

## MANAGEMENT OF FOURNIER'S GANGRENE: CASE REPORT AND LITERATURE REVIEW

Josip Katušić<sup>1</sup>, Goran Štimac<sup>1</sup>, Goran Benko<sup>2</sup>, Igor Grubišić<sup>1</sup>, Šoip Šoipi<sup>1</sup> and Jordan Dimanovski<sup>1</sup>

<sup>1</sup>University Department of Urology, Sestre milosrdnice University Hospital, Zagreb; <sup>2</sup>Department of Urology, Varaždin General Hospital, Varaždin, Croatia

**SUMMARY** – A 65-year-old man was referred to our department with clinical signs of septic shock and necrotizing soft tissue infection of the scrotal, perianal and right inguinal region. Initial presentation was a typical Fournier's gangrene. Because of the life-threatening condition, the initial treatment was extensive removal of necrotic tissue. Antibiotic therapy was administered and several debridements of the wound were done afterwards. Three weeks after the initial treatment, wide wound defects of the perianal, scrotal and inguinal regions were closed secondarily and the patient was discharged from the hospital. Fournier's gangrene is a surgical emergency. Although rare, it remains a life-threatening disease. Rapid and accurate diagnosis remains the key component in achieving successful outcome. Early aggressive surgical intervention together with fluid, hemodynamic and nutritional support and broad-spectrum antibiotics is the essential management to reduce mortality.

**Key words:** *Fournier gangrene – diagnosis; Fournier gangrene – surgery; Fournier gangrene – therapy; Debridement; Emergencies; Acute disease; Case report*

### Introduction

Fournier's gangrene is a necrotising fasciitis involving the genital, perianal or perineal regions. The infective process leads to thrombosis of subcutaneous blood vessels, resulting in gangrene of the overlying skin. Early recognition of this condition with prompt surgical treatment and early antibiotics make the cornerstone in its management. Jean Alfred Fournier, a Parisian dermatologist and venereologist was the first to describe this condition in a specific region of the body, i.e. scrotum in 1883<sup>1</sup>. The infection may spread along subcutaneous planes and result in tissue necrosis. Infections are usually polymicrobial. The organisms most commonly isolated from wound cultures include *Bacteroides*, coliforms, *Streptococcus*, *Staphy-*

*lococcus*, and *Peptostreptococcus*. Anorectal infections, genitourinary infections, and cutaneous injuries are the most common sources of infection in necrotizing genital gangrene. Among gastrointestinal causes (30% to 50%), ischioanal, perianal, and intrasphincteric abscesses account for approximately 70%<sup>2</sup>. Necrotizing gangrene has also been reported to be secondary to minor anorectal procedures such as rectal mucosal biopsy, anal dilation, and hemorrhoidectomy as well as appendicitis, colorectal malignancy, and diverticulitis. Genitourinary foci comprise the second major source of initial infection (20% to 40%); underlying urethral stricture and periurethral infection are most common. Urologic conditions also associated include urethral trauma and instrumentation, indwelling urethral catheters, urethral calculi, epididymitis, prostate biopsy and massage, and bladder cancer extension<sup>2</sup>. Cutaneous injuries and infection account for 20% of cases. Malnutrition, AIDS, malignancy, renal failure, and immunosuppressive chemotherapy are other risk factors<sup>2</sup>. As tissue necrosis progresses, normal flora in-

Correspondence to: *Josip Katušić, MD*, <sup>1</sup>University Department of Urology, Sestre milosrdnice University Hospital, Vinogradska c. 29, HR-10000, Zagreb, Croatia  
E-mail: josip.katusic@zg.t-com.hr

Received April 6, 2010, accepted November 11, 2010

Table 1. Fournier's gangrene – causative bacteria

Gram-negative bacteria	Gram-positive bacteria	Anaerobic bacteria	Fungi
<i>Fusobacterium</i>			
<i>Salmonella</i>			
<i>Escherichia coli</i>			
<i>Enterobacter</i>	<i>Streptococcus</i>		
<i>Proteus</i>	(not group A)	<i>Bacterioides</i>	<i>Candida</i>
<i>Klebsiella</i>	<i>Staphylococcus</i>	<i>Clostridium</i>	<i>Histoplasma</i>
<i>Serratia</i>	<i>Corynebacterium</i>	<i>Peptococcus</i>	<i>Cryptococcus</i>
<i>Pseudomonas</i>	<i>Streptococcus</i> group A		
<i>Shigella</i>			
<i>Neisseria</i>			
<i>Pasteurella</i>			

vades in a perifascial fashion and colonizes previously sterile sites. With continued bacterial overgrowth and bacterial synergy, oxygen tension decreases and local ischemia develops, allowing for proliferation of anaerobic organisms. Detailed bacteriologic studies have revealed the infections to be polymicrobial. The organisms most commonly isolated from wound cultures include *Bacteroides*, coliforms, *Streptococcus*, *Staphylococcus*, and *Peptostreptococcus*; anaerobes are less reliably isolated but invariably present (Table 1)<sup>2,3</sup>. Anorectal infections are typically caused by monobacterial anaerobes, clostridial and nonclostridial gas-formers, and aerobic-anaerobic combinations. Urinary pathogens usually include streptococci, staphylococci, and gram-negative rods, while cutaneous infections involve skin flora such as staphylococci<sup>2,3</sup>. Infections originating in the anorectal region first penetrate sphincteric musculature. Then, the infection spreads along the perianal region and may extend along Colles' fascia. While lateral spread is prevented by attachments of Colles' fascia, anterior and superior extension along dartos and Scarpa's fasciae is unhindered<sup>2</sup>. Alternatively, anorectal infection may spread through the urogenital diaphragm to the perivesical space, then to the scrotum *via* the spermatic fascia. Most cases of necrotizing gangrene, regardless of location, begin insidiously. Patients initially complain of scrotal discomfort and associated malaise. As the infection worsens, fever and chills develop with genital skin changes. Scrotal swelling is usually present with erythema and increased pain. However, the skin can appear relatively normal, which may account for the

delay in presentation after the onset of symptoms, usually averaging 5 days. In addition, the pain may subside as pressure necrosis and infection of cutaneous nerves take place. Signs and symptoms frequently found at presentation include pain (100%), swelling (80% to 100%), fever (60% to 80%), and crepitus (60% to 70%)<sup>2</sup>. Systemic manifestations, such as overt shock and altered mental status, do not often correlate with physical findings and must be recognized early.

### Case Report

A 65-year-old man was transferred to our hospital with clinical signs of septic shock and necrotizing soft tissue infection of the scrotal and perianal regions and right inguinal region. One year before, inoperable colorectal carcinoma with the possible pulmonary metastases was diagnosed and definitive anus praeter sigmoideus was formed. At the time of admission, the patient was septic with temperature of 38 °C. The patient denied dysuria frequency or urethral discharge and had suffered no local trauma to the scrotum recently. He had well-demarcated necrosis of the scrotum, perianal and right inguinal region (Fig. 1). Fournier's gangrene was suspected based on these findings. Progression of rectal carcinoma was confirmed with digitorectal examination. Due to life-threatening status, the patient was transferred immediately to the operating room to remove necrotic tissue. The area was cleaned with antiseptic solution and urinary catheter was placed. Blood and wound cultures were taken. The involved nonviable soft tis-



Fig. 1. Initial presentation of the patient with Fournier's gangrene. Before surgery, considerable edema and scrotal necrosis with gas are seen.

sue areas were debrided and necrotic tissue was excised. Hydrogen peroxide and iodine-povidone solutions were used for local wound care. The wound was left open, covered by gauzes impregnated with normal saline. After initial prompt fluid resuscitation, antibiotic therapy with gentamicin, metronidazole and cefuroxime was started. The patient had penicillin allergy in his history. On the next day, the patient had second debridement, became afebrile and remained so until discharge (Fig. 2). After two days, blood culture



Fig. 2. Perineal and inguinal areas after repetitive extensive debridements of the liquefied necrosis and necrotic fascial tissues. The patient is prepared for reconstructive surgery with exposed testicles.



Fig. 3. Postoperative view of reconstructed anogenital and inguinal region. Right testicle was removed.

was positive and *Escherichia coli*, susceptible to the antibiotic therapy administered, was found. Seventeen days of the first operation, wide wound defects of the perianal, scrotal and inguinal regions were closed secondarily. Small wounds healed by second intention. During this procedure, right orchiectomy was performed because of necrosis (Fig. 3). In wound culture, *Pseudomonas aeruginosa* susceptible to ceftazidime was found. The patient did well after the surgery and no further wound debridement was required. After 23 days, the patient was discharged from the hospital. Two months after the surgery, genital and inguinal region completely healed (Fig. 4).



Fig. 4. Healed genital and inguinal region two months after surgery.

**Discussion**

Fournier's gangrene is described as a fulminant infection of the perineum and abdominal wall, and the scrotum and penis in men. Analysis of the predisposing and accompanying conditions suggests that most cases occur as a result of the one of three mechanisms: trauma to the area, providing access of organisms to the subcutaneous tissues; extension from urinary tract infection, probably most commonly a periurethral gland infection, with dissection along the fascial planes involving the penis and scrotum; and extension of infection from the perianal area or, less commonly, the retroperitoneal space along fascial planes to the penis and scrotum<sup>4</sup>. Other predisposing conditions include diabetes mellitus, chronic alcoholism, malignancy and immunosuppression, prior prolonged hospitalization, and prior surgical intervention<sup>5</sup> (Table 2). Colorectal causes of Fournier's gangrene include carcinoma of the sigmoid colon and rectum, colonic anastomotic dehiscence, appendicitis, perforated sigmoid diverticulitis and rectal perforation by foreign body<sup>6</sup>. Colorectal lesions are the most common foci of sepsis<sup>7</sup>. The precise etiology of Fournier's gangrene remains unclear<sup>8</sup>. The disease commonly begins locally with discomfort, itching and swelling of the scrotum and perineum. At presentation, edema and crepitus may be noted with systemic symptoms of fever, leukocytosis, anemia and electrolyte abnormalities. Before entering the operating room, all patients undergo aggressive fluid resuscitation, broad-spectrum anti-

microbial therapy and hemodynamic support if needed. Early diagnosis and urgent debridement are necessary to control the associated septic process and improve the chances for survival<sup>9</sup>. The most widely used agents for local wound care are hydrogen peroxide and iodine-povidone solutions. Hydrogen peroxide solution generates nascent oxygen, which helps destroy anaerobic organisms<sup>7,9</sup>. It is necessary to determine the extent of disease and to identify any underlying colorectal or urogenital pathology. The testes are rarely affected owing to the abdominal source of their blood supply. If they are involved, intra-abdominal pathology should be suspected<sup>10</sup>. The patient should undergo orchiectomy when severe infection in the peritesticular tissues is observed intraoperatively, even though the testicular tissues were not found to be involved histologically. Because most patients require more than one debridement, primary closure of skin defects is impossible during the initial surgery; furthermore, patients have various sizes of skin defects following multiple debridements. Although most authors suggest that defects should be closed by secondary healing, the number of institutions that prioritize reconstructive surgery is not small<sup>8</sup>. The disease still has a high mortality rate for delayed patients. The causes of death include severe sepsis, coagulopathy, acute renal failure and multiple organ failure<sup>7</sup>. Hyperbaric oxygen therapy could be an optional therapy; it may optimize neutrophil function and inhibit anaerobic growth and should be used as an adjuvant to surgery<sup>7</sup>. The patient from this case report was treated success-

*Table 2. Fournier's gangrene – predisposing conditions*

	Genitourinary	Gastrointestinal	Obstetric/Gynecologic
Pathologic	Infection	Anorectal abscess	
	Trauma	Ischiorectal abscess	
	Urethral stricture	Perianal fistula	Post-coital
	Periurethral abscess	Hemorrhoids	Vulvar abscess
	Epididymitis	Perforated rectal carcinoma	Bartholin's gland abscess
	Paraphimosis	Rectal perforation by foreign body	Septic abortion
	Soft tissue injuries	Perforated sigmoid diverticulitis	
	Post-coital		
Procedural	Postoperative TURP	Anoscopy/sigmoidoscopy	Hysterectomy
	Traumatic catheterization	Colonoscopy	Cervical/pudendal nerve block
		Postoperative Anastomotic dehiscence	Postoperative Episiotomy
			Pelvic exenteration

fully in accordance with current therapeutic concepts, hemodynamic stabilization, broad-spectrum antimicrobial chemotherapy, and efficient surgical excision to remove all devitalized tissue.

## Conclusion

Fournier's gangrene is a surgical emergency. Although rare, it remains a life-threatening disease. Many patients may present with only minor skin lesions in the early stages of the disease. Rapid and accurate diagnosis remains the key component in achieving a successful outcome. Early aggressive surgical intervention together with fluid, hemodynamic and nutritional support, and broad-spectrum antibiotics is the essential management to reduce mortality.

## References

1. EFEM SE. The features and aetiology of Fournier's gangrene. *Postgrad Med J* 1994;70:568-71.
2. MENG MV, McANINCH JW. Necrotizing gangrene of the genitalia and perineum. *Infect Urol* 1999;12:132-40.
3. CHAMPION SE. A case of Fournier's gangrene. *Urol Nurs* 2007;27:296-9.
4. KILIÇ A, AKSOY Y, KILIÇ L. Fournier's gangrene: etiology, treatment and complications. *Ann Plast Surg* 2001;47:523-7.
5. TLEYJEH MI, ROUTH J, QUTUB OM, LISCHER G, LIANG VK, BADDOUR ML. *Lactobacillus gasseri* causing Fournier's gangrene. *Scand J Infect Dis* 2004;36:501-3.
6. LEHNHARDT M, STEINSTRASSER L, DRUECKE D, MUEHLBERGER T, STEINAU UH, HOMANN HH. Fournier's gangrene after Milligan-Morgan hemorrhoidectomy requiring subsequent abdominoperineal resection of the rectum: report of a case. *Dis Colon Rectum* 2004;47:1731-2.
7. ATAKAN IM, KAPLAN M, KAYA E, AKTOZ T, INCI O. A life threatening infection – Fournier's gangrene. *Int Urol Nephrol* 2002;34:387-92.
8. CORMAN JM, MOODY JA, ARONSON WJ. Fournier's gangrene in a modern surgical setting: improved survival with aggressive management. *BJU Int* 1999;84:85-8.
9. 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;30:1750-4.
10. AHO T, CANAL A, NEAL DE. Fournier's gangrene. *Nat Clin Pract Urol* 2006;3:54-7.

## Sažetak

### LIJEČENJE FOURNIEROVE GANGRENE: PRIKAZ SLUČAJA I PREGLED LITERATURE

J. Katusić, G. Štimac, G. Benko, I. Grubišić, Š. Šoipi i J. Dimanovski

Šezdesetpetogodišnji muškarac je primljen u našu ustanovu s kliničkom slikom septičkog šoka i nekroze u skrotalnom, perianalnom i desnostranom ingvinalnom području. Postavljena je dijagnoza Fournierove gangrene. Zbog lošeg općeg stanja bolesnik je odmah kirurški zbrinut, učinjena je opsežna nekrektomija. Antibiotička terapija je ordinirana, a nakon prve operacije je učinjeno nekoliko debridmana rane. Sedamnaest dana nakon operacije su postavljeni sekundarni šavi, a 23. dana bolesnik je otpušten na kućnu njegu. Fournierova gangrena je hitno kirurško stanje te, iako je rijetka, predstavlja tešku i za život opasnu bolest. Brza i točna dijagnostika uz agresivnu kiruršku terapiju i opetovane debridmane te antibiotici širokog spektra i dalje su ključ uspješnog liječenja.

Ključne riječi: *Fournierova gangrena – dijagnostika; Fournierova gangrena – kirurgija; Fournierova gangrena – terapija; Debridman; Hitni slučajevi; Akutna bolest; Prikaz slučaja*

