C A S E R E P O R T

UDC: 616.64-002.4-07/08:616.617-089.844

Fournier's gangrene

Fournierova gangrena

Novak Milović*, Vladimir Bančević†, Zoran Čampara*, Branko Košević*, Uroš Zoranović‡

Military Medical Academy, *Urology Clinic, †Department of urology diagnostics, ‡Clinic of vascular surgery, **Belgrade**

Abstract

Background. Fournier's gangrene (FG) represents a necrotizing infection of the skin and subcutaneous soft tissue of the external genitalia and perineum. It arises as a result of propagation of anorectal, urogenital and skin infections. The principles of treatment include improving general condition of a patient, debridement of wound, excision of necrotic tissue, combined antibiotic therapy, hyperbaric oxygen therapy and reconstructive procedures. It is a rare but very serious condition which regardless to aggressive treatment can lead to a lethal outcome in up to 20–30% of patients. **Case report.** Since the year 2000 we have treated six patients with FG. We presented the course and positive treatment outcome in a 65-year-old male patient with numerous comorbid conditions, nonregulated insulin-dependent diabetes, hypertension, previous myocardial infarction, chronic viral hepatitis and thrombocytopenia, rehabilitation was complicated with heart failure, atrial fibrillation and pulmonary thromboembolism. The treatment consisted of two extensive debridement of the wound with removing necrotic tissue, drainage, consolidation of state of health, correction of his blood sugar levels and thrombocytopenia, antimycotic and combination of three antibiotics and hyperbaric oxygen therapy. In two delayed surgical procedures reconstruction of a large defect of the urethra was performed. **Conclusion.** A patient with numerous and serious comorbid conditions with FG could recover as a result of teamwork of urologists, infective medicine specialists, cardiologists, endocrinologist, vascular and plastic surgeons.

Key words:
fournier gangrene; diagnosis; comorbidity; therapeutics; urologic surgical procedures; hyperbaric oxygenation; treament outcome.

Apstrakt

Uvod. Fournieova gangrena (FG) predstavlja nekrotizujuću infekciju kože i potkožnog mekog tkiva spoljašnjih genitalija i perineuma. Nastaje kao posledica širenja anorektalnih, urogenitalnih ili kožnih infekcija. Princip lečenja FG podrazumeva stabilizaciju opšteg stanja bolesnika, debridman rane, odstranjivanje nekrotičnih promena, kombinovanu antibiotsku terapiju, oksigenoterapiju i eventualne rekonstruktivne zahvate. Ovo je veoma retko, ali veoma ozbiljno stanje koje uprkos agresivnoj terapiji, dovodi do letalnog ishoda kod 20–30% obolelih. **Prikaz bolesnika.** U našoj ustanovi od 2000. godine lečeno je šest bolesnika sa FG. Prikazujemo tok i pozitivan ishod lečenja muškarca, starog 65 godina, sa brojnim komorbidnim stanjima: neregulisanim dijabetesom zavisnim od insulina, hipertenzijom, ranijim infarktom miokarda, hroničnom infekcijom virusom hepatitisa i trombocitopenijom čiji se oporavak komplikovao srčanom dekompenzacijom, atrijalnom fibrilacijom i plućnom tromboembolijom. Lečen je primenom dva opsežna debridmana rane uz uklanjanje nekrotičnih površina, drenaža, stabilizacija opšteg stanja, korekcija glikemije i trombocitopenije, antimikotičkom i trojnom antibiotskom terapijom i hiperbaričnom oksigenacijom. U dve odložene hirurške procedure učinjena je rekonstrukcija velikog nedostajućeg dela uretre. **Zaključak.** Bolesnik sa brojnim i ozbiljnim komorbidnim stanjima, oboleo od FG može se izlečiti timskim radom urologa, infektologa, endokrinologa, kardiologa, vaskularnog i plastičnog hirurga.

Ključne reči:
furnijeova gangrena; dijagnoza; komorbiditet; lečenje; hirurgija, urološka, procedure; hiperbarička oksigenacija; lečenje, ishod.

Introduction

Fournier's gangrene (FG) represents a necrotizing infection of the skin and subcutaneous soft tissue of the external genitalia and perineum [1, 2]. In 1764 Baurienne first described this condition, but in 1883 Jean Alfred Fournier defined it as an idiopathic, rapidly fulminating infection in previously healthy young patients and pointed out the known predisposing factors for development of this type of gangrene [1]. In 11 patients, Wilson described FG as a type of necrotizing fasciitis which involves superficial and deep fascia of the perineum and surrounding structures [1]. In 1920, Melney first proposed surgical treatment for this type of gangrene [3]. In the Medline data base about 600 reported cases

Correspondence to: Vladimir Bančević, Military Medical Academy, Urology Clinic, Crnotravska 17, 11 040 Belgrade, Serbia. Phone: +381 64 12 77 350. E-mail: vladaban@eunet.yu

with FG till 1996, and less than 2000 cases till today have been cited. Mortality rate for FG is 4–67% in the reported series, and most authors reported 20–30% [1, 3].

Fournier's gangrene arises as a result of propagation of anorectal, urogenital and skin infections. Propagation from the anorectum is a result of injury or complication of malignancy of this region, inflammation of perineal glands, diverticulitis or appendicitis, perianal fistulas, hemorrhoid etc. Urogenital causes of FG are inflammation of bulbourethral glands, urethral injuries, urinary tract infection etc. A special group consists of iatrogenic and noniatrogenic injuries of the perineum. Skin infections of this region initially start as supurative hydroadenitis, ulceration of the scrotum, result of trauma, complications of surgical procedures or intentional trauma (popping or piercing). Beside these entrance sites for infection, predisposing factors for FG are leukemia, Crohn's disease and human immunodeficiency virus (HIV) infection. Diabetes mellitus, obesity, liver cirrhosis, vascular disease of the pelvis minor, malignancies, alcoholism, intravenous drug abuse and a prolonged use of steroids are recognized as comorbid conditions which compromise the immune system and are included in predisposing conditions for FG. This fulminant and life-threatening infection develops when the balance of the immune system of the host is compromised by these comorbid conditions in the presence of virulent bacterial strains [1, 3, 4].

Case report

A patient, 65-year-old, was admitted in the Military Medical Academy in November 2002 complaining of a painful, erythematous and swollen scrotum. Previously he had episodes of frequent urination up to twenty times per day, followed by irritation in the urethra and a feeling of inadequate emptying of the bladder and high temperature, up to 39 ºC. He was an insulin-dependent diabetic patient for over twenty years and in the year 2 000 he had an acute myocardial infarction. He was hepatitis C virus positive, had high blood pressure with leukocytosis and thrombocytopenia. In the inguinal region there were palpable bilateral enlarged lymph nodes up to 2 cm. The penis was swollen, livid and the foreskin could not be retracted over the glans. The scrotum was also swollen, livid with two charcoal grey necrotic lesions near the root of the penis and the lower part of the right hemiscrotum covering about 1/3 of the hemiscrotum (Figure 1). The prostate was impossible to palpate due to very intensive pain that the patient had during digitorectal examination. At the time of admittance he was febrile (38 ºC), pale, in a very serious condition. Laboratory findings were full blood count (FBC): leukocytes 17.9×10^9, thrombocytes 59×10^9, glucose 26.4 mmol/l. In the urine culture *Morganella morganii* was later isolated in a significant number. Immediate debridement of necrotic lesions of the scrotum and inguinal regions bilaterally was performed with lavage and drainage with multiple ripped drains and the testes were dislocated under the skin of both inguinal regions. Because the severity of the necrosis most of the penile and scrotal skin was removed (Figures 2). During catheterization, before the operation the stricture of the bulbar urethra was identified, after catheterization with a rigid Tiemann tip catheter a periurethral abscess at the level of the stricture was drained. We evacuated 800 ml of clear yellow residual urine. Immediately after the hospitalization and prior to the surgical procedure a combination of three *iv* antibiotics (ceftazidime, metronidazole and amikacin) were introduced. Five days after the primary surgical procedure a necrectomia of devitalized skin was preformed. The immediate postoperative period was complicated by atrial fibrillation, pulmonary thromboembolism and acute heart failure. For this reason, he was under conservative treatment for five days in the Emergency

Fig. 1 – Necrotic lesions on the scrotum at the time of admittance

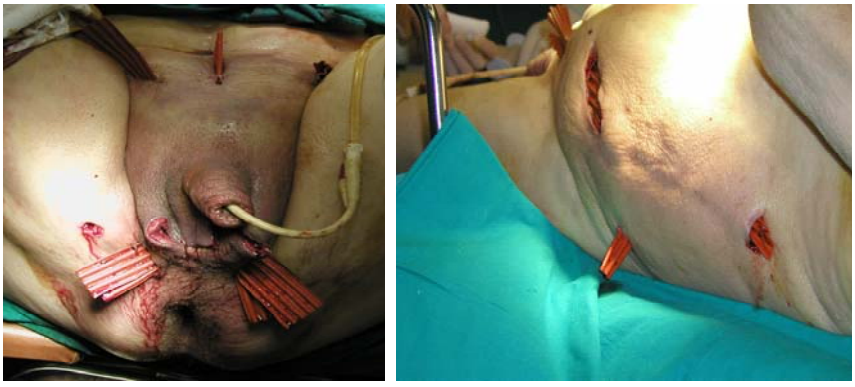

Fig. 2 – After necrectomia and debridement of the wound

Clinic for Internal Diseases, Military Medical Academy. The patient was under constant supervision of the urologist, endocrinologist and cardiologist. Besides antibiotics he received antimycotic therapy (fluconasole) and *iv* substitution of liquid, albumin and plasma. His therapy with diuretics, anticoagulants, sedatives and cardiotonics was continued. His blood glucose levels were controlled daily with the correction of his insulin doses. His dressing was changed 3–5 times a day with debridement of the wound. He was isolated.

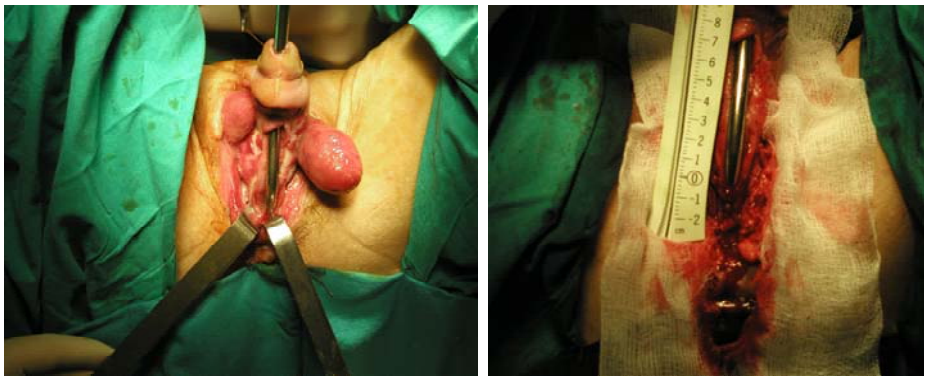

Fig. 3 – The urethra defect in the length of 7 cm that was reconstructed 12 months after the primary reconstruction

Fig. 4 – On lay urethroplasty cum inner tight flap

At least once a week laboratory results and swabs of the wound were taken with the correction of his therapy. Eight days after the initial surgical intervention the swab was positive for *Echerichia coli* and *Acinobacter* species and the hemoculture showed the presence of coagulase negative and gold *Staphylococcus*. The antibiotics were changed due to these results and with consultation of the infective medicine specialists. During the first hospital stay that lasted 58 days and when the patient became stable and the wound status improved, we treated him with hyperbaric oxygen therapy (HBO) in ten 60-minute sessions under the pressure of 2 atmospheres absolutes (2 ATA).

After five months of primary surgery the patient got a fistula on the midpart of the penile urethra, about 4 cm from the external meatus, through which the entire urine passed during urination. Six months after the fistula had appeared, we performed a reconstruction of the penile urethra by the transposition of the prepuce, but the graft failed and the fistula occurred again, this time in the penoscrotal region. Twelve months after the primary reconstruction of the urethra, we performed a second one. We found a defect in the posterior wall of the urethra in the length of about 7 cm from the penoscrotal region and up to 4 cm from the external meatus (Figures 3). After the use of on lay urethroplasty cum inner tight flap (Figures 4), and the urine removal from the bladder with a cystostomy catheter, the urethra defect normalized, and the patient was recovered fully.

Discussion

Even today Fournier's gangrene represents a rare but a very serious disease with a high mortality rate. The pathophysiological theories on the development of Fournier's gangrene include the necrosis of the superficial and deep fascia, fibrinous coagulation in the hole of the nutritive arterioles and the infiltration of the polymorphonuclears. Anaerobic organisms can give rise to the production of gas [1]. The most common causes of Fournier's gangrene are *Streptococcus* species, *Staphylococcus* species, *Enterobacteriaceae* species, *Bacteroides* and anaerobic bacteria and fungus [1, 3]. Nowadays, it is assumed that Fournier's gangrene occurs as a result of polymicrobic infection, where microorganisms synergistically produce enzymes that bring to a rapid spreading of infection.

The clinical signs and symptoms of Fournier's gangrene involve the presence of intensive pain, redness and the swelling of the affected parts of the cutis and subcutis, genital and

perianal region usually followed by a high body temperature. The skin changes go through all of the phases of the necrosis development with a possible purulent secretion from the wound. Infection can spread between the Scarpa's fascia and the fascia from the external abdomen muscles, up to the claviculas. Subskin crepitations are possible. Systemic symptoms and signs of the disease are high body temperatures, shivering, till the development of septic shock [1]. A great number of patients that suffer from Fournier's gangrene have diabetes, which is explained by the changes at micro-level in blood vessels (diabetic microangiopathy) [5]. On the other hand, diabetics have a lower phagocyte activity and a neutrophiles dysfunction exists, which helps the infection to spread [6].

The principles of Fournier's gangrene treatment consist of stabilization of a patient, parenteral usage of wide specter antibiotics and an early and aggressive surgical intervention, and after that hyperbaric oxygenation if it's possible [7]. Prognosis mostly depends on how timely the diagnosis is made and the treatment started [8]. An initial antibiotic triple therapy is suggested, so that the specter of gram-positive, gram-negative and anaerobic bacteria is covered [3]. The radically achieved debridement of the affected surfaces is done without delay, because the untreated gangrene spreads with the speed of 3 cm/h until it reaches the supraclavicular fossa [9]. The surgical treatment consists, besides the removal of necrotic masses and drainage of rinsing and removing of urine through the urethral or cystostomy catheter. In 2001, Kovacs et al. [10] published a series in which they recognized a better treatment result *via* vacuum-assisted closure (VAC) of the wound. Many urologists consider VAC procedure as a part of standard treatment. The term HBO treatment implies breathing 100% of oxygen with the pressure higher than the atmosphere pressure, in a specially designed chamber [11]. This therapy brings to an improvement of the perfusion of ischemic tissue, improved oxygen supply, neovascularization and it also has an antimicrobic effect which is related to anaerobic bacteria [12]. In the available literature there is no reference to larger series of patients with Fournier's gangrene treated with HBO. Pizzorno et al. [13] described in their study on Fournier's gangrene the treatment of 11 patients via HBO, without mortal outcomes. Korhonen et al [14] showed in the study involving 33 patients the positive effects of HBO in the treatment of Fournier's gangrene, concluding that this method of the treatment allows the tissue preservation and the decrease of the mortality rate. On the other hand, there are studies that have not proved the advantage of HBO usage in the treatment of Fournier's gangrene [15].

In the Urology Clinic, Medical Military Academy, Belgrade, six patients with FG have been hospitalized since the year 2000. Here we reported, to our opinion, the most interesting case due to enormous comorbidity, bad condition of the patient's and defects on the urethra that requested reconstructive procedures also done in the field of diabetic microangiopathy and secondary thrombocythopeny, and even so the used method of treatment gave exellent results. We think that HBO treatment had excellent outcome in this patient because he also had FG diabetic microangiopathy and prior pulmonal thromboembolysm and myocardial infarction. The first hospitalization lasted 58 days because shortly after the primary surgery heart failure, atrial fibrillation and pulmonary thromboembolism occurred. After we overcame these vital threatened disorders, the patient took HBO treatment three times per week, in ten times. This HBO treatment was also done in the first hospitalization. Both times the delayed urethral reconstruction was caused by bad health of the patient and numerous comorbidities, which were the reasons for preoperative internal management and therapy to need a longer time period.

Conclusion

A patient with numerous and serious comorbid conditions with FG could recover as a result of a teamwork of urologists, infective medicine specialists, cardiologists, endocrinologist, vascular and plastic surgeons.

REFERENCES

1. *Santora T, Rukstalis D.* Fournier Gangrene. Available from: http://www.emedicine.com/med/topis2814.htm
2. *Eke N.* Fournier's gangrene: a review of 1726 cases. Br J Surg 2000; 87(6): 718–28.
3. *Norton KS, Johnson LW, Perry T, Perry KH, Sehon JK, Zibari GB.* Management of Fournier's gangrene: an eleven year retrospective analysis of early recognition, diagnosis, and treatment. Am Surg 2002; 68(8): 709–13.
4. *Romics I.* Fournier's disease-an elusive disorder: European Urology Today 2007; 19: 20.
5. *Baskin LS, Carroll PR, Cattolica EV, McAninch JW.* Necrotising soft tissue infections of the perineum and genitalia. Bacteriology, treatment and risk assessment. Br J Urol 1990; 65(5): 524–9.
6. *Huber P Jr, Kissack AS, Simonton CT.* Necrotizing soft-tissue infection from rectal abscess. Dis Colon Rectum 1983; 26(8): 507–11.
7. *Nikolić J.* Diseases of penis. In: Genital Surgical procedures, 2nd ed. Beograd: Radunić; 2000. p. 215–7. (Serbian)
8. *Yanar H, Taviloglu K, Ertekin C, Guloglu R, Zorba U, Cabioglu N,* et al. Fournier's gangrene: risk factors and strategies for management. World J Surg 2006; 30(9): 1750–4.
9. *Laucks SS 2nd.* Fournier's gangrene. Surg Clin North Am 1994; 74(6): 1339–52.
10. *Kovacs LH, Kloeppel M, Papadopulos NA, Reeker W, Biemer E.* Necrotizing fasciitis. Ann Plast Surg 2001; 47(6): 680–2.
11. *Camporesi EM,* editor. Hyperbaric oxygen therapy: a comitee report. Kensingtony: Undersea and Hyperbaric Medical Society (UHMS); 1996.
12. *Zoranović U.* Determination of the effects of hyperbaric oxygenation in the treatment of the chronic occlusive low leg arterial diseases using 99mTc perfusion radionuclide inaging [thesis]. Belgrade; Military Medical Academy; 2006. (Serbian)
13. *Pizzorno R, Bonini F, Donelli A, Stubinski R, Medica M, Carmignani G.* Hyperbaric oxygen therapy in the treatment of Fournier's disease in 11 male patients. J Urol 1997; 158(3 Pt 1): 837–40.
14. *Korhonen K, Hirn M, Niinikoski J.* Hyperbaric oxygen in the treatment of Fournier's gangrene. Eur J Surg 1998; 164(4): 251–5.
15. *Mindrup SR, Kealey GP, Fallon B.* Hyperbaric oxygen for the treatment of fournier's gangrene. J Urol 2005; 173(6): 1975–7.

The paper was receives on May 9, 2008.