Fourniers gangrene in modern conditions

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Abstract: Fournier's gangrene (FG), or fulminant gangrene of the external genitalia, perineum and perianal region, is a rare, life-threatening urosurgical pathology. Currently, HF is considered as a variant of necrotizing fasciitis caused by a synergistic polymicrobial infection. A rapidly developing infectious process in the fascia causes thrombosis of the subcutaneous vessels and leads to gangrene of the overlying skin [1;2;7]. Despite its rarity, the disease has been known since ancient times.

Keywords: Fournier's gangrene, necrotizing fasciitis, gangrene of the penis and scrotum

Introduction. The first description of gangrene of the external genitalia in men was made in the 5th century BC. e. Hippocrates in his treatise Epidemics. In the 1st century, the Jewish historian Josephus Flavius, in his works "Jewish Antiquities" and "The Jewish War," describes gangrene of the genital organs of King Herod the Great, which he had in the last days of his life. In the Middle Ages, Avicenna, in his treatise "The Canon of Medicine," described gangrene of the genital organs as an operational complication of urethrotomy in the perineum when removing bladder stones. He believed that the cause of the disease was urine getting into the wound and inadequate blood flow from it. For treatment, he suggested immediately making an incision until blood appears and applying a bandage with vinegar and salt. The first modern description of the disease was made by the French military surgeon H. Baurienne in 1764. He reported a case of post-traumatic gangrene of the scrotum in a 45-year-old army butcher's assistant. The disease developed 4 days after he was gored by a bull, causing two wounds in the pubic bone and perineum. The basis of treatment was active surgical tactics. When dressing, he used lint soaked in camphor alcohol with the addition of ammonia. After cleansing, the wounds were dressed with balsamic dressings. The resulting wound defect due to the loss of the scrotum was eliminated by skin grafting using local tissues with the application of secondary sutures [3,5,6]. In 1777, the English ship surgeon R. Robertson described non-

traumatic gangrene of the genital organs in an elderly ship butcher against the background of chronic alcoholism and gout. The disease developed 48 hours after sexual intercourse, after which acute urinary retention and severe swelling of the penis appeared. Thirty-six hours later he developed scrotal gangrene and died another 24 hours later. Treatment was carried out with dressings with Peruvian balsam [7;8;9]. At the end of the 18th century, 2 more observations of gangrene of the genital organs in men were published, the treatment of which was carried out with Peruvian balsam with a favorable outcome. During the 19th century, reports of isolated observations of genital gangrene, including in infants, continued to appear in different countries [9;11;13]. In 1883, the Parisian dermatovenerologist, Professor Jean-Alfred Fournier first described the idiopathic variant of fulminant gangrene of the penis in a young man. Also in this work, he for the first time summarized a series of known cases of genital gangrene and examined their causes in detail. All of them were divided into 2 groups: general and local. The first group of causes includes concomitant diseases (diabetes mellitus, atherosclerosis), the second includes injuries (accidental and surgical) and infections of the urogenital tract, it is noted that the second group occurs more often than the first [5;6] And as a result, this work has become widely known in Europe. Originally the name J.-A. Fournier was associated only with the idiopathic variant of gangrene of the genital organs; later, the term GP began to consider any gangrene, regardless of etiology. In the literature you can find more than 15 different names for the disease. Such a variety of terms is a reflection of different views on the nature of the disease and approaches to its treatment [14;15]. There is a proposal to use this term only for diseases first described by J.-A. Fournier - cases of fulminant gangrene of the penis and scrotum of unknown etiology [8;9]. Despite the rarity of the disease, the relevance of studying this pathology is increasing every year, which is associated with an increase in the number of immunocompromised patients, who make up the bulk of patients with HF [9-11]. According to epidemiological studies from 1950 to 1999 and from 2000 to 2007, the annual increase in patients with HF increased by 6.4 times [10;11;12]. HF can occur at any age, not only in men, but also in women and children. It is more common in men aged 40-60 years, the ratio of men to women is 10:1. The average age of patients with HF has a steady upward trend [3;4]. Mortality does not tend to decrease and, despite modern treatment methods, reaches 40% [11]. It is more common in men aged 40-60 years, the ratio of men to women is 10:1. The average age of patients with HF has a steady upward trend [13]. Mortality does not tend to decrease and, despite modern treatment methods, reaches 40% [11]. It is more common in men aged 40-60 years, the ratio of men to women is 10:1. The average age of patients with HF has a steady upward trend [13;14]. Mortality does not tend to decrease and, despite modern treatment methods, reaches 40% [12].

Purpose of the study: study of the features of GF in modern conditions.

MATERIAL AND METHODS: A retrospective analysis of GF was carried out in 7 patients aged 56.1±22.2 years who were treated in the surgical department in 2021-2023. In the study group of patients, HF was observed only in males aged 18 to 77 years. In all observations, the necrotic process was localized to the scrotum and perineal area without affecting the penis; in 2 observations, necrosis extended to the anterior abdominal wall. In the affected area, the entrance gates of infection were identified - wounds of various origins that existed before the disease for more than 10 days. All patients suffered from concomitant diseases: 4 had lower paraplegia or paraparesis with impaired bladder function, 2 had type II diabetes mellitus, 1 had arthrosis of the right knee joint with decreased patient activity. In all presented observations, patients were admitted in clear consciousness, stable hemodynamics (systolic blood pressure more than 90 mm Hg, mean blood pressure more than 70 mm Hg) and a respiratory rate of less than 20 1/min. Tachycardia greater than 90/min was observed in 2 patients with fever. In 4 patients the disease progressed rapidly and had a fulminant course. A necrotic process on the scrotum appeared within 3 days from the moment the first clinical symptoms appeared. Of these, 2 had fever, others had low-grade fever. In 3 patients there was a slowly progressive course, which was characterized by the appearance of scrotal necrosis a week after the onset of the disease. Moreover, in all observations the temperature was low-grade. All patients with HF complained of intense pain in the scrotum and perineum. On examination, severe swelling and erythema of the scrotum with bluish or black spots were noted. Erythema often spread to adjacent areas. Palpation of the scrotum was painful, the focus of fluctuation was difficult to determine, in 4 observations gas was clinically detected in the tissues of the scrotum (crepitus on palpation, tympanitis on percussion). In doubtful cases, a diagnostic puncture was used, during which pus with an unpleasant odor was obtained. Instrumental research methods to identify the accumulation of pus and gas in tissues were of an auxiliary nature to clarify the prevalence of the purulent-necrotic process. Patients with HF were characterized by leukocytosis. However, a significant increase in the level of leukocytes in the blood (>12.0×109 /l) was noted only in 2 patients. The hemoglobin level was reduced, with a relatively normal red blood cell count (calculated color index was 0.77). A significant decrease in hemoglobin levels (<80 g/l) was noted only in 2 observations. Bilirubin levels were within normal limits. The detected increase in bilirubin levels in 2 patients was transient. Creatinine values were within normal values.

RESEARCH RESULTS: All patients underwent complex treatment, consisting of surgical and conservative methods. Surgical treatment was based on active surgical tactics. The basis of conservative therapy was rational antibacterial and infusion therapy. All patients admitted with HF underwent emergency surgery. Surgical

treatment consisted of wide dissection of infected tissues soaked in pus, opening of purulent leaks and excision of visible necrotic tissue. In all observations, lysing fascia of a dull gray color, saturated with pus with an unpleasant odor, was found; the testicles were viable, bright red. After dissection and excision of tissue, the wounds were sanitized with a 3% solution of hydrogen peroxide, drained with tubular drainages, and performed with gauze swabs with antiseptic solutions. In the 1st stage of the wound process, wounds were dressed with a 3% solution of hydrogen peroxide until the unpleasant odor disappeared in the wound, after which - with water-soluble ointment "Levomekol". As new areas of necrosis formed and purulent leaks were detected, staged necrectomies and secondary surgical treatment of wounds were performed to eliminate them. After removing large areas of necrotic tissue surgically, ultrasonic wound cavitation (USC) was used to eliminate small necrosis and fibrin films at the bottom of the wound, which had a positive effect not only on cleansing the wound, but also on the appearance of fairly bright granulations in it. The use of dressings with enzyme preparations was rarely used for economic reasons. In the early postoperative period, physiotherapeutic procedures were carried out as etiotropic treatment to eliminate anaerobic infection in the wound. For this purpose, the following were used: hyperbaric oxygenation (HBO) in 1 observation, ultraviolet irradiation (UVR) in 1, local ozone therapy in 3. When carrying out local ozone therapy, two methods were used. The first is for a wide open and large wound. According to this technique, the wound was isolated from the external environment with a sterile film, so that an air cavity was formed between the film and the wound, into which two tubes were installed, one for supplying ozone from the apparatus, the other for removing ozone. The second technique was used for narrow wounds with long wound channels and pockets. Sterile tubular drainages were installed in them, into which ozone was directly supplied, and the wound was isolated from the external environment with a sterile film without creating a cavity. Ozone was removed through one or more drains. The procedures were performed during dressing changes - morning and evening. After 2 days the foul odor disappeared. After which ozone therapy was performed once a day for 5 days. By the end of the course of the procedure, distinct granulations appeared at the bottom of the wound against the background of the remains of necrotic tissue, which were removed due to ultrasonic cavitation. In the 2nd stage of the wound process, in 5 cases scrotal plastic surgery was performed by moving the remnants of scrotal skin flaps with the application of secondary sutures, in 1 case - autodermoplasty of split skin flaps according to Thiersch. The nature of antibacterial therapy was determined by the clinical characteristics of the purulent-necrotic process. In all observations, the damage to soft tissues was of an anaerobic putrefactive nature. The following were verified in the exudate: Escherichia coli in 4 patients, Proteus vulgaris - 1, Pseudomonas aeruginosa

- 1, Klebsiella pneumoniae - 1. Ceftriaxone (2-4 g/day) or ciprofloxacin (1.0 g/day) was prescribed as initial antibiotic therapy day) in combination with metrogil (1.5 g/day). After receiving the results of bacteriological examination of wound exudate, adjustment of antibacterial therapy was carried out. In all observations, infusion therapy was performed, at least 1.5 l/day. There was a fatal outcome in 1 (14.3%) observation in a patient (No. 2) with a fulminant course of the disease, leading to extensive necrotic damage to the scrotum and perineum with the spread of the putrefactive-necrotic process to the anterior abdominal wall and the development of sepsis.

DISCUSSION OF RESEARCH RESULTS: During the study period, HF was noted only in males of various age groups, the average age of which was 56.1 ± 22.2, which is fully consistent with the literature data [7]. In all observations, the cause of the disease was identified, which correlates with the data of N. Eke [11], who analyzed 1726 cases of HF, in which the cause was identified in 95-97%. In each observation there was a combination of local and general causes of the disease. Among the local causes is the presence of an infection portal that existed for more than 10 days before the onset of the disease. Among the common causes, the leading place was occupied by concomitant diseases leading to limitation of the activity of patients with urinary disorders (paralysis, paresis, diseases of the lower extremities), and less often - diseases with metabolic disorders (diabetes mellitus). According to the course of the disease, two forms can be distinguished: rapidly progressive (fulminant) and slowly progressive. The fulminant course of the disease (4 cases) is characterized by the development of a necrotic process in the scrotum within the first 3 days from the moment the first clinical symptoms appear. The slowly progressive course of HF (3 cases) was characterized by the development of a necrotic process a week after the onset of the disease and low-grade fever. Diagnosis of the disease described in the observations did not cause difficulties; it was based on complaints, anamnesis, and physical examination of the patient. No severe hemodynamic or respiratory disturbances were observed during hospitalization. Patients with HF complained of pain in the scrotum, marked swelling and erythema with bluish spots, and pain on palpation. Gas in the tissues was often detected by palpation and percussion. The most important method of confirming the diagnosis is tissue puncture to obtain pus. Laboratory and instrumental studies were of no importance in the diagnosis of the disease: moderate leukocytosis and a slight decrease in the concentration of hemoglobin in erythrocytes were detected in the blood. This led to the fact that the proposed prognostic scales based on clinical and laboratory indicators did not live up to their expectations in relation to the analyzed HF observations. These are, first of all, the LRINEC and FGSI scales. The LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) scale was proposed by C. Wong

et al. to predict the development of necrotizing fasciitis and was based on the use of indicators of the number of leukocytes and hemoglobin in the blood, the level of sodium, glucose, creatinine and C-reactive protein in the blood plasma [12]. The Gangrene Severity Index FGSI (Fournier's Gangrene Severity Index) was proposed by E. Laor et al. was a set of 9 main clinical and laboratory parameters (pulse and respiratory rate, blood pressure and body temperature, the number of blood leukocytes, hematocrit, levels of sodium, potassium, creatinine, albumin, alkaline phosphatase and standard bicarbonates in the blood plasma) [13]. Treatment of patients with HF was complex. The surgical treatment was based on active surgical tactics, which was first successfully used for the treatment of scrotal gangrene by H. Baurienne (1764) [3] and has not changed fundamentally since then. It was based on the dissection of tissues soaked in pus and excision of necrosis. Among the modern innovations, the ultrasonic ultrasound method of the wound has proven itself to be effective for cleaning the wound from the remnants of slowly lysing small necrosis and infected fibrin films. The method made it possible to transfer the wound to the second stage of the wound process in a shorter time, followed by closing the wound defect using one of the methods. Physiotherapeutic effects with the formation of free oxygen radicals were used as additional methods of etiotropic effects on the wound in order to eliminate anaerobic flora. For this purpose, a number of foreign experts suggest using the HBO method, which leads to an increase in tissue oxygenation and macrophage activity at the site of inflammation, prevents the spread of necrosis and reduces the manifestations of endotoxemia. The method has a direct antibacterial effect in relation to the anaerobic form, due to the formation of free oxygen radicals [15; 16]. In the presented series of GF observations, we had a single experience of using HBO. In general, the method lived up to the expectations placed on it by quickly eliminating the aerobic process and preventing the progression of necrosis in the wound. The main reasons for limiting the use of this method of treatment for HF and necrotizing fasciitis are logistical and organizational problems. When the acute process is stopped and the condition stabilizes, as a rule, the patient's need for HBOT disappears. A good alternative to HBOT may be local exposure to ozone on wounds. The advantage of ozone therapy is the portability of the device, which allows the procedure to be carried out directly during the dressing process with full control over the patient's condition. According to the developed ozone therapy method, the antibacterial effect against anaerobes occurs after 2 days, due to the effect of oxygen free radicals. The use of ultraviolet irradiation in the acute period of HF was limited by a number of problems: Transportation to the ultraviolet irradiation room, the need to open the wound during the procedure and close it upon completion. However, this can be solved by installing a portable ultraviolet emitter at the dressing sites. General treatment was carried out according to the traditional method for purulent diseases -

selection of antibacterial drugs taking into account the sensitivity of the microflora, determination of the volume and duration of infusion therapy, correction of metabolic processes and the blood coagulation system, etc. All this required constant monitoring. The wound ultrasound method has proven itself well. The method made it possible to transfer the wound to the second stage of the wound process in a shorter time, followed by closing the wound defect using one of the methods. Physiotherapeutic effects with the formation of free oxygen radicals were used as additional methods of etiotropic effects on the wound in order to eliminate anaerobic flora. For this purpose, a number of foreign experts suggest using the HBO method, which leads to an increase in tissue oxygenation and macrophage activity at the site of inflammation, prevents the spread of necrosis and reduces the manifestations of endotoxemia. The method has a direct antibacterial effect in relation to the anaerobic form, due to the formation of free oxygen radicals [14; 15]. In the presented series of GF observations, we had a single experience of using HBO. In general, the method lived up to the expectations placed on it by quickly eliminating the aerobic process and preventing the progression of necrosis in the wound. The main reasons for limiting the use of this method of treatment for HF and necrotizing fasciitis are logistical and organizational problems. When the acute process is stopped and the condition stabilizes, as a rule, the patient’s need for HBOT disappears. A good alternative to HBOT may be local exposure to ozone on wounds. The advantage of ozone therapy is the portability of the device, which allows the procedure to be carried out directly during the dressing process with full control over the patient’s condition. According to the developed ozone therapy method, the antibacterial effect against anaerobes occurs after 2 days, due to the effect of oxygen free radicals. The use of ultraviolet irradiation in the acute period of HF was limited by a number of problems: Transportation to the ultraviolet irradiation room, the need to open the wound during the procedure and close it upon completion. However, this can be solved by installing a portable ultraviolet emitter at the dressing sites. General treatment was carried out according to the traditional method for purulent diseases - selection of antibacterial drugs taking into account the sensitivity of the microflora, determination of the volume and duration of infusion therapy, correction of metabolic processes and the blood coagulation system, etc. All this required constant monitoring. The wound ultrasound method has proven itself well. The method made it possible to transfer the wound to the second stage of the wound process in a shorter time, followed by closing the wound defect using one of the methods. Physiotherapeutic effects with the formation of free oxygen radicals were used as additional methods of etiotropic effects on the wound in order to eliminate anaerobic flora. For this purpose, a number of foreign experts suggest using the HBO method, which leads to an increase in tissue oxygenation and macrophage activity at the site

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CONCLUSION. In modern conditions, HF can develop in any age group. This is facilitated by the presence of the entrance gate of infection in the area of the external genitalia against the background of concomitant diseases leading to (paralysis, atony of the bladder, diabetes mellitus). HF has two clinical variants - rapidly progressing (fulminant) and slowly progressing. The diagnosis of HF is based on an assessment of the local status with a diagnostic puncture. Treatment of HF is complex. It is based on active surgical tactics with adequate antibacterial and infusion therapy. Wound ultrasound in combination with ozone therapy effectively complements local wound treatment.

References

1. Mallikarjuna MN, Vijayakumar A, Patil VS, Shivswamy B S. Fournier's Gangrene: Current Practices. ISRN Surgery. 2012:1-8. doi:10.5402/2012/942437

2. Singh A, Ahmed K, Aydin A, Khan MS, Dasgupta P. Fournier's gangrene. A clinical review. Archivio Italiano Di Urologia e Andrologia. 2016;88(3):157-164. doi:10.4081/aiua.2016.3.157

3. Baurienne H. Sur une contuse qui s'est termineé par le sphacèle de le scrotum. J Med Chur Pharm. 1764; 20: 251-256.

4. Robertson R. Observations of Fevers and Other Diseases which Occur on Voyages to Africa and the West Indies, 1st edn. London: John Murray; 1792; 121-123.

5. Abduvali, X., Otabek, S., Asilbek, E., & Daminov, A. T. (2023). TYPE 2 DIABETES: TIME TO CHANGE THE CONCEPT. Science and innovation, 2(D4), 165-167.

6. Nazira K., Siddikovna T.G., Davranovna D.A., Takhirovich D.A., Tulkinovich O.S. (2021). Cardiovascular complications in patients with covid and diabetes mellitus 2. Central Asian Medical and Natural Science Journal, 2(3), 37-41.

7. GROWTH HORMONE FOR THE TREATMENT OF HEREDITARY DISEASES IN CHILDREN Ortikov Shahzod Tulkinovich. Karimova Nazira Alimovna, Kurbanova Nozima Sobirjanovna, Daminov Abdurasul Takhirovich / International Journal of Innovative Engineering and Management Research. 2021 281-284.

8. Features of the course of type 2 diabetes mellitus with arterial hypertension and ways of their correction Negmatova Gulzoda Shukhratovna, Salimova Dildora Erkinovna Eurasian Medical Research Journal 17, 39-41, 2023.

9. FEATURES OF THE TECHNIQUE OF TYPE 2 DIABETES MELLITUS IN COMBINATION WITH ARTERIAL HYPERTENSION AND WAYS OF CORRECTION IX G.Sh. Negmatova, D.E. Salimova LLC "Research and publications", Enlightener, 2023.

10. Features of the coexistence of type 2 diabetes mellitus with arterial hypertension and their treatment Gulzoda Shukhratovna Negmatova, Dildora Erkinovna Salimova LLC "Ochik fan", Science and education, 2023.

11. Khalimova Z.Yu. and G.Sh. Negmatova. Autoimmune polyglandular syndromes. Literature review". Central Asian Journal of Medical and Natural S

12. Даминов А., Хайдаров О., Хасанова М. и Абдукахорова Р. (2023). ОСЛОЖНЕНИЯ ГЛЮКОКОРТИКОИДНОЙ ТЕРАПИИ У ПАЦИЕНТОВ С ДИАБЕТОМ, ПЕРЕЖИВШИХ КОВИД-19. Евразийский журнал медицинских и медицинских наук , 3 (4), 197-200.sciences 2.4 (2021): 166-175.

13. Khamidova M.N., Ismatova I.F., Zh.Sh. Berdirov, G.Sh. Negmatova and A.T. Daminov. "DIABETES AND COVID-19". Eurasian Journal of Medicine and Natural Sciences 2, no. 13 (2022): 190-204.

14. Takhirovich D.A., Burchaklar S.J.A., Shukhratovna N.G., Shukhratovna S.G., Zainuddinovna M.G. (2022). COURSE OF COVID-19 IN PATIENTS WITH DIABETES. Web of Scientist: International Journal of Scientific Research, 3(02), 73–76.

15. Takhirovich D.A., Korners S.J.A., Shukhratovna N.G., Shukhratovna S.G., Zainuddinovna M.G. (2022). COURSE OF COVID-19 IN PATIENTS WITH DIABETES. Web of Scientist: International Journal of Scientific Research, 3(02), 73–76.