

Fournier's gangrene: A retrospective analysis of 26 cases in a Canadian hospital and literature review

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Abstract

We performed a systematic review of all cases of Fournier's Gangrene (FG) at our hospital over a 12-year period. A total of 26 cases were assessed. Our goal was to determine the mortality rate and to identify risk factors associated with FG. We also wanted to examine three potential prognostic factors in relation to patient survival, including the time delay from emergency room admission to surgery, the initial extent of the disease, and the impact of more than one debridement procedure under general anesthesia. The time between emergency room admission and the beginning of surgical debridement was not statistically different between survivors and non-survivors. The extent of surgical debridement was close to the margin of statistical significance ($p = 0.07$) and can be considered an index of the extent of the disease. FG extending to the thighs or to the abdominal wall carries a worse prognosis. The number of surgical debridement procedures done under anesthesia was statistically different between survivors and non-survivors. Patients were 4.8 times more at risk of dying if they are required to have more than one surgical debridement under general anesthesia. This presumably reflects persistent gangrene following initial surgical debridement, fluid resuscitation, and wide spectrum antibiotic treatment.

Introduction

Fournier's gangrene (FG) is a rapidly spreading polymicrobial necrotizing fasciitis affecting the perineum, scrotum, and penis in men, but it has also been described in women and children.¹ FG can spread to the anorectal area, thighs, and to the abdominal wall. Baurienne first reported the disease in 1764, but it was a French dermatologist, Dr. Jean Alfred Fournier, who described the disease in great detail by reporting 5 cases in 1883. The disease process involves an entry point for microorganisms (rupture of skin) with

synergistic polymicrobial infection leading to obliterative endarteritis of subcutaneous arteries, necrosis of skin, subcutaneous tissues, fat, muscles, fasciae with suppuration and gas formation. Although considerable progress has been made in the treatment of this disease, it remains a serious and debilitating condition with a high mortality rate.

In a review of 1726 cases of FG, Elk reported an overall mortality of 16%.¹ However, considerable variability exists and authors have reported mortality rates ranging from 10% to 80%.²⁻⁹ To our knowledge no prospective studies have been done on FG. Retrospective research has been directed to identifying both risk factors associated with the onset of FG and prognostic factors relating to patient survival.

We performed a systematic review of all cases of FG at our hospital over a 12-year period. Our goal was to determine the mortality rate in our hospital and to identify risk factors associated with FG. We also wanted to examine three potential prognostic factors: (1) the time delay from emergency room admission to surgery; (2) the initial extent of the disease; and (3) the impact of more than one debridement procedure under general anesthesia in relation to patient survival.

Methods

We reviewed the English medical literature in PubMed with the terms "Fournier's gangrene and review" for the last 15 years to identify recent literature pertaining to the diagnosis and treatment of FG. This review allowed us to identify known risk and prognostic factors to guide our own research.¹⁻⁴⁰ Risk factors involve systemic and non-systemic diseases. Systemic risk factors include cardiovascular disease, diabetes, morbid obesity, renal/hepatic failure, alcoholism, active cancer/chemotherapy, HIV, and steroid use. Non-systemic risk factors are related to cutaneous rupture and include urologic diseases, such as urethral strictures, skin surgery or trauma, and anorectal conditions, such as anal abscess.¹⁻⁹

We then retrospectively reviewed the charts of all patients treated for FG from January 2000 to January 2012 at our hospital. The diagnosis of FG was based on clinical examination, which showed skin necrosis and was confirmed under anaesthesia when the skin incision revealed the gray-black appearance of gangrenous tissue along with purulence. A total of 26 cases of FG were assessed. The following data were collected for each patient: (1) demographics (age, occupation, marital status); (2) clinical features (comorbidities, etiologies, microbiological results and antibiotics, time from emergency room admission to surgery); and (3) surgical parameters (duration of surgery, number and extent of debridement surgeries, need of other surgical specialist). Etiologies were classified the following way: active skin or wound infection, abscess (scrotal/perianal), genitourinary source, rectal/colorectal source, trauma, postoperative complication, and undetermined. Lastly, debridement extent was categorized as being peno-scrotal only, extending down to lower limbs or extending up to the abdomen. The 90-day mortality rate was calculated. For this single parameter analysis, one patient was excluded because of missing information. Means, medians, and frequencies were calculated. The statistical significance of differences in the distribution of major variables was tested using the chi-square test. Statistical significance was determined at $p < 0.05$. All statistical tests were performed using Statistical Package for Social Science (SPSS Inc., 20.0 for Mac).

Results

In total, 26 male patients were diagnosed and treated at our hospital over a 12-year period from 2002 to 2012 (Table 1). Statistical analysis was performed to determine prognostic factors, which may have distinguished survivors and non-survivors. The only statistically significant predictor of mortality in our series was the number of debridement surgeries performed on each patient. Patients were 4.8 times more at risk of dying if they were required to have more than one surgical debridement under general anesthesia.

The median time between admission to the emergency department and the urology consult was available for 21/26 patients and was 5 hours, 7 minutes (range: 30 minutes–97 hours, 48 minutes). The median time from the initial urology consult to surgical debridement was 3 hours, 22 minutes (range: 1–48 hours). One patient was excluded from this analysis because of insufficient information. In one case, the time from the urology consult to surgery was long (48 hours). This delay occurred because initially the patient presented with scrotal cellulitis and it was during repeat physical exams that skin necrosis was noted thus confirming the diagnosis of FG. The time between emergency room admission and the beginning of surgical debridement was not statistically significant between sur-

vivors and non-survivors (Table 1). The extent of surgical debridement most often involved the peno-scrotal area (25/26, 96.15% of patients), but both the anal/perineal (13/26, 50%) and the colorectal areas (9/26, 34.6%) were often involved in the fasciitis. Fasciitis extended less often to the lower limbs (5/26, 19.2%) and to the abdominal wall (4/26, 15.4%). Most patients underwent only one surgical debridement (20/26, 76.9%). Three patients underwent 2 surgical debridements, 2 patients were operated 3 times, and 1 patient was operated 4 times. As expected, microbiological analysis revealed a polymicrobial disease. All but one of the patients was managed with the help of a microbiological consultant. Histological analysis confirmed inflammatory cell infiltration and necrotic tissue.

In our series 5 patients died within a 90-day interval, giving an overall mortality rate of 20%. Specific causes of death involved 2 patients with septic shock, 1 patient with cardiorespiratory arrest during surgery and 1 patient who refused a second surgical intervention and died of septic complications related to FG. This patient was included in our statistical analysis as having undergone only 1 surgical debridement. One patient died within 90 days after surgery, but we were unable to determine the cause of death and no autopsy was performed.

Discussion

Although considerable progress has been made in the treatment of FG, it remains a serious and debilitating condition with a high mortality rate. We performed a systematic review of 26 case records at our hospital over a 12-year period between 2000 and 2012. Our goal was to determine the mortality rate in our hospital and to identify risk factors associated with FG. We also wanted to examine possible prognostic factors related to patient survival. In particular we wanted to examine the time delay from emergency room admission to surgery, the initial extent of the disease, and the impact of more than one debridement procedure under general anesthesia.

Demographics

In total, 26 male patients were diagnosed and treated at our hospital over a 10-year period ranging from 2002 to 2012. Statistical analysis of our demographic data did not reveal any significant difference between survivors and non-survivors (Table 1).

Time to surgical debridement

We studied the time lapse between the initial arrival of the patient in the emergency room, the ensuing urology consult, and the start of the surgical debridement for 20/26

Table 1. Statistical analysis

	Survivors (n = 20)	Non-survivors (n = 5)	p value
Age (mean, median)	55, 57	60, 62	0.69
Etiologies			
Skin wound/infection	9 (45%)	2 (40%)	
Abscess	5 (25%)	2 (40%)	
Postoperative complication	1 (5%)	0	0.7
Genitourinary source	2 (10%)	0	
Anorectal/colorectal source	2 (10%)	0	
Trauma	1 (5%)	1 (20%)	
No. debridement surgeries			
1	17 (85%)	2 (40%)	0.04
2 or more	3 (15%)	3 (60%)	
Time (hours) between ER admission and surgery (mean, median)	16.36, 8.95	45.03, 48.0	0.50
Extent of debridement			
Peno-scrotal ± anal/perirenal	13 (65%)	1 (20%)	0.07
Beyond	7 (35%)	4 (80%)	

ER: emergency room.

patients. Six charts were incomplete. Statistical analysis did not reveal any significant difference between survivors and non-survivors for this parameter. Nonetheless, the delay from onset of symptoms to surgery could be an important prognostic factor.^{19,23,31,39}

Extent of disease

Although many studies have reported the extent of disease to be a significant parameter between survivors and non-survivors,^{21,22,30-33,39} others have not found this parameter significant.^{17,28} Extent of surgical debridement was categorized as being peno-scrotal only, extending down to lower limbs or extending up to the abdomen. The extent of surgical debridement is a reflection of the extent of the disease. Statistical analysis did not reveal any significant difference between survivors and non-survivors in regards to surgical extent. However, this parameter was very close to significance ($p = 0.07$). FG extending to the thighs or to the abdominal wall carries a worse prognosis.

Number of surgical debridement procedures

Most patients underwent only one surgical debridement (20/26, 76.9%). Three patients underwent 2 surgical debridement procedures, 2 patients were operated 3 times, and 1 patient was operated 4 times. The decision to perform additional surgical debridements was made at the bedside when there was a persistent sign of tissue necrosis or of spreading cellulitis. The number of surgical debridement procedures done under anesthesia was statistically significant different between survivors and non-survivors ($p = 0.04$, Table

1). Mortality risk was increased in patients who required more than one surgical debridement under general anesthesia. Some authors have reported a relation between the number of surgical debridements and survival,²⁶ but some authors disagree.^{28,34} In our series, patients are 4.8 times more at risk of dying if they were required to have more than one debridement under general anesthesia. This presumably reflects persistent gangrene following initial extensive surgical debridement, intensive fluid resuscitation, and wide spectrum antibiotic treatment. As a corollary, it has become evident that a second-look procedure under general anesthesia was not always mandatory since most survivors underwent only one surgical debridement under anesthesia. It has been suggested that all patients should undergo a second look under general anesthesia and that these patients have a lower mortality rate,³ but our data did not support this statement. While the repeated nature of debridements may be considered the accepted standard of care in these patients, this is not always predictive of outcome.³⁴ From our experience, a good visualization of the surgical wound at the patient's bedside and follow-up of the patient's hemodynamic parameters are sufficient to determine the necessity of an additional debridement procedure. If the wound cannot be well-evaluated or if the patient is hemodynamically unstable, then a second-look exam should be done in the operating room.

Mortality

The 90-day mortality was determined in 25/26 patients. For this single parameter analysis, 1 patient was excluded because of insufficient information. Five deaths occurred in our series, yielding a mortality rate of 20%.

Conclusion

Our retrospective study of 26 consecutive patients at a single institution over a 12-year period helped us study both risk and prognostic factors related to patient survival. Five deaths occurred in our series, yielding a mortality rate of 20%. Statistical analysis of our demographic data (age, occupation, marital status) did not reveal any significant difference between survivors and non-survivors. The time between emergency room admission and the beginning of surgical debridement was not statistically significant between survivors and non-survivors. The extent of surgical debridement was most probably a clinically significant parameter between survivors and non-survivors. FG extending to the thighs or to the abdominal wall carries a worse prognosis. In our series, the extent of surgical debridement is close to the margin of statistical significance. The number of surgical debridement procedures done under anaesthesia was statistically different between survivors and non-survivors. Patients are 4.8 times

more at risk of dying if they are required to have more than one debridement surgery under general anesthesia.

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This paper has been peer-reviewed.

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