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FOURNIER'S GANGRENE: A LIFE THEATENING SURGICAL EMERGENCY

1. **GHULAM HYDER RIND**
FCPS
2. **AZHAR ALI SHAH**
FCPS
3. **ALI GOHAR BOZDAR**
MBBS, MS
4. **KHUSH MOHAMMAD SOHU**
MBBS, MS
5. **MOHAMMAD AYOOB**
MBBS, FCPS
6. **SAIMA ARSHAD**
FCPS

1. ***Assistant Professor***
2. ***Assistant Professor***
SURGERY
3. ***Assistant Professor***
SURGERY
4. ***Assistant Professor***
SURGERY
5. ***Assistant Professor***
SURGERY
6. ***Assistant Professor***

1-6: Surgical Unit I
GHULAM MOHAMMAD MAHER MEDICAL COLLEGE SUKKUR
SHAHEED MUHTARAMA BENAZIR BHUTTO MEDICAL UNIVERSITY LARKANA

Correspondence:
DR GHULAM HYDER RIND
Associate Professor Surgery
GHULAM MOHAMMAD MAHER MEDICAL COLLEGE SUKKUR
CLINIC;Al-Khair Hospital Airport Road Sukkur
Cell No. 0300-3299917
E-Mail: drhyder1064@yahoo.com

ABSTRACT

OBJECTIVE: *The purpose of this study was to report our experience and results in the management of Fournier's gangrene.*
STUDY DESIGN: *Prospective case series study*
PLACE AND DURATION OF STUDY: *This study was conducted in Surgical Unit-I Ghulam Mohammad Maher Medical College Hospital Sukkur from January 2007 to December 2009.*
PATIENTS AND METHODS: *During the study period the demographics of patients, duration of presenting symptoms, the etiology, predisposing factors, microbiological findings, duration of hospital stay, treatment and out come were recorded on specially designed Performa and discussed in the light of published literature.*
RESULTS; *31 male patients with a mean age of 43.6year (range 25-78 year) presented with symptoms and signs of Fournier's gangrene were studied.*
The source of infection was anorectal in 14 (45.2%) patients, urogenital in 6 (19.4%) patients, cutaneous in 2 (6.5%) patients and no cause was identified in 9 (29.1%) patients. The most common comorbid condition seen in this series was diabetes mellitus. Pus Culture and sensitivety results revealed a polymicrobial infection in 18 patients (58.1%) while in 13 (49.1%) of patients only one organism identified. Five (16.2%) patients underwent suprapubic cystostomy for urinary diversion. Sigmoid loop colostomy was done in three (9.7%) patients with gross involvement of perianal skin for faecal diversion. Secondary procedures for the closure of the wound were done in 26 (83.9%) patients that survived. Five patients could not survive giving a mortality rate of 16.2%.
CONCLUSION: F*ournier's gangrene is truly a life threatening surgical emergency. Early presentation and diagnosis, supportive measures, aggressive treatment with extensive debridement of the lesion and use of broad spectrum antibiotics remains the cornerstone of management.*

KEY WORDS: Fournier's gangrene, Necrotizing fasciitis, Reconstructive surgical procedures.

INTRODUCTION

Fournier's gangrene is a life-threatening disorder in which infection of the perineum and scrotum spreads along fascial planes, causing soft tissue necrosis. If urgent surgery is delayed, the disease will soon result in septic shock, multiorgan failure, and death.[1] It is characterized by a synergistic, necrotising fasciitis leading to the thrombotic occlusion of small subcutaneous vessels and the development of gangrene.[2] There are two types. Type I is due to a mixture of aerobic and anerobic organisms usually following an abdominal operation or associated with diabetes mellitus.[2] Type II is due to Group A *Streptococcus* synergistic with a second organism (*Staphylococcus aureus*, coliforms, *Bacteroides* spp.).[3, 4]

Wound cultures from patients with Fournier gangrene reveal that it is a polymicrobial infection with an average of 4 isolates per case. The bacteria involved act synergistically, via collagenases, hyaluronidases, and other enzymes to invade and destroy fascial planes. Ultimately, an obliterative endarteritis develops, and the ensuing cutaneous and subcutaneous vascular necrosis leads to localized ischemia and further bacterial proliferation. Rates of fascial destruction as high as 2-3 cm/h have been described.[5] The description of the disease has been attributed by many to Avicenna (1025)[6], Baurienne (1764)[7], and Hebler(1848)[8].The first documented clinical picture of idiopathic, rapidly progressive tissue-necrotizing gangrene in the region of the male genitalia was made by Jean Alfred Fournier (1832–1914), a French venereologist, in 1883. [9]

The mortality rate in Fournier's gangrene is high and varies from 20–30% to 80%.[10] The

high mortality results from the rapid progress of the disease, leading to a quick development of septic shock and multi-organ failure. Despite the development of medical therapy and intensive care technique, Fournier's gangrene still carries a high mortality.[11]

Fournier's gangrene was commonly fatal in the pre-antibiotic era; even today, it poses a significant risk of morbidity and mortality.[12] Despite aggressive therapy, the mortality rate for patients with Fournier's gangrene is nearly 50% because of the aggressive nature of the infection and the presence of underlying comorbidities.[13] Delays in diagnosis or treatment increase the mortality rate. For example, a 24-hour delay in radical debridement increases the mortality rate by 11.5%; a 6-day delay is associated with a mortality rate of 76%.[14] Additional factors associated with high mortality include anorectal origin, advanced age, extensive disease, shock or sepsis at presentation, renal failure, and hepatic dysfunction. [15] Multiorgan system failure secondary to gram-negative sepsis is the most common cause of death.[16] Early clinical identification and prompt, aggressive treatment are essential for reducing mortality and morbidity in patients presenting with this disease.

Our experience with thirty-one patients of Fournier's gangrene prompted us to review the related literature to highlight the current status of the disease. We present 31 patients with Fournier's gangrene who were treated in a period between 2007 and 2009 in the Department of Surgery, Ghulam Mohammad Maher Medical College Hospital Sukkur.

MATERIALS AND METHODS

Thirty-one patients admitted to our hospital between January 2007 and December 2009 with extensive infection of the scrotum, penis or perineum consistent with Fournier's gangrene were analyzed.. All the patients underwent a full history and physical examination and with life-saving interventions if required. Apart from routine blood and urine examinations, and blood grouping, a plain X-ray of the pelvis and ultrasonography of the affected region plus abdomen was done in all the patients.

Factors such as comorbidities, past medical history, addictions, and duration of symptoms were also noted. Patients were admitted and treated with intravenous fluids and broad-spectrum antibiotics and any hypovolaemia and electrolytes disturbances were corrected. Blood transfusion was given as needed, especially in late presented cases and in patient with shock. Purulent tissue or pus was sent for culture and sensitivity tests. After initial stabilization in all patients a radical excision of the gangrenous tissue was performed as soon as possible after admission. Urethral Foley's catheter was passed in 26 patients and suprapubic cystostomy was done in the remaining 5 patients. In three patients with extensive

TABLE I.
ETIOLOGICAL CAUSES IN 31 PATIENTS WITH FOURNIER'S GANGRENE

Cause	No. of patients	Percentage
Anorectal	**(14)**	
Peri-anal abscess	06	19.4%
Haemorrhoidectomy	03	9.7%
Anal fistula	02	6.5%
Fistulatomy	02	6.5%
Infected 3rd degree piles	01	3.3%
Urogenital	**(6)**	
UTI* post foley.	02	6.5%
Urethral stricture dilatation	02	6.5%
Epididymo-orchitis	02	6.5%
Scrotal carbuncle	01	3.3%
Cutaneous	**(2)**	
Multiple Sebaceous cysts scrotum	01	3.3%
Scrotal trauma	01	3.3%
No cause identified (Idiopathic)	**09**	29.1%

Urinary tract infection

Some pre-existing medical illnesses predispose to Fournier's gangrene. The most common comorbid condition seen in this series was diabetes mellitus. Table-II

TABLE-II
PREDISPOSING FACTORS FOR FOURNIER'S GANGRENE

Predisposing condition	No. of patients	Percentage
Diabetes Mellitus	10	32.3%
Hypertension	08	25.8%
Malnutrition due to drug addiction	03	9.7%
Chronic Liver Disease	02	6.5%
Congestive cardiac failure	01	3.3%
No Predisposing condition	07	22.6%

A variety of organisms had been cultured from purulent tissue or pus during surgery or at the bedside in ward. Only one organism was identified in 13 patients (49.1%), while culture results revealed a polymicrobial infection in 18 patients (58.1%).

perineal involvement, diverting sigmoid loop colostomy was done to avoid faecal contamination of the wound.

All the patients were managed in the ward with daily dressing twice a day, with povidone iodine solution. Once healthy granulation tissue appeared at the local wound, definitive procedures for the closure of the wound and/ or the coverage of the bare testes were undertaken. Depending upon the defect in the scrotal skin, age of the patient, and the viability of the testes, definitive procedures like secondary closure, orchidectomy with secondary closure, thigh pouch placement of the testes and split thickness skin grafting were carried out.

RESULTS

Thirty one patients presented with symptoms and signs of Fournier's gangrene were admitted, investigated and treated in our Hospital, over a period of three years. All were male patients. The patients ages range from 25 to 78 years (mean age 43.6year). Time elapsed between onset of symptoms and presentation was one day to 13days with a mean delay to reach hospital was 6days. The most common cause for delayed presentation to tertiary level hospital was failure of primary care physicians to recognize the disease and gravity of situation. The source of infection was anorectal in 14 (45.2%) patients, urogenital in 6 (19.4%) patients, cutaneous in 2 (6.5%) patients and no cause was identified in 9 (29.1%) patients. Table-I.

TABLE III
INCIDENCE OF VARIOUS MICRO-ORGANISMS SEEN IN FOURNIER'S GANGRENE

Micro-organism	No. of patients	Percentage
Polymicrobial	18	58.1%
Escherichia coli (E-coli)	06	19.4%
Proteus spp.	02	6.5%
Staphylococcus spp.	02	6.5%
Bacteroids spp.	02	6.5%
Klebsiella pneumoiae	01	3.3%

TABLE-IV
TYPES OF RECONSTRUCTION TO CLOSE BARE TESTES AND WOUND

Type of Reconstruction	No. of patients	Percentage
Closure by second intention	16	58.1%
Placement of testes in thigh pouch	04	12.9%
Local skin mobilization	03	9.7%
Orchidectomy and skin grafting	01	3.3%

DISCUSSION

Fournier's gangrene is an aggressive and rapidly spreading infection of soft tissues, ultimately resulting in death. An estimated 750 cases have been reported in the literature since Fournier first described the disease in 1883.[17] Fournier's gangrene is 10 times more common in men than women.[18] In our study all patients were male. The reason of male predominance could be our social taboos that female patients do not expose genital areas to others.

The age of most patients was between 30 and 60 years.[19] The mean age in our study was 43.6 years.Fournier's gangrene was originally thought to be an idiopathic gangrene of the genitalia; however, a specific etiology is found in approximately 95% of cases. Anorectal abscess, genitourinary infection, and traumatic injury are the most common causes.[20]

All patients required at least two debridements, while four debridements were required in 40% of the patients at the interval of 1–2 days. Five (16.2%) of the patients, mostly those with urethral stricture and urinary tract infections, underwent suprapubic cystostomy for urinary diversion. Sigmoid loop colostomy was done in three (9.7%) of the patients with gross involvement of perianal skin for faecal diversion.

Secondary procedures for the closure of the wound were done in 26 (83.9%) of those patients that survived (Table-IV). Five patients could not survive giving a mortality rate of 16.2%. All patients who died were in their sixties with extensive body surface area involved and presented after more than six days onset of symptoms. The reason for delayed presentation was misdiagnosis by primary care physicians and social taboos for shameful disease area. All had associated comorbid medical illnesses. Three patients died because of septic shock and acute renal failure. Two patients died due to respiratory failure and hepatic failure respectively. Hospital stay of patients was 7 to 35 days (average 15.3 days).

The source of infection may be identified as of colorectal, urological, or cutaneous origin. The distribution of suspected infection source in one study (including 55 patients) was urological in 35%, colorectal in 29%, and cutaneous in 29% [21]. Another study (including 29 patients) reported the distribution of colorectal, urological and cutaneous origin as 48%, 21%, and 31%, respectively [22]. In our series source of infection was anorectal in 45.2% of patients, urogenital in 19.4% of patients, cutaneous in 6.5% of patients and no cause was identified in 29.1% of patients.

Comorbid diseases that compromise the immune system are a predisposing factor. The most frequent systemic illness associated with Fournier's gangrene is diabetes mellitus, which is seen in 10% to 60% of cases.[23] Diabetes causes defective phagocytosis, decreased cellular immunity, and microvascular disease with resultant ischemia. The most common comorbid condition seen in this series was diabetes mellitus 32.3% of cases. Table-II

Fournier's gangrene is considered to be a polymicrobial infection [24]. Both aerobic and anaerobic bacteria are usually present, but anaerobes are isolated less frequently. Some patients are infected by one pathogen only (either an aerobe, anaerobe or fungi)[25] The causative pathogens may have low virulence but act synergistically [24]. Thrombosis of the small vessels, known as obliterative endarteritis, is thought to be a key pathophysiological event [14]. The

underlying thrombosis results in a cutaneous and subcutaneous vascular necrosis [3,11]. *E. coli*, Bacteroides and Streptococcus spp. were the most common organisms in one study[22]. However, *E. coli*, *Streptococcus* spp., *Staphylococcus* and *Enterococcus* were isolated more commonly in other study [15]. In our study one organism was identified in 13 patients (49.1%), while culture results revealed a polymicrobial infection in 18 patients (58.1%). Table-III

Temporary fecal diversion can be achieved by colostomy to prevent wound contamination, especially in cases of large complex wounds [24]. Suprapubic cystostomy is sufficient for urinary diversion; however, Foley catheters may be enough in selected patients[25].

In this study five (16.2%) of the patients, mostly those with urethral stricture and urinary tract infections, underwent suprapubic cystostomy for urinary diversion. Sigmoid loop colostomy was done in three (9.7%) of the patients with gross involvement of perianal skin for faecal diversion.

Reconstruction surgery should be considered once all necrotic tissue has been removed and the wound base is clean. Many factors, such as the patient's age, sexual activity and erectile status, the location of skin loss and the amount of genital skin remaining, etc., should be taken into account [26]. For example, direct closure or a split-thick skin graft may be enough in partial penile skin loss. Placement of the bare tests into the subcutaneous pouch of the thigh had a 96% success rate, requires less surgical skill, less morbidity, but again is cosmetically unacceptable, particularly for the young patients as buried testes gives the appearance of female genitalia. Again fertility may be decreased due to abnormal temperature in the thigh.[27]

In a study from India,[27] medial placement of testes in thigh pouch was done in 25.5% of cases, skin grafting in 19.6% of cases while majority of cases underwent delayed closure. In our study majority of patients under went secondary wound closure while placement of testes in thigh pouch was done in 12.9% of patients Table-IV.

One of the most important prognostic factors in gangrene of the genitals is the extension of the necrosis. Patients with gangrene area between 0 and 3% rarely die, while patients that present with an area affected by the gangrene larger that 5% have a poor prognosis [28]. We observed a mortality rate of 16.2% in our patients. This mortality was related to advanced age, large area of gangrene and associated comorbid conditions. Septic shock and renal failure were most common complications associated with death.

CONCLUSION

Fournier's gangrene is truly a life threatening surgical emergency. Early presentation and diagnosis, supportive measures, aggressive treatment with extensive debridement of the lesion and use of broad spectrum antibiotics remains the cornerstone of management. The adverse prognostic factors are; late presentation, advanced age, large area of gangrene, septic shock at presentation and associated predisposing factors particularly diabetes mellitus and chronic liver disease.

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