World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-19, February 2023
ISSN: 2749-3644

SOME WAYS TO OPTIMIZE DIAGNOSTIC METHODS OF NECROTIZING SOFT TISSUE DISEASES

Okhunov Alisher Oripovich.-, Professor, DSc, PhD, MD, Head of the Department of General and Pediatric Surgery-1 of the Tashkent Medical Academy, member of the American (SIS) and European (S IS-E) Societies of Surgical Infection, Tashkent, Uzbekistan. E-mail: general-surgery@mail.ru
Korikhonov Dilshod Nasrullokhonovich.- Assistant of the Department of General and Pediatric Surgery-1 of the Tashkent Medical Academy, Tashkent, Uzbekistan. E-mail: dqorixonov@gmail.com

Article history:

Received: December 11th 2022
Accepted: January 11th 2023
Published: February 20th 2023

Abstract:

Background. The new early diagnosis of necrotizing fasciitis, and, consequently, the key to successful treatment of these severe patients, to date, is still a timely thorough analysis of anamnestic data and clinical symptoms. At the same time, there is no reliable data on the clinical significance of various symptoms of necrotizing fasciitis, as well as on specific signs of varieties of such infections in the literature.
Material. The clinical picture and features of the course of necrotizing fasciitis in 45 patients who were treated and examined in the multidisciplinary clinic of the Tashkent Medical Academy from 2020 to 2022 were analyzed.
Conclusion. In the early stages of the disease, the diagnosis of necrotizing soft tissue infection can almost always be established based on an assessment of the clinical picture of the disease. Conducting an additional examination (ultrasound, computed tomography, radiography) is advisable only with a dubious clinical picture and the absence of a pronounced increasing syndrome of a systemic inflammatory reaction. Diagnostic puncture is not an informative diagnostic method for necrotizing infections. Differential diagnosis of necrotizing soft tissue infection should be carried out with several infectious and non-infectious lesions. If suspicions of necrotizing infection persist, surgical revision of all layers of soft tissues is indicated.

Keywords:

INTRODUCTION

Necrotizing fasciitis is a generally recognized severe, rapidly, or lightning-fast progressive disease of a soft tissue infection accompanied by severe intoxication, mainly affecting fascia, muscles, or fatty tissue, occurring without the formation of purulent exudate or with its disproportionately small amount. Depending on the predominant morphological substrate, necrotizing fasciitis, myositis, and cellulite are usually isolated. [2,4,19]

These diseases and complications are found in the practice of any surgeon, regardless of specialization. Each case of necrotizing fasciitis in a general surgical hospital, as a rule, causes several diagnostics, therapeutic, organizational and epidemiological problems. Mortality in the development of such infections ranges from 13.9% to 30%. [6,21]

The extraordinary malignancy of the course of necrotizing infections led to the desire of researchers to associate this disease with certain microorganisms. In crops from foci of infection, associations of microbes are more often found, which are various combinations of pathogens of wound infection. Traditionally, in the pathogenesis of necrotizing fasciitis, the leading role is given to anaerobic microorganisms, but in recent years, works have been published in which the legitimacy of this approach is questioned authoritatively. [10, 22]

Late diagnosis of the disease, underestimation of the severity of the patient's condition and, consequently, the lack of adequate comprehensive surgical treatment in a significant number of cases lead to the death of the patient from septic shock, sometimes before the correct diagnosis is established. [1, 3]

At the same time, the timely diagnosis of rapidly progressive necrotizing infection is still among the most difficult tasks. It is believed that in the early stages, the clinical picture of this suffering differs little from the usual variants of surgical infection. The use of rapid diagnostic methods, such as gas-liquid chromatography, and computed and magnetic resonance imaging in an urgent situation, is limited since they require special equipment and trained personnel, which is not always available in non-specialized surgical hospitals. In addition, the question

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-19, February 2023
ISSN: 2749-3644

of the effectiveness of their application remains currently debatable. [3]

Thus, the basis for the early diagnosis of necrotizing fasciitis, and, consequently, the key to successful treatment of these severe patients, to date is still a timely thorough analysis of anamnestic data and clinical symptoms. At the same time, there are no reliable data on the clinical significance of various symptoms of necrotizing fasciitis, as well as on specific signs of varieties of such infections in the literature.

MATERIAL AND METHODS

The clinical picture and features of the course of necrotizing fasciitis in 45 patients who were treated and examined in the multidisciplinary clinic of the Tashkent Medical Academy from 2020 to 2022 were analyzed. The preliminary diagnosis of necrotizing fasciitis was based on the following characteristic clinical signs: cyanosis of the skin with areas of necrosis; crepitation; with dim local symptoms with a predominance of general inflammatory symptoms (oedema and infiltration of tissues, skin flushing) - pronounced general signs of an inflammatory reaction and intoxication (severe and extremely severe general condition of the patient, tachycardia, hypotension, high leukocytosis, neutrophilic shift to the left); rapid, within a few hours, the appearance of characteristic local symptoms or an increase in intoxication.

The establishment of a preliminary diagnosis of necrotizing fasciitis was an indication of emergency surgical intervention. The final clinical diagnosis of necrotizing fasciitis with an assessment of the nature, anatomical substrate and volume of the lesion was established intraoperatively after revision of the focus of infection.

Of the total number of studied patients, men 26 (57.8%) people, women 19 (42.2%). Patients aged 41 - 60 years (40.0%) and over 70 years (20.0%) prevailed.

In 29 (6 4.4%) cases, necrotizing fasciitis developed against the background of damage to the skin: medical manipulations, such as operations - 5 (1 1.1%) observations, intramuscular and intravenous injections - 8 (17.8%). Trophic ulcers and gangrene of the lower extremities caused the development of necrotizing infection in 2 (4.4%) patients, and pressure sores - in 1 (2.2%) patient. It should be especially noted that in 11 (24.4%) observations, the "entrance gate" of infection was not detected.

In assessing the severity of the general condition of patients with NIMT, we were guided by the criteria for diagnosing sepsis R. Bone, developed by the Conciliation Conference in Chicago. [3]

RESULTS

With necrotizing fasciitis as an infectious-necrotic process with a characteristic predominant lesion of the superficial and muscular fascia, the initial course of the disease in almost all patients was quite hidden, without bright specific clinical symptoms. As the first symptom, all patients noted moderate pain in the affected part of the body without clearly defined boundaries. The nature of the pain of 41 (91.1%) patients were described as aching. In the remaining observations, patients noted pulling or pressing, bursting pain. In 33 (73.3%) observations, patients could not clearly localize the pain, characterizing it as diffuse. However, during surgery for necrotizing fasciitis, it is the localization of pain and soreness determined before the operation that most clearly corresponded to the area affected by the superficial fascia.

On examination, only 28 (62.2%) people had "classic" symptoms of inflammation, such as swelling and hyperemia of the affected part of the body. The swelling was moderate, unstrained, and noticeable only when compared with a symmetrical area of the body. Skin flushing was characterized as dull, often barely noticeable, without clear boundaries. The hyperemia zone was usually much smaller than the zone of soreness and swelling.

A distinctive feature of the described changes was their rapid increase. So, in 9 (2 0.0%) patients from the moment of initial damage to the skin to the appearance of the described symptoms, less than 24 hours passed.

Of the specific signs of necrotizing fasciitis in our patients, a variety of skin color changes most often occurred. Characteristic bluish or brownish spots were noted by us in 37 (8 2.2%) observations. Uniform cyanosis of the skin with areas of black or dark purple necrosis was present in 15 (3 3.3%) patients. Epidermal detachment in the form of bullae of bluish-gray color, filled with dark turbid fluid, we met in 26 (57.8%) patients. In 3 (6) .7%) people were detected by infiltration of the skin in the form of a "lemon peel".

In terms of area, skin changes were significantly less than the boundaries of inflammation of the subcutaneous tissue, the swelling of which, in turn, did not allow palpating of deep muscle formations. At the same time, the localization of skin changes, as a rule, was quite clearly projected onto the intraoperative zone of the greatest lesion of the superficial fascia. Such a sign of necrotizing fasciitis described in the literature, as the "wooden" density on palpation, has not been noted by us in any observation. In 2 (4.4%) previously operated patients,

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-19, February 2023
ISSN: 2749-3644

when pressing on the suture wound or probing it, a scanty dark discharge was noted.

Fluctuation in necrotizing fasciitis in our observations, as a rule, was not determined. Only in 6 (1 3.3%) patients in whom necrotizing fasciitis developed against the background of purulent-inflammatory diseases of soft tissues did not undergo timely surgical treatment, the fluctuation was noted over the delimited area of the purulent focus.

Crepitation on palpation was present in 13 (28.9%) observations. It is noteworthy that this sign was often determined far beyond necrotically altered tissues, sometimes even without having common boundaries with them, and when performing diagnostic incisions over areas with a characteristic palpation crunch, we often found visually viable tissues with single gas bubbles.

In 13 (28.9%) patients, body temperature remained normal, in 15 (33.3%) there was a subfebrile fever, in 5 (1 1.1 8%) there was a rise in temperature above 39.2 ° C, in the remaining 9 (20.0%) patients the body temperature was in the range of 38.0-39.1 ° C. In 2 (4.4 8%) of the person had hypothermia. In 3 (6.7%) patients, a rise in temperature was noted during the first hours, and in 6 (13.3%) - on the first day from the onset of the disease.

During surgical intervention for necrotizing fasciitis, the subcutaneous tissue was swollen, in some cases stained in a dirty grey color, impregnated with cloudy, often fetid exudate, and sometimes with gas bubbles. Fascia - swollen, grey or black in color, often slimy and impregnated with similar exudate. The muscles had a dull, flabby, "boiled" appearance, impregnated with serous-hemorrhagic exudate, at the same time in some observations were intact, despite pronounced necrotic changes in the fascia.

We also noted an unparalleled case of idiopathic necrotizing fasciitis with a typical clinical picture, in which there was a combined lesion of the left lower and right upper extremities, separated from each other by a large area of healthy tissues.

Necrotizing fasciitis of the scrotum occurred in 6 (13.3%) patients. Characteristic of it was the appearance of a black spot - a focus of necrosis or a bubble filled with cloudy fluid on the scrotum, in addition, almost all patients with this pathology had a sharp swelling and hyperemia of the scrotum, as well as compaction of the tissues of the subcutaneous tissue, because of which it was often not possible to palpate the testicles. In 3 (50%) of the observations of hyperemia and compaction of the underlying tissues spread to neighbouring areas - groin, buttocks, lower extremities, as well as the abdominal wall.

At the same time, in 2 (4.4%) patients for a long time (up to several days) the only local symptom of necrotizing fasciitis was a pain in the affected segment without any other physical signs of infection.

DISCUSSION

Differential diagnosis of necrotizing fasciitis at an early stage of the disease presents certain difficulties. Among the diseases accompanied by the development of extensive foci of soft tissue necrosis, rapidly progressive inflammation, and systemic inflammatory reaction syndrome, it is possible to distinguish a syndrome of prolonged compression and infringement of the hernia of the anterior abdominal wall with phlegmon of the hernial sac. , various necrosis after injection of chemicals, thrombophlebitis of saphenous veins, etc. [7, 21,24]

The syndrome of prolonged compression, like a surgical infection, in a significant number of patients is accompanied by a serious general condition, intoxication, and often multiple organ failure. There is also a pronounced swelling of the limb, abundant exudation from wounds, necrotic muscle damage, and, consequently, skin changes caused by it, such as hyperemia, cyanosis, and bulla. In addition, vast areas of deep-lying necrotic tissues serve as an excellent nutrient medium for the development of various microorganisms, so it is almost impossible to completely exclude the development of necrotizing fasciitis. [9]

In such situations, we began intensive therapy based on the principles of treatment of both necrotizing fasciitis and prolonged compression syndrome. If against the background of conservative treatment, positive dynamics were noted within a few hours - stabilization of the general condition, lack of progression of local symptoms of inflammation - then the disease was regarded as a syndrome of prolonged compression, and the operation was performed only after the final stabilization the patient's condition and demarcation of necrosis. With the ineffectiveness of intensive care, the increase in oedema of the limb, and the development and increase in renal failure, we resorted to emergency surgical intervention, during which we established the final diagnosis. With a characteristic picture of necrotizing fasciitis, radical surgical intervention was performed. In the absence of total soft tissue necrosis, the detection of "mosaic" myonecrosis, secondary necrotic foci against the background of a large volume of visually healthy tissues, we performed surgical treatment of the wound recommended for the syndrome of prolonged compression, which consists in the wide opening of all fascial cases, if necessary supplemented by necrectomy. Fasciotomy was combined with

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-19, February 2023
ISSN: 2749-3644

separation, revision and drainage of intermuscular spaces and muscle cases.

Similar in appearance to necrotizing fasciitis, necrotic changes in soft tissues were noted when hernias of the anterior abdominal wall were infringed with phlegmon of the hernial sac. At the same time, a routine physical examination of the patient with the identification of symptoms of infringement of the hernial sac made it possible to clearly differentiate this disease. [13,23]

Extensive necrotic changes were also encountered in patients who were administered various drugs and narcotic drugs. These patients had a variety of external manifestations, such as oedema, impaired function of the affected limb, and hyperemia of varying intensity. Given that the introduction of these drugs, as a rule, occurred without observing the rules of asepsis, it was not possible to exclude the infectious nature of the necrotic process. However, because in both cases the situation required immediate surgical intervention, the diagnostic error did not cause serious negative consequences for patients. [4]

The intraoperative picture with necrotic lesions of chemical origin in a few observations corresponded to necrotic myositis with its inherent extensive muscle necrosis. The spread of the necrotic process and the change in laboratory parameters occurred slowly, therefore, the general condition of the patients for a long time remained satisfactory, and there was no systemic inflammatory reaction.

In the first hours after the onset of skin changes, various hematomas that outwardly resembled necrotizing fasciitis presented certain difficulties in the differential diagnosis. As with surgical infections, an increase in the size of the focus of hyperemia and cyanosis due to the spread of blood poured into the subcutaneous tissue occurred quite quickly. In some observations, blisters also appeared on the skin. The task was complicated in cases where patients, being able to alcohol, and drug intoxication, as well as due to somatic severity, could not accurately indicate the presence of an injury preceding the disease. In the absence of other clinical manifestations indicating the presence of a surgical infection, in these situations, we carried out dynamic monitoring of the patient for several hours. The absence of an increase in local changes, as well as clinical and laboratory signs of intoxication, made it possible to exclude necrotizing fasciitis. In other cases, it was necessary to resort to performing diagnostic incisions with the revision of all layers of soft tissues.

Local manifestations of limb ischemia in obliterating atherosclerosis, arterial thrombosis, and diabetic foot syndrome can be similar to changes in necrotizing fasciitis. The slow increase in local symptoms, the absence or non-severity of other physical and laboratory signs, and a characteristic anamnesis make it possible to easily distinguish this group of diseases from necrotizing fasciitis.

Manifestations of systemic vasculitis during the initial examination can cause diagnostic alertness. Various changes in skin color, soft tissue necrosis, as well as muscle pain, and impaired limb function, make you think about a surgical infection. In such cases, the presence of rheumatic diseases in the anamnesis, the defeat of several parts of the body simultaneously, the lack of rapid progression and characteristic laboratory changes speak in favour of the immune, and not the infectious nature of the process.

Thrombophlebitis of the saphenous veins of the lower extremities, like necrotizing fasciitis, can begin with the appearance of pain, moderate oedema of the affected limb, increasing faint hyperemia, and increased body temperature. Symptoms of thrombophlebitis develop quite quickly, however, unlike necrotizing fasciitis, there are practically no signs of a systemic inflammatory reaction, which allows, with a thorough examination, to exclude a surgical infection.

With post-injection iliofemoral phlebothrombosis after the introduction of narcotic and psychotropic substances into the inguinal region, as well as with rapidly progressing necrotic processes, there are pains, moderate swelling of the limb, non-intense, without clear boundaries hyperemia can be noted. In some cases, the muscles become "wooden", resembling necrotic myositis. The situation is complicated by the fact that anamnestic data do not help to conduct differential diagnosis, since there is always a source of infection and damage to the skin. In addition, the diagnosis of iliofemoral phlebothrombosis in itself does not exclude the presence of necrotizing fasciitis. In such cases, it is necessary to focus on the patient's condition, and laboratory data, and, if necessary, resort to a diagnostic incision.

We also observed the occurrence of crepitation of the subcutaneous tissue after operations on the abdominal organs when restoring intestinal motility, puncture of the pleural cavity, and laparoscopy. In all cases, this symptom was not accompanied by the appearance of any skin changes, as well as negative dynamics in the general condition of patients.

With erysipelas, despite the presence of oedema and hyperemia in the focus of infection, and in some cases bulla, differential diagnosis usually does not present particular difficulties: unlike necrotizing fasciitis, in this disease, hyperemia, as a rule, is quite intense, bright, bullae are filled with a clear liquid. The

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-19, February 2023
ISSN: 2749-3644

disease in most cases is accompanied by a rise in body temperature to 40 ^{00} With and above chills, more often than with necrotizing fasciitis, there are phenomena of regional lymphadenitis and lymphangitis. [10]

In patients of the intensive care unit, we observed the appearance of oncotic oedema, visually resembling necrotizing fasciitis. In addition to external manifestations, other signs that make it possible to suspect soft tissue necrosis with this symptom did not occur.

Various skin diseases in some cases can imitate necrotizing fasciitis in external manifestations. Pronounced macerations against the background of oedema of the trunk and limbs, often with non-compliance with the rules of personal hygiene, are sometimes complicated by fungal lesions, as well as superficial skin necrosis. These changes, as a rule, occur in obese patients and are localized on the scrotum, perineum and inguinal folds, which is why it is necessary to make a differential diagnosis with Fournier's gangrene. [8,12,22,24,25] As with most of the other sufferings described above, the study of anamnesis (duration of the disease, previous skin diseases), laboratory data and, if necessary, dynamic observation make it possible to exclude necrotizing infection in such patients.

The similarity with necrotizing fasciitis in the clinical picture of other infectious and non-infectious diseases and complications is due to the same immediate causes of the appearance of certain external symptoms, such as ischemia and necrosis of deep tissues, vein thrombosis in the focus of inflammation, toxic damage to capillaries and nerves, inflammation of regional lymphatic vessels, hair follicles, etc.

FINDINGS

In the early stages of the disease, the diagnosis of necrotizing soft tissue infection can almost always be established based on an assessment of the clinical picture of the disease. Conducting an additional examination (ultrasound, computed tomography, radiography) is advisable only with a dubious clinical picture and the absence of a pronounced increasing syndrome of a systemic inflammatory reaction. Diagnostic puncture is not an informative method for diagnosing necrotizing infections.

Differential diagnosis of necrotizing soft tissue infection should be carried out with several infectious and non-infectious lesions. If suspicions of necrotizing infection persist, surgical revision of all layers of soft tissues is indicated.

Ethics approval and consent to participate - All patients gave written informed consent to participate in the study.

Consent for publication - The study is valid, and recognition by the organization is not required. The author agrees to open the publication

Availability of data and material - Available Competing interests - No

Financing – Self

REFERENCES

1. Antimicrobial agents and related therapy. // In: Pickering L.K., ed. Red book 2003 report of the Committee on Infectious Diseases. 26th ed. Elk Grove Village, IL: American Academy of Pediatrics, 2003 p. 693-694
2. Arslan A., Pierre-Jerome C., Borthne A. Necrotizing fasciitis: unreliable MRJ findings in the preoperative diagnosis. // Euro J Neurol, 2000 — 36 -p. 139-143.
3. Azizov, Y. H., Okhunov, A.O. and Azizova, P.H. "Metabolic activity of lungs in the development of an experimental model of surgical sepsis." European Science Review 11-12 (2018): 66-69.
4. Barie P.S. Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score: useful tool or paralysis analysis. // Crit Care Med, 2004 — 32 — p. 1618-1619
5. Bobokulova, Sh. A., Okhunov A. O. "Acute Purulent-Destructive Lung Diseases as Consequences of Endotheliitis after COVID-19." (2022).
6. Heitmann C., Pelzer M., Bickert B., Menke H., German G. Chirurgishes konzeptund ergebnisse bei nekrotisierender fasciitis. // Chirurg, 2001 -72-p. 168-173
7. Hseih T., Samson L.M., Jabbour M., Osmond M.H. Necrotizing fasciitis in children in eastern Ontario: a case-control study. // CMAJ, 2000 — 163 — p. 393-396
8. Korkut M., Icoz G., Dayangac M., Akgun E. Outcome analysis in patients with Fournier's gangrene. // Dis Colon Rectum, 2003 46 - p. 649-652
9. Lee T.C., Carrick M.M., Scott B.G. et al. Incidence and clinical characteristics of methicillin-resistant fasciitis in a large urban hospital // Am J Surg, 2007 194 - p. 809-813.
10. Majeski J. A., John J. F. Jr. Necrotizing soft tissue infections: a guide to early diagnosis and initial therapy. // South. Medical Journal, 2003 Sep; 96 (9); p. 900 905
11. Marupov, I., Bobokulova, S., Okhunov, A., Abdurakhmanov, F., Boboev, K., Korikhonov, D., Yakubov, I., Yarkulov, A., Khamdamov, S., & Razzakov, S. (2023). How does lipid peroxidation affect the development of

World Bulletin of Public Health (WBPH)
Available Online at: https://www.scholarexpress.net
Volume-19, February 2023
ISSN: 2749-3644

pneumosclerosis: experimental justification. Journal of education and scientific medicine, 1(1), 2-7. Retrieved from https://journals.tma.uz/index.php/jesm/article/view/368
12. Muftah H. EL.Khafifi, Khalifa S. Muhammed, Wael E. Y. Alaorfi, Amin R. Osman. Fournier's Gangrene experience of one decade in Benghazi-Libya 1998-2007 // The Libyan Journal of Infectious Diseases, 2009 Vol. 3 - N 2 -p. 149-16
13. Okhunov, A. O. "Influence of granulocyte-colony-stimulating factor on the cytological picture of the wound in patients with purulent-inflammatory diseases of soft tissues on the background of diabetes mellitus." (2022).
14. Okhunov, A. O., Sh. A. Bobokulova. "Improvement of treatment methods of acute purulent destructive pulmonary diseases considering the non-respiratory function of lungs." 湖南大学学报 (自然科学版) 48.8 (2021): 313-319.
15. Okhunov, A. O., and Sh. A. Bobokulova. "The Role and Place of Nitroxidergic Regulation of The Endothelial System in the Pathogenesis of Acute Lung Abscess." (2022).
16. Okhunov, A. O., et al. "Principles of diagnosis and treatment of acute purulent-destructive lung diseases." World Bulletin of Public Health 7 (2022): 1-2.
17. Okhunov, A. O., et al. "Treatment of acute lung abscesses considering their non-respiratory function in patients with diabetes." *Indian Journal of Forensic Medicine and Toxicology* 14.4 (2020): 7465-7469.
18. Okhunov, A., et al. "Morphological Characteristics of Intestinal Vessels of Animals with an Experimental Model of Diabetes Mellitus Type 2 Complicated by Microangiopathy." Indian Journal of Forensic Medicine & Toxicology 14.4 (2020): 7348-7353.
19. Pulatov, U. I., et al. Morphological aspects of wounds in patients with purulent inflammation of soft tissues in diabetes mellitus and under the influence of granulocyte-colony-stimulating factor. Diss. 2022.
20. Shadmanov, A. K., A. O. Okhunov, and F. M. Abdurakhmanov. "Morphological Characteristics of a New Experimental Model of Chronic Renal Failure in the Background of Diabetic Nephropathy." journal of education and scientific medicine 2.3 (2022): 68-76.
21. Stevens D.L., Bisno A.L., Chambers H.F. et al. Practice Guidelines for the Diagnosis and Management of Skin and Soft-Tissue Infections // Clinical Infectious Diseases, 2005 41- p. 1373-1406
22. Tahmaz L., Erdemir F., Kibar Y., Cosar A., Yalcyn O. Fournier's gangrene report of 33 and a review of literature. // Int J Urol, 2006 13 - p. 960967
23. Wall D.B., Klein S.R., Black S., de Virgilio C. A. Simple model to help distinguish necrotizing fasciitis from nonnecrotizing soft tissue infection. J Am Coll Surg, 2000 191 - p. 227—231
24. Yaghan R.J., Al-Jaberi T.M., Bani-Hani I. Fournier's gangrene: changing face of the disease. // Dis Colon Rectum, 2000 43 - p. 1300-1308
25. Yanar H, Taviloglu K, Ertekin C, Guloglu R, Zorba U, Cabioglu N, Baspinar I. Fournier's gangrene: risk factors and strategies for management. // World J Surg, 2006 30 - p. 1750-1754.