

## Fournier's Gangrene, Urological Emergency

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### ABSTRACT

Fournier's gangrene is a serious infection of the genital and perineal area, potentially fatal with a higher prevalence in males; It is considered a urological emergency, for which an opportune diagnosis is the norm. Patients present with systemic symptoms, genital discomfort, intense and penetrating pain in the perineoscrotal region. The prognosis is usually ominous, in most cases it is influenced by factors specific to the immunocompromised host, as well as by factors. The mortality rate is estimated to be 88%. A high index of diagnostic suspicion is essential, based on the accelerated progression of symptoms of an infectious process in the genital region, such as blisters, necrosis, and fetid lesions. The diagnosis of the disease focuses on laboratory and imaging studies. The basis of treatment is surgical intervention, in the same way the administration of antibiotics is recommended as soon as possible. Patients with a timely diagnosis who underwent debridement have a lower risk of mortality.

**KEYWORDS:** Fournier, Urology, Emergency, Male, Surgical Treatment

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### INTRODUCTION

Fournier gangrene is an infectious disease characterized by necrotic fasciitis of the perineum and abdominal wall, as well as the scrotum and penis in men and the vulva in women. The main characteristic of this disease is severe tissue necrosis<sup>1-4</sup>. Risk factors include comorbidities, such as Diabetes Mellitus, obesity, peripheral vascular disease, high blood pressure, kidney failure, immunocompromise, as well as elderly patients, smokers, chronic alcoholics, among others. First described by Baurianne in 1764. Later, in 1883, Jean Alfred Fournier, a French dermatologist, studied a case of fulminant gangrene in the genitalia of a young man. In 1997, Jonasson described it as necrotizing cellulitis and fasciitis, mainly in diabetic men who had recently undergone urethral catheterization. Olumi et al. have described it as a necrotizing fasciitis of the male perineum and external genitalia, involving subcutaneous tissues. Currently, it is known that it is a clinical entity that can be both polymicrobial and monomicrobial and that it does not only occur in males, nor is it exclusive to the urogenital system. It is a rare disease, but of great importance, since it is considered a urological emergency, which, since it is not treated in time, has a dismal prognosis.

The objective of the present work, through this case, is to offer a clinical summary based on the information offered by the literature.

### THEORETICAL FRAMEWORK

Fournier's gangrene (GF) is a progressive infection of the soft tissue of the external genitalia, which can sometimes affect the perineum. It was described by Baurianne in 1764, however, it is named after the Frenchman Jean-Alfred Fournier, who first described the etiology of the disease. It is characterized by necrotizing fasciitis and gangrene that affects the subcutaneous tissue, deep and superficial fascia, genital and perineal muscles, which can even extend to the abdomen and extremities. It is a urological emergency and as such must be diagnosed in a timely manner, in order to provide adequate treatment and prevent a fatal outcome.<sup>1</sup>.

### Epidemiology

Initially, it was thought to occur more frequently in young adults, mainly men. However, over the years and due to various investigations, it is now recognized that FG is a condition that can occur at any age and in any sex, but is more prevalent in those between 40 and 80 years of age. Likewise, there is a male:female ratio of 10:1, so the prevalence remains

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in the male sex. Likewise, recent hospitalization history was considered a predisposing factor<sup>5</sup>.

Various studies on the geographical distribution of this pathology have shown that a greater number of cases are reported in the United States of America and Canada, followed by Africa and Europe, however, it is unknown if there is any environmental condition in these places that favors the appearance of this disease. the GF5

### Etiology and risk factors

GF is a multifactorial disease. In the first instance, it has been seen that there is an association with diabetes mellitus, chronic alcoholism, smoking, kidney failure, liver damage, cancer and HIV. All these conditions have in common that they alter the microcirculation or compromise the person's immune response. Of these, it has been established that the most frequent comorbidity and with the greatest influence on the development of the pathology is diabetes in 36-56%, due to the fact that it causes a decrease in chemotaxis, phagocytosis and altered digestive cell function. In a study carried out in Germany, it was identified that 51.5% of patients with Fournier's gangrene were overweight, having a Body Mass Index (BMI) >25 and 39.4% had a BMI >30 or more. Various studies have also shown that the most frequent origin of FG is secondary to urological conditions and pathologies of the perianal region, such as urethral strictures and indwelling catheters, as well as genital trauma and perianal abscesses. The anorectal region is a source of infection in 60% of cases, while in the remaining 40% the urogenital area is responsible<sup>1,6,7</sup>.

Other important risk factors are advanced age, late or inadequate treatment, septic shock, high urea levels, and are also considered poor prognostic factors<sup>1,6,7</sup>.

On the other hand, the microbiological etiology can be monomicrobial or polymicrobial. Yilmazlar et. al, mentions in his study that the most frequently isolated microorganism in cultures of secretions in GF is *Escherichia coli*, occurring in 72% of cases. Following this, there are also *Enterococcus* sp., *Acinetobacter baumannii*, *Bacteroides* sp., *Staphylococcus aureus*, *Proteus*, *Streptococcus* sp., *Klebsiella*, and *Pseudomonas A. baumannii* and *Klebsiella* were strongly associated with mechanical ventilation. Furthermore, the presence of *A. baumannii* was associated with a poor prognosis and high mortality. The presence of these causative agents will eventually provoke the development of tissue necrosis. This process begins in the hypodermis. The bacteria release toxins into the tissue that cause tissue breakdown and promote the spread of bacteria and necrotic tissue, which progresses rapidly. In a matter of hours, the infection can spread along the planes of the fascia, especially when it is a streptococcal infection. Tissue hypoxia, as well as necrosis and gangrene are not only caused by tissue breakdown, but also by arterial and venous thrombosis, leading to tissue ischemia that will eventually become visible in the superficial layers. There are 4 types of necrosis according to the causal agents. Type I is

polymicrobial, both aerobic and anaerobic, and is considered to be more indolent than type II, which is monomicrobial and usually secondary to beta-hemolytic streptococci or staphylococci aureus. Types III and IV are rare and are caused by Gram-negative microorganisms and fungi, respectively. The incidence of these types is uncertain since the information presented in various articles are variable quantities. In type I, it is associated with gas in the tissue and is usually seen in elderly patients. It has been linked to predisposing factors such as hemorrhoids, decubitus ulcers, rectal fissures, episiotomies, urological surgery, and gynecological procedures. Finally, type IV is associated with trauma and is more common in immunocompromised patients<sup>8-11</sup>.

### Clinical picture

Among the clinical manifestations that characterize FG are genital discomfort or intense and penetrating pain in the perineoscrotal region. At the beginning of the infection, hypoxia and the consequent nerve damage are the cause of the pain, which will later transform into local hypesthesia. There is erythema and swelling with purulent discharge and a foul odor. The erythema progresses rapidly along the fascial planes of Dartos, Colles and Scarpa and sometimes to deeper planes, with which the probability of involvement of the perineum and abdominal wall increases. The skin of the affected area can sometimes appear grayish in color. There may be presence of necrosis in the skin and neighboring tissues. As for systemic symptoms, there may be fever, tachycardia, tachypnea, and hypotension. Considering the rapid progression of this disease, it can spread to surrounding tissues, but not be seen within the visible skin findings. This is why FG is considered a urological surgical emergency, since other structures are in danger of being affected. If the FG is of anorectal origin, it presents perianal pain and edema, while if it is of urorectal origin, it is associated with urinary retention, testicular and scrotal pain<sup>9,10</sup>.

Skin and soft tissue infections are classified into four categories, according to local and systemic signs, and treatment will depend on the group in which the patient has been classified. What this classification consists of is explained below and the treatment will be addressed in the corresponding section. Class I includes patients who are externally healthy and afebrile but have cellulitis. Class II is made up of patients who are known to be unhealthy and febrile but do not have an unstable comorbidity, such as diabetes, peripheral vascular disease, deep venous insufficiency, or morbid obesity. Class III is made up of patients who are critically ill and have at least one unstable comorbidity. Finally, those in class IV are patients with sepsis<sup>10</sup>.

### Diagnosis

Laboratory and imaging studies are useful for both diagnosis and risk stratification and to locate the source of infection. However, in the case of this pathology, the fundamental

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datum that guides the suspicion or diagnostic confirmation of FG is the accelerated progression of the symptoms of an infectious process in the genital region, such as the formation of blisters, necrosis and foul-smelling lesions in a short time. Weather. Even so, to make an accurate diagnosis, it is complemented with laboratory and imaging diagnostic methods <sup>8</sup>.

Hematic biometry, blood chemistry, coagulation times, among others, should be performed in search of findings that reveal data of an infectious and inflammatory process. A study revealed that in patients with FG, alterations were found in some components of the BH and organic alterations. Of the data evaluated in the laboratory tests, those that were found to be affected were hematocrit, white blood cells, serum urea, calcium, lactate, potassium, and serum albumin, reported as anemia, hydroelectrolytic alterations, hyperglycemia, leukocytosis, and even septic shock. The scale of "Laboratory Risk indicator for Necrotizing Fasciitis" (LRINEC) was proposed to distinguish between necrotizing fasciitis from other soft tissue infections, using laboratory tests such as C-reactive protein, total white blood cell count, hemoglobin, sodium, creatinine, and glucose. On this scale, a score >6 or equal supports the suspicion of necrotizing fasciitis and a score >8 or equal is almost confirmatory. CT is highly specific for the diagnosis of FG and extension, being useful to guide and perform the appropriate debridement for the patient. Radiography is the most economical study and on some occasions allows the observation of hyperlucency that represents the gas in the tissue, before the crepitus manifests itself clinically. Ultrasound is only performed in hospitals that do not have the resources to perform higher quality studies. Even so, USG is a good diagnostic support in patients who arrive with scrotal pain, providing a rapid assessment to give the patient a better prognosis <sup>8, 12, 13</sup>.

Definitive diagnosis can only be made by surgical exploration that reveals edematous and devitalized tissue, areas of necrosis, exudate, non-contractile muscle, and absence of bleeding. The microbiological diagnosis is made through tissue cultures, secretions or blood cultures <sup>8</sup>.

### Treatment

As mentioned above, there is a classification that groups patients into four classes according to clinical presentation and comorbidities and provides treatment guidance according to class. For patients grouped in class I, management is with oral antibiotics on an outpatient basis; in class II, management can be outpatient or hospitalize the patient for observation plus antibiotic therapy; Class III and IV should be admitted and monitored, as well as given broad-spectrum antibiotics and fluids for sepsis, in severe cases they should be intubated <sup>8</sup>.

Pharmacological: Fluid replacement and correction of fluid and electrolyte imbalance is essential in critically ill patients and must be done immediately. Broad-spectrum antibiotics should be administered as soon as the clinical diagnosis is suspected to prevent further spread and tissue involvement.

The antibiotic regimen includes agents effective against aerobic, anaerobic, gram -positive, and gram - negative microorganisms. The most recommended antibiotic regimen is a combination of gentamicin, clindamycin and either parenteral ampicillin plus sulbactam or third-generation cephalosporins. In cases where there is no response to clindamycin, chloramphenicol can be used. To cover fungal or hospital-acquired infections, fluconazole, vancomycin, or piperacillin-tazobactam are used. Fluoroquinolones may also be useful in place of aminoglycosides, and metronidazole may be used in place of clindamycin. The American Society for Infectious Diseases has added carbapenems to therapy as monotherapy. Antibiotic treatment should continue until the patient is clinically stable and continues to recover. <sup>8,9</sup>.

Surgical: Early surgical intervention is the mainstay of treatment for FG. Extensive debridement should be performed within the first 12 hours of patient admission. People who are diagnosed early and undergo debridement have a lower risk of mortality. It was published that the time that these patients underwent surgery was a maximum of 2 days, which yielded good results, since the patients had a lower risk of dying, compared to those diagnosed later (an interval of 5-7 days). A minimal debridement approach has been proposed, consisting of excision of the scrotal skin limited to necrotic tissue with Penrose drains left in situ after irrigation of the wound with betadine and peroxide. This approach is successful in some patients, however, wide surgical excision is preferred in various literatures. The American Association for Infectious Diseases recommends rebridement within 24 hours to assess for local spread. All necrotic tissue should be removed and resected until bleeding skin margins are found. Once debridement is complete, the wound is irrigated with copious amounts of saline and hemostasis is performed with electrocautery for small vessels or ligation for larger vessels.

### Forecast

Regarding the prognosis, this is affected by various factors such as the systemic condition, the treatment and specific data of the patient, such as their age. The presence of pathologies such as coagulopathies, acute kidney injury, the presence of *A. baumannii*, and the use of mechanical ventilation are associated with a poor prognosis and a high mortality rate. In general, after several studies it was found that the mortality rate in FG is 88%. The mortality rate is higher in patients suffering from an associated disease such as liver failure, alcoholism, diabetes mellitus and advanced age. However, of all the comorbidities, the ones most closely related to high mortality are kidney failure and liver dysfunction. Surgical debridement provides a favorable prognosis coupled with broad-spectrum empirical treatment <sup>9</sup>.

There is an index to calculate the severity and condition of the patient called "Fournier gangrene severity index (FGSI)" which is based on nine parameters including body temperature, heart rate, respiratory rate, serum sodium and potassium levels, creatinine, bicarbonate, hematocrit and

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leukocyte count, described by Laor et al. (Table 1) These parameters are evaluated on a scale of 0-4 and summed to obtain the FGSI, with a score of >9 indicating a 75% chance of death and a score of <9 indicating a 78% chance of survival. In recent years, this index has expanded, adding values such as age and extent of disease, creating the Uludag FGSI, which is a tool that more accurately measures prognosis, predicting 94% death when obtained. a score >9 and 81% survival when a score <9 or equal is obtained <sup>10</sup>.

### DISCUSSION

Fournier's gangrene is a urological emergency that imposes a very great risk to the life of the sufferer. The baseline state of the patient plays a very important role in the evolution and prognosis of the disease.

Regarding the bibliography that we have selected for the realization of this work, we were able to reach the conclusion that it is refined, since the articles and books that compose it have followed the international parameters to be valid, a reflection of this is that they appear in scientific journals or belong to prestigious publishers, as the case may be. In addition, all are conclusive in their results, in addition to validating each other, they are consistent in the risk factors and the therapy to be followed.

### CONCLUSION

This disease, for learning and for medical training, covers a multidisciplinary spectrum. This is a great challenge both for the doctors who treat this pathology, as well as for the patient's relatives, since they play a very important role in the patient's evolution, in the care that must be given and as moral support for the patient. Same.

The purpose of this work, in addition to knowing the best or most appropriate management for this disease, was to emphasize the fact that it is a urological emergency that must be treated as such. FG has a very rapid progression and is so delicate that close attention must be paid to the patient's comorbidities and condition, since any of these complications can imply a dangerous deterioration for the patient, such as the development of an inflammatory response syndrome. Systemic or even fall into septic shock, as was the case in this patient.

Taking into consideration what was investigated in this case, the best management for these patients is surgical debridement of the affected area together with rational antibiotic therapy, which offer us a good prognosis for patients with this disease, fulfilling its objective. get the better of them.

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