

# Fournier's Gangrene: Series of Twenty Patients

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## Key Words

Fournier's gangrene · Predisposing factors · Effective factors, on survey

## Abstract

**Background and Purpose:** Fournier's gangrene (FG) is a rare, rapidly progressive, fulminant form of necrotizing fasciitis of the genital, perianal and perineal regions. Our aim is to investigate the clinical signs, symptoms and factors which affect the clinical results of patients with FG in our clinic. **Patients and Methods:** 20 patients having FG were admitted to our department during the past 6-year period. Age, gender, diabetes mellitus (DM), duration of symptoms, FG severity index score (FGSIS), colostomy, hospitalization time and number of debridements were investigated for their effects. **Results:** 13 of our patients were male, 7 of them were female. The mean age was 52.2 years (range: 30–80 years). 85% of our patients had DM as a predisposing factor. The mean hospitalization time was 19.7 days (range: 6–45 days), and overall mortality was 20% (4 patients). Age and FGSIS have been found to be statistically significant factors among the parameters studied. **Discussion:** FG is still an important disease with high mortality rates in spite of the developments in in-

tensive care units and new-generation antibiotics. In conclusion, we have found that the age and FGSIS of the patient are the most important effecting factors.

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## Introduction

Necrotizing fasciitis is a rapidly progressive infection that involves subcutaneous fat and spreads along the fascial planes. Fournier's gangrene (FG) is necrotizing fasciitis of the perineal, genital or perianal regions [1–3]. It was first reported by Baurienne in 1764, but Jean Alfred Fournier gave this infectious disease its eponymous name in 1883 [4]. It spreads from the external genitalia through the inguinal region towards the thighs and finally to the peritoneum along the fascia [5]. The disease is not limited to young individuals, nor is it limited to men [6]. Anorectal and urogenital infections and trauma play an important role in the etiology. Diabetes mellitus (DM), steroid use, older age, chronic ethanol abuse, malignancies, liver and kidney diseases, local traumata and obesity have been found as risk factors for FG [7–11].

The treatment of choice for FG is aggressive surgical debridement [12]. Despite the development of knowledge regarding the etiology, diagnosis, treatment and intensive care techniques, the mortality rate of FG patients is still approximately 15–50% [2, 13, 14]. In this study, we retrospectively investigated data on localization, bacteriology, risk factors, management and complications in a series of 20 patients with FG.

## Patients and Methods

After having acquired ethical approval, institutional review board data were collected from patients with FG who were treated between 2003 and 2008 in the Vakif Gureba Training and Research Hospital 2nd Department of General Surgery. The study was designed as a retrospective study. Patient charts were reviewed and the parameters such as age, gender, predisposing condition, localization, duration of symptoms, isolated microorganism, FG severity index score (FGSIS), necessity of diverting colostomy, hospitalization time, number of debridements, morbidity and mortality rates were recorded. Age, gender, DM, duration of symptoms, FGSIS, colostomy, hospitalization time and number of debridements were investigated for their effects on clinical results.

The diagnosis of FG was based on patient history, clinical symptoms and findings, i.e. rash, swelling and erythema. In the beginning, 3rd-generation cephalosporin and metronidazole were used for treatment, and antibiotherapy was adjusted according to culture results. Colostomies were closed 8 weeks after discharge from the hospital.

All data were collected and analyzed by using SPSS version 11.0. For nonparametric data, statistical evaluations were performed by Fisher's exact test, and for parametric data, statistical evaluations were performed by Student's t test and multivariate regression analysis within the groups.  $p < 0.05$  was considered to be statistically significant.

## Results

### Patient Demographics

Seven of our patients were female, 13 of them were male. The mean age was 52.2 years (range: 30–80 years). Seventeen of them had DM. All of the nonsurvivors had DM. Perianal and genital regions were most commonly involved, with 7 patients each; perineal site involvement followed, affecting 6 patients. The duration of symptoms was 7.1 days (range: 3–20 days) for discharged patients, 13 days (range: 5–30) for deceased patients. A variety of organisms were cultured from purulent or necrotic tissue. More than 1 type of microorganism was isolated in the tissue cultures of 15 patients (75%). The most common bacterial isolate was *Escherichia coli*. The patients' clinical features are summarized in table 1.

### Surgery

All 20 patients underwent aggressive surgical debridement, and additional debridements were performed, if necessary. Diverting colostomies were performed in 7 patients and were closed 2 months after discharge from the hospital. Colostomy was performed on the patients with gangrene involving the anal sphincter, and on those with inevitable fecal contamination.

### Outcome

Of the 20 patients evaluated, 4 died (20%) and 16 survived (80%). Sepsis and multiorgan failure were the causes of death in 3 patients, 1 patient died due to cardiopulmonary dysfunction. There was no statistically significant difference in gender, DM, duration of symptoms, colostomy, hospitalization time and number of debridements between survivors and nonsurvivors ( $p > 0.05$ ). There was a statistically significant difference in terms of age between survivors and nonsurvivors ( $p = 0.007$ ). The FGSIS were calculated as 4.8 in survivors and 15.2 in nonsurvivors. There was a statistically significant difference in FGSIS between survivors and nonsurvivors ( $p = 0.00002$ ). The results are shown in table 2.

## Discussion

The pathognomonic histological findings on FG are necrosis of the superficial and deep fascial planes, fibrinoid coagulation of the nutrient arterioles, intact epidermis, polymorph nuclear cell infiltration, and microorganisms identified within the involved tissues [15]. In spite of development in medical treatment and intensive care procedures, FG is still a mortal disease. The rates fell in time parallel to the developments in medicine. The mortality rates reported were 8.8% in Basoglu et al. [6], 22.7% in Kuo et al. [4], 40% in Yanar et al. [7] and 16% in the study by Eke [16]. In the present study, the mortality rate found was slightly high (20%). This situation may be related to having a relatively lower patient number or to the high mean age in our series.

In the literature, of the factors that affected results, age was considered to be one. Clayton et al. [17] and Laor et al. [18] have shown that survivors were statistically younger than nonsurvivors, and according to Sørensen et al. [19], increasing patient age was associated with increased mortality. In contrast, Yenyol et al. [20] and Corcoran et al. [10] have shown no statistical difference between survivors and nonsurvivors in age. In our study, however, we

**Table 1.** Clinical features of 20 cases of FG

Sex; age years	Predisposing conditions	Localization	Duration of symptoms days	Isolated microorganisms	FGSIS	Colostomy	HT days	ND	O
M; 48	DM	perianal	7	<i>Streptococcus</i> sp. <i>E. coli</i>	5	+	45	5	DS
F; 50	DM	perineal	5	<i>E. coli</i> <i>Corynebacterium</i> sp.	4		10	1	DS
M; 52	DM	perianal	4	<i>Peptostreptococcus</i> <i>E. coli</i>	6	+	35	3	PS
M; 57	steroid use	genital	7	<i>Bacteroides</i> <i>E. coli</i>	3		10	1	PS
M; 55	chronic liver disease	perineal	6	MRSA	4		10	1	PS
M; 54	alcoholism	genital	5	<i>E. coli</i>	6	+	36	2	PS
M; 51	DM	perianal	7	<i>Klebsiella</i> <i>Proteus</i> sp.	7	+	36	2	DS
M; 41	DM	perianal	7	<i>E. coli</i>	4		12	1	DS
F; 50	DM	perianal	10	<i>Enterococcus</i> <i>Acinetobacter</i>	6		29	5	DS
M; 54	DM	genital	7	<i>Candida albicans</i> <i>Lactobacillus</i>	15	+	17	3	D
F; 70	DM	genital	10	<i>C. albicans</i>	18	+	18	1	D
M; 58	DM	perianal	20	<i>Klebsiella</i> <i>E. coli</i>	3		11	1	DS
F; 59	DM	perianal	7	<i>E. coli</i> <i>Klebsiella</i> <i>Corynebacterium</i> sp.	4		23	4	DS
F; 80	DM	genital	5	<i>Lactobacillus</i> <i>Klebsiella</i>	14	+	19	3	D
F; 49	DM	perineal	7	<i>Proteus</i> sp.	2		6	1	DS
M; 30	DM	perineal	6	<i>Staphylococcus</i> sp. <i>Enterococcus</i>	2		11	3	DS
F; 56	DM	genital	30	<i>Corynebacterium</i> sp. <i>E. coli</i>	14		30	4	D
M; 49	DM	perineal	3	<i>Corynebacterium</i> sp. <i>E. coli</i>	5		8	1	DS
M; 30	DM	genital	7	<i>Staphylococcus</i> sp. <i>C. albicans</i>	6		11	1	DS
M; 52	DM	perineal	7	<i>Clostridium perfringens</i> <i>E. coli</i>	11		17	2	DS

HT = Hospitalization time; ND = number of debridements; O = outcome; MRSA = methicillin-resistant *S. aureus*; DS = discharged; PS = plastic surgery; D = died.

also observed a significant difference in age between the survivors and nonsurvivors.

FG must be diagnosed and treated immediately. FG usually begins and progresses suddenly. The duration of symptoms before being admitted to hospital was 6.4 days

and 3.5 days according to Basoglu et al. [6] and Yanar et al. [7], respectively. Unalp et al. [11] recorded no deaths of patients who had been admitted to hospital in the first 48 h after symptom onset, leading them to state that earlier admission may lower the mortality rate. In our series,

the duration of symptoms before being admitted to hospital was 7.1 days for survivors, and 13 days for nonsurvivors. But this difference was not found to be statistically significant.

Debridement is urgently needed to control the associated septic process and improve the chances of survival. Some authors advocate the debridement of both the tissue with apparent necrosis and the tissue with doubtful viability and extension to healthy areas [21]. In our study, due to great tissue loss after debridement, 4 of our patients were transferred to the plastic surgery department for reconstruction; other patients were left to secondary wound healing. Chawla et al. [22] found that survivors had a mean number of 2.3 surgical debridements compared to 5.2 in nonsurvivors. In this study, the mean number of debridements was 2.1 in the survivors, and 2.7 in nonsurvivors; however, the difference was not statistically significant.

Many etiological and predisposing factors have been advocated for the development of FG, of which the most important are urologic and colorectal portal-related factors together with local trauma of the genital, perianal and perineal areas [23]. Predisposing factors for FG include DM, cardiac disorders, chronic obstructive pulmonary disease, alcoholism and cortisone treatment [8, 24]. Although the relationship between FG and DM has not been established, neuroangiopathy and immunosuppression associated with DM could play an important role. Yanar et al. [7] reported DM in 46% of the FG patients. DM was the leading predisposing factor at a rate of 85% in our series. All the nonsurvivors had DM. Various bacteriologic agents have been identified in patients with FG. Gram-negative enteric bacilli and Gram-positive cocci have been identified in the majority of patients [25]. In our study, 75% of the cases were polymicrobial and 25% were monobacterial. The most common bacterial isolate was *E. coli*.

**Table 2.** Effective and noneffective factors

	Survivors (n = 16)	Nonsurvivors (n = 4)	p
Mean age, years	49.06	65	0.007
Gender			
Male	12	1	NS
Female	4	3	
DM, n	13	4	NS
Duration of symptoms, days	7.1	13	NS
FGSIS	4.8	15.2	0.00002
Colostomy, n	4	3	NS
Hospitalization time, days	19.3	21	NS
Number of debridements	2.1	2.7	NS

NS = Nonsignificant.

In recent years, the FGSIS has been developed. The temperature, heart rate, respiratory rate, serum sodium, serum potassium, serum creatinine, hematocrit, white blood cell count and serum bicarbonate were all measured, assigned a value of 0–4 based on the degree of deviation from normal, and then totaled [6, 10]. In our study, the FGSIS was 8.75 in survivors and 18.5 in nonsurvivors. This difference was found to be statistically significant ( $p = 0.00002$ ).

In our study, DM was the strongest predisposing factor. For this reason, we think that it is very important to especially educate DM patients on FG. Even though age and FGSIS were found to be the effective factors, we still think that early diagnosis and early onset of treatment are the other effective factors in the outcomes.

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