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## **Fournier gangrene - diagnostic and treatment**

### **Zgorzel Fourniera - postępowanie diagnostyczne i leczenie**

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## **Streszczenie**

Zgorzel Fourniera to rzadkie, burzliwie przebiegające martwicze zapalenie krocza, często prowadzące do zgonu pacjenta. Zakażenie wywołane jest przez mieszaną tlenowo-beztlenową florę bakteryjną. Leczenie opiera się na niezwłocznej i radykalnej interwencji chirurgicznej wspomaganą antybiotykoterapią i intensywnym leczeniem ogólnym. Odpowiednie, szybkie podjęcie działań leczniczo-pielęgniarskich jest jednym z czynników wpływających na pomyślność leczenia. W zależności od dynamicznie postępującego procesu choroby, od etapów stosowanego leczenia należy sprawnie identyfikować problemy i modyfikować plan leczenia i opieki pielęgniarskiej.

**Słowa kluczowe:** zgorzel Fourniera, martwicze zakażenie skóry, przeszczep skóry, hiperbaria tlenowa

## **Abstract**

Fournier gangrene is a rare, progressively necrotizing perineum inflammation, often leading to death of the patient. The infection is caused by a mixed oxygen-anaerobic bacterial flora. Treatment is based on immediate and radical surgical intervention supported by antibiotic therapy and intensive general treatment. Adequate, quick adoption of curative and caring activities is one of the factors affecting the success of treatment. Depending on the dynamically progressing disease process, it is necessary to efficiently identify problems and modify treatment and nursing care plans from the stages of treatment.

**Key words:** Fournier gangrene, necrotic skin infection, skin transplant, hyperbaric oxygen

## **Introduction**

Acute scrotum organs diseases (Table 1) belong to the conditions that the very turbulent course require rapid diagnosis and implementation of immediate treatment [1].

Table 1. Acute scrotal disease [1].

Acute diseases of the scrotal organs

Acute inflammation - testes, atrial, vas deferens, immune-mediated vasculitis, abscesses, malaclakia nucleus and others,

Testicle, appendage or epididymis,

Injuries of the scrotum - hematomas, scrotum, testes, testicular rupture, burns and others,

Allergic skin changes in the scrotum,

Vascular diseases - venous thrombosis, seminal vein inflammation, testicular involvement, cavernous hemangioma,

Implied inguinal hernia,

Pain radiating to the scrotum - prostatitis, inflammation of seminal vesicles, appendicitis, neuralgia, in the course of ureteriasis and others,

Diseases of the scrotal skin - rose, furunculosis, scrotal phlegmon, Fournier's gangrene, etc.

Fournier's gangrene is one sharp, necrotic infections of the scrotum and the penis is called the often-soft tissue infection Fulminans, which is not limited only to the crotch, genital and rectal membrane around, but with lightning speed rife on the fascia of the abdominal cavity and the upper surfaces of the thighs [2]. Necrosis is progressing at a speed of 2-3 cm/h. This disease is rare, incidence is 1.6 cases/100 000 people/year [3]. Is high mortality, on average die about 25% of patients [4, 5, 6]. It is characterized by a very severe and rapidly progressive course, leads not only to the local destruction of soft tissues, but also to the development of

sepsis and generalized inflammatory response (SIRS). In medical terminology describing this kind of infection used different names: Streptococcus pneumoniae, Meleney gangrene, hospital, hemolytic, necrotic rose. Now apply the name of Fournier's gangrene.

The first symptoms are usually nonspecific-burning, discomfort, itching in the crotch and genital area, redness and swelling of the skin. Then appear purulent infiltration, accompanied by severe pain in the tissues under the skin tactile is fluctuance and crepitus, there is a high fever and chills. The redness spreads on the underbelly and the thigh, the blisters are filled with serous. The patient is usually very heavy, there may be confusion, symptoms of shock and severe sepsis [7].

For all the necrotic infection types characteristic is [8]:

discharge-cloudy, bactericidal instead of typical purulent,

bleeding from the wound does not occur or is very sparse,

skin lesions include an increasingly larger area,

numerous blood clots cause local swelling and tissue hypoxia,

the tissue after the incision is pale,

decaying after you touch,

you are necrotic areas,

in the study of microscopic observed large leucocytic infiltration,

and necrotic tissue developing micro-abscesses in preparations for most of the duration of the infection detects germs that caused the infection.

The etiology and risk factors

Fournier's gangrene, there is 10 times more common in men than in women, the largest incidence of falls between 50 and 60 years of age [6]. Necrotic infection of the soft tissues may be a complication of Urologic treatments, near the proctological or gynecological. It is assumed that in 45% of the original focus of infection is derived from the Genitourinary (prostate biopsy, injury caused by a catheter put into the bladder, wound infection after episiotomy after childbirth and others) in 33% of the area of the perineum and rectum (hemorrhoids, mucosal biopsy, an colorectal abscess and others), in 21% (injuries, abrasions, bites, insect bite) [3, 9]. Factors that increase your risk of Fournier's gangrene are (Table 2) [1, 10]:

Table 2. Risk factors for Fournier's gangrene [1, 10].

Fournier's gangrene

diabetes, renal failure, atherosclerosis,

cancers,

immunity disorders, HIV infection,

alcoholism,

immunosupouch, chemotherapy, steroid therapy,

malnutrition, wasting of the body.

In terms of classification is one of Fournier's gangrene. Mortify soft tissue infections (necrotizing tissue soft-NSTI infections) [11].

Causal factor Necrotizing infection is [8, 12]:

Table 3. The Pathogens causing Fournier's gangrene [8, 12]:

Type - 1

Mixed bacterial flora with anaerobic Grammar (+) and Gram (-).

Most often: anaerobes of the Bacteroides genus, of the genus Clostridium, Escherichia coli  
aerobes, streptococci, staphylococcus, Pseudomonas aeruginosa.

Type - 2

Called streptococci from group A Streptococcus pyogenes, sometimes in combination with staphylococcus aureus.

## Diagnostics

Diagnosis and proper treatment Fournier's gangrene take place based on the results of microbiological tests. Material for analysis, you must download the syringe by aspiration of liquid content, or by using a surgical biopsy. You can do this when you called. you try to digital, when during the penetration of the tissue begins to follow Brown Gore. Avoid contact with sample. In an unsuccessful attempt to obtain the material, it performs a subcutaneous injection of a small amount of 0.9% NaCl and repeat aspiration [7, 13] does not recommend that you download a smear, it's hard for him to grow anaerobic flora. Useful for quickly bringing the likely diagnosis is microscopic assessment of direct. There is also blood on seeds, positive culture may correlate with worse negotiated. Microbiological studies should consider the fungal infection and Mycobacterial tuberculosis. In the literature many authors that identification of pathogenic flora in severe inflammation, not easy [14]. It is recommended that you so use such antibiotics that your spectrum include anaerobic pathogens.

An important element of the Diagnostics are imaging studies: ultrasonography (Ultrasound), computer tomography, magnetic resonance imaging, the classic x-rays to note m.in. gas bubbles in soft tissues (nitrogen and hydrogen, which are produced by pathogens), which likely indicates the Fournier's gangrene (though this does not indicate significant only for this infection). An image of bubbles in under fascial space resembles a honeycomb [14, 15].

In the initial stage of the disease to determine proper diagnosis can be difficult. Prodrome symptoms are non-specific: low-grade fever and weakness (2-7). After them can receive the redness, swelling, pain, penis and scrotum. Characteristic is the black dot. Brodie spot that appears most often in the area of anogenital cancers, or at the base of the penis. From this point begins to develop gangrene. Necrotic changes include first, superficial fascia and subcutaneous tissue, the skin appear relatively late, which can cause delays in diagnosis and proper treatment [16].

## Treatment

The proceedings in fulminant infection of the skin and soft tissue includes the following procedure [10]:

Table 4. Treatment strategy Fournier's gangrene [10]

early and repeated surgical intervention,  
counteracting vascular clogging,  
intravenous broad-spectrum antibiotic therapy,  
alignment of circulatory-respiratory, metabolic, water-electrolyte disorders,  
hyperbaric therapy.

Surgical treatment of Quick surgical intervention (even within the first 24 hours of hospitalization) is the gold standard for the treatment of Fournier's gangrene. Deferring operation may lead to the development of sepsis, multiple organ failure, also increases the risk of death of the patient [17] it has been shown that among patients undergoing surgery in the first era of the mortality rate is 12%, as opposed to those whose treatment was held after 6 days, their mortality reaches 76% [3]. The first stage of surgery is a radical removal of the skin, tissue, knell Necro revised fascia, until living structures. The wounds are not Staples, remain open to healing by secondary intent, as well as to when a possible therapy hyperbaric oxygen had access to all the structures. Sometimes the necrosis covers the crotch, the sphincter muscles and forces a radical necrotomy, or amputation knell Necro altered nuclei.

Sometimes it is necessary to limb amputation or if the infection crosses the border of the peritoneum basin is chosen a stoma. Patients usually are provided with over pubic fistula to lead the urine from the bladder. Necrotic tissue cutting procedure is repeated several times [8, 18, 19] epidemiological reasons, patients with Fournier's gangrene should be isolated from other patients, bed linens and dressings need to be changed often, always if needed [10].

After cleaning the wound, mastery of infection and stabilize the general condition is carried out reconstruction surgery. Performs a free, autologous skin grafts intermediate thickness, full-thickness skin grafts (give better results, the patient must, however, have the right in

terms of anatomical donor site), brow lift (based on you move the freed the banks wound), patches of skin, muscular-cutaneous or fascia-skin cells from tissue culture or synthetic materials [19] are used various methods from the scope of plastic surgery, vascular surgery, eye microsurgery. Nucleus along with vascular pedunculus can be sewn in under the skin of the thighs or abdomen, sometimes it is possible to reconstruct the scrotum or testicle cover transplantation for treating skin problems-this is not, however, guarantee the proper functioning of the gonads. The behavior of an erection and physiological function of the penis is subject to rather from the breadth and size of the damage to the corpora cavernosa, and not how the reconstruction. In order to prepare for the reconstruction of wounds using a variety of methods, such as the assistance. Hydroactive wound dressings with silver nanocrystalline (Acticoat, Mepilex Ag, Biatain Ag and others), the local vacuum therapy (MTP) or hydrosurgery. Using the camera Versa Jet using effluent under pressure saline solution or antiseptics, a surgeon, precision is developing a wound, cuts and removes the shredded tissue epidermal operating field, eliminates phlegm, fibrin, bacteria, biofilm, you may align the surface, edge and the bottom of the wound. MTP consists of applying negative pressure within the wounds with exudates evacuate - NPWT (Negative Pressure Wound Therapy) [8] the therapy promotes the separation of necrotic tissue, speeds up the evacuations of bacteria, soothes pain and swelling, speeds up the secondary intent [20, 27-30].

#### Antibiotic therapy

Thundering course of infection requires rapid inclusion of empirical antibiotic therapy prior to surgical intervention, typically a few antibiotics with a broad spectrum, until an antibiogram in advance and then antibiotic therapy targeted. In the first stage, bearing in mind the frequently occurring mixed etiology of infection treatment is complex and combine piperacillin/tazobactam, ciprofloxacin, clindamycin or monotherapy - meropenem, tygacil was compared with imipen, ertapen, tigecycline or cefotaxime with clindamycin or metronidazole. In streptococcal infection it is recommended to use penicillin with clindamycin, and infections caused by *Staphylococcus aureus* - oxacillin, cefazolin, vancomycin [12].



## Hyperbaric therapy

Next to the surgery and antibiotic therapy applied in treatment of Fournier's gangrene is also high-pressure oxygen [21]. Hyperbaric aerobic (HBO) must be deployed immediately after diagnosis and continue until a granulation in the wound and confirmation of arid culture. Hyperbaric oxygen has a beneficial effect on reducing the swelling of damaged tissues, stimulates the formation of new blood vessels, activates neoangiogenesis, stimulates the production of collagen and fibroblasts, improves metabolism, increases blood flow by damaged tissue, stimulates neutrophils, increase the capacity of the bactericidal leukocytes, inhibits the growth of anaerobic bacteria, promotes overproduction of free radicals of oxygen, and it all accelerates the healing of wounds. There are two recommended 90-minute therapy sessions throughout the day [7, 10, 22]. HBO can also cause side effects such as barotrauma. Pressure trauma affects most the inner ear and the Middle, paranasal sinus or lung. Important is, therefore, appropriate qualification of patients for this treatment, during treatment and rapid deployment of a possible treatment. Another sign of oxygen toxicity is a side in the form of hyperoxia and hypercapnia, which primarily affects the brain and lungs. Sometimes people with claustrophobia, you may see the August panic [19, 23, 25, 26]. Nevertheless, thanks to HBO to shorten the duration of treatment is the patient, recovery is accelerated, reduces the number of surgical interventions and lowers the risk of death associated with infection [26].

## Summary

Fournier's gangrene is rare, happens very rapidly and has a high mortality rate. Requires immediate, multi-factor treatment, which an important part is the surgical removal of tissue necrotic, early and ensure drain secretions. Treatment often leads to amputation of the affected changed organs and body parts. In parallel is deployed with a broad spectrum of antibiotics directed against mixed flora. Is carried out intensive treatment overall, anti-shock, anticoagulants, sometimes HBO. The dynamics of the disease, methods of treatment, a multitude of protective actions-therapeutic response and require rapid action and efficient modification of the treatment and the process of nurture. There is a need for close cooperation between individual team members of interdisciplinary and holistic treatment of the patient. At all stages of treatment an important element of the therapy is to proper care, thorough observation and topical treatment. Despite the use of different modern therapeutic methods,

the prognosis is still uncertain and the results sometimes disappointing. Results of treatment of the patient with Fournier's syndrome are made up of the time in which he reported to the hospital, the relevance of the fast diagnosis, undertake surgical intervention and competence of the members of the interdisciplinary team therapeutic use.

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