the patients with bullous form of the disease, patients with phlegmonous form were treated for 24.4 ± 2.3 days, and those with the necrotic form of the disease underwent an inpatient treatment during more than 1 month (depending on the timing of dermatoplasty).

We did not observe unsatisfactory consequences of erysipelas treatment due to inadequately prescribed ABT. The explanation is as follows. Firstly, we took into account the microbiological passport of the center, which has been maintained and analyzed for over 20 years. With the knowledge of the probable pathogens and the high percentage of staphylococcal strains MRSA, we were able to prescribe an empiric ABT as close as possible to the targeted one. Secondly, as previously noted, determination of purulent microorganisms sensitivity to antibacterial drugs was performed by means of an automated apparatus Vitek-2 (France).

We consider semi-synthetic penicillins or

cephalosporins of generations I-II to be effective in the erythematous form of erysipelas. Such ABT regimen is successful in almost 100% of cases and provides an opportunity to stop the inflammatory process within 5-7 days.

Semi-synthetic penicillins or cephalosporins of generations I-II are also effective in case of the bullous form of erysipelas. If bullae were common, we used cephalosporins of generation III. Ceftriaxone was preferred among the latter.

Further ABT was performed only according to the results of the inoculation. It consisted of the prescription of protected cephalosporins of generation III + linezolid 600 mg 2 times per day *per os*.

Antibacterial therapy in case of the necrotic form of erysipelas included the prescription of protected cephalosporins of generations III-IV+ linezolid 600 mg 2 times per day intravenously, then 600 mg 2 times per day *per os*.

The highest doses of carbapenems + linezolid 600 mg 2 times per day intravenously were prescribed if the disease was burdened by sepsis.

We detected that almost all forms of erysipelas, both primary and recurrent, occurred with underlying secondary immunodeficiency with varying degrees of immune disorders. Patients with secondary immunodeficiency of immune disorders degree I (which is probably a transient condition) did not require the improvement by means of immunomodulators, while patients with degree II and III, being immunologically compromised, required mandatory appointment of immunomodulators.

Pathogenically substantiated prescription of Erbisol Extra and Laferon in patients with destructive forms of erysipelas showed that the number of repeated surgical interventions was significantly lower ($P<0.05$) than in patients who did not receive this therapy. Therefore, the unsatisfactory consequences of the treatment, to some extent, were the strategy of immunomodulatory therapy prescription.

The above-mentioned drawbacks significantly affect the final treatment outcome of patients with erysipelas. However, why were not 9 patients (37.5%) out of 24 individuals who died operated, i.e. why was not the cause of intoxication syndrome eliminated? The reason was as follows: on admission to the hospital their condition was considered to be inoperable due to septic shock and multiple organ failure. Despite the intensive treatment at the ICU, their condition could not be stabilized and they died in the following days.

The typical cases are presented.

Case history №3976, patient D., male, 78 years of age. He was hospitalized on September 14, 2021 with the diagnosis of erysipelas of both lower extremities, the necrotic form. Sepsis, multiple organ failure. Secondary diagnosis: CAD, coronary atheroma, hypertensive disease stage III. The condition worsened during the stay in the intensive care unit and biological death was pronounced on September 16, 2022. The autopsy: septicemia: subacute septic myocarditis, subacute septic hepatitis (2160.0 mass), subacute septic spleen (790.0 mass), subacute lymphadenitis, bilateral fibrinopurulent bronchopneumonia, chronic venous congestion and parenchymal organs dystrophy.

Secondary diagnosis: Chronic coronary artery disease: fine-focal and diffuse intercurrent cardiosclerosis, stenotic atherosclerosis of coronary arteries by 75%. Atherosclerosis of aorta and its branches, myocardial hypertrophy (heart weight was 430.0, left ventricular wall thickness was 1.9 cm), arteriosclerotic nephrosclerosis.

Case history №4318, patient N., female, 84 years of age. She was hospitalized on October 6, 2021 with the diagnosis: Erysipelas of the right lower extremity, necrotic form. Sepsis, multiple organ failure. Leukocytal intoxication index constituted 24.4, procalcitonin was 9.810 ng/ml. Secondary diagnosis: CAD, atherosclerotic cardiosclerosis, heart failure stage II, FC III, hypertensive disease stage III, degree II.

Considering very severe condition of the patient, she was hospitalized in the intensive care unit where she stayed during the entire period of the disease and died on October 16, 2021.

At the autopsy: Sepsis. Cerebral-lobular hepatic necrosis. Background disease: Diabetes mellitus, type 2, sclerosis and pancreatic lipomatosis (80 g mass), diabetic nephropathy (diffuse intracapillary glomerulosclerosis), arteriosclerosis, diabetic macro-microangiopathy.

24 patients with necrotic form of erysipelas burdened by sepsis died. Generally, mortality constituted 7.5% in the patients of the main group and 9.4% in the patients of the comparison group ($t = 3.75213$; $P = 0.000320$).

11 patients out of 21 with necrotic form of erysipelas in the main group died, mortality constituted 52.4%. 13 patients out of 19 in the comparison group died, mortality constituted 68.4%.

Conclusions

1. The reason for the unsatisfactory results of the disease treatment is the patients' late seeking for medical care ($t = 2.19227$, $P = 0.032690$).

2. The main causes of unsatisfactory consequences in the patients with erysipelas are disease complication by septic shock and multiple organ failure at the time of hospitalization, severe decompensated comorbidities.

3. Determination of procalcitonin indices in the blood serum provides an opportunity to assess the progression of the process generalization and is a sensitive test for the effectiveness of the conducted treatment.

Confirmation

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References

1. Brazhnik EA, Ostroushko AP. Rozhistoe vospalenie v khirurgicheskoy praktike. Nauchnoye obozreniye. Meditsinskiye nauki. 2016; 4: 14-17.

2. Dykyi BM, Kondryn OYe, Farbishevskyi VV et al. Udoskonalennia kompleksnoi terapii khvorykh na beshykhu. Medytsyna transportu Ukrainy. 2011; 2: 88-90.

3. Vasylevska LA. Mortality in necrotic form of erysipelas. Suchasni medychni tekhnolohii. 2021; 3(50): 19-21. [Article in Ukrainian]. https://doi.org/:10.34287/MMT.3(50).2021.4

4. Shapoval SD, Vasylevska LA. Vykorystannia prokaltsytoninu u khvorykh na khirurhichni formy beshykhy. Medychni perspektyvy. 2021; 26 (1): 196-200. https://doi.org/:10.26641/2307-0404.2021.1.228011

5. Shapoval SD, Vasylevska LA, Vorontsova LL. Vykorystannia imunokorehuiuchoi terapii v kompleksnomu likuvanni khirurhichnykh form beshykhy. Klinichna khirurhiya. 2021; 5-6(88): 53-55.

6. Saka B, Kombate K, Mouhari-Toure A. et al. Bacterial dermohypodermis and necrotizing fascitis: 104 case series from Togo. Med. Trop. 2011; 71(2): 162–164. https://doi.org/:10.19080/OAJS.2018.09.555772

7. Shimizu T, Tokuda Y. Necrotizing fasciitis. Intern. Med. 2010; 49(12): 1051–1057. https://doi.org/:10.2169/internalmedicine.49.2964

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