

Probabilistic Antibiotic Therapy in the Fournier's Gangrene Our Experience on 320 Cases

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Abstract

Introduction : Fournier's gangrene (FG) is an acute and devastating illness that affects the perineum and external genitalia. Its treatment is based on an early and extensive debridement and on a probabilistic broad spectrum antibiotherapy covering the aero-anaerobic organisms.

The aim's study is to compare the mortality, the hospitalization delay and the main prognostic predictors between two groups of patients whether if they received or not targeted antibiotic therapy.

Patients and methods : It's a retrospective study of 320 patients divided in two groups. G1 : targeted antibiotic therapy (n = 20) and G2 : broad spectrum antibiotic therapy (n = 300). Collected data were related to the mortality, time admission, physical examination, etiologies, comorbidities, pre - and post-admission treatments and debridement frequency.

Results : The overall mortality rate was 18.4 % (n = 59). It was 30 % (n = 6) in G1 and 17.7 % (n = 53) in G2 (NS). The mean of post-admission debridement was 5, 35 ± 1.81 in G1 and 4. 68 ± 1. 89 in G2 (NS)

The hospitalization delay was 42 ± 19 and 42. 18 ± 16, 84 days in respectively G1 and G2 (NS). For the G1, flora was polymicrobial (75 %), monomicrobial (15 %) ; no growth (10 %)

Conclusion : broad spectrum antibiotherapy retains its place in the treatment of FG. Its adaptation had no influence on mortality or on prognostic factors compared to the targeted one. It remains an excellent option for centers with high recruitment and low means.

Keys words : Fournier's Gangrene, poly-microbial flora, broad spectrum antibiotherapy, targeted antibiotherapy.

Résumé

La gangrène de Fournier est une maladie aiguë et fulminante du périnée et des organes génitaux externes. Son traitement repose l'association d'un débridement précoce et extensif et sur une antibiothérapie probabiliste à large spectre destinée aux germes aéro-anaérobies.

Le but de l'étude est de comparer la mortalité, le délai d'hospitalisation, et les principaux facteurs pronostiques comparant deux groupes de patients selon qu'ils aient reçus ou pas une antibiothérapie ciblée.

Patients et méthodes : C'est une étude rétrospective sur 320 patients divisés en deux groupes.

Groupe 1 (G1) ayant reçu une antibiothérapie ciblée (n = 20), Groupe 2 (G2) ayant reçu une antibiothérapie empirique, probabiliste à large spectre (n = 300).

Les données recueillies et étudiées ont comparé la mortalité, le délai d'admission, l'examen clinique, les étiologies, les comorbidités, les traitements pré et post-admission et la fréquence des débridements.

Résultats : La mortalité globale a été de 18.4 % (n = 59). Elle a été de 30 % (n = 6) dans le G1 et de 17.7 % (n = 53) dans le G2 (NS). Le nombre moyen de débridements post-admission a été de 5.35 ± dans le G1 et de 4. 68 ± 1. 89 in G2 (NS).

Le délai d'hospitalisation a été de 42 ± 19 and 42, 18 ± 16. 84 jours respectivement dans les G1 and G2 (NS).

Dans le G1, la flore était poly microbienne dans 75 % des cas, mono microbienne dans 15 % des cas, stérile dans 10 % des cas.

Conclusion : L'antibiothérapie probabiliste garde toute sa place dans la prise en charge de la maladie de Fournier. Le recours à l'antibiothérapie ciblée n'a eu aucune

influence ni sur la mortalité ni sur les principaux facteurs pronostiques.

L'antibiothérapie probabiliste reste une excellente option pour les centres ayant un recrutement important et des moyens insuffisants.

Mots clés : Gangrène de Fournier, flore poly-microbienne, antibiothérapie à large spectre, antibiothérapie ciblée.

Introduction

Fournier's Gangrene (FG) is an acute bacterial dermo-hypodermatitis with necrotizing and extensive cellulitis of the perineum and external genital organs [1]. It's a dreaded and dreadful threatening disease that Jean-Alfred Fournier, in 1883, a French venereologist, best known for his work on syphilis [2, 3] described as a necrotizing and idiopathic fasciitis of the male genito-urinary system, in the young and healthy man (Gangrènes foudroyantes de la verge) (The medical week) [4]. He recalled the specified genital gangrene etiologies that none of them applies to his patient, nevertheless he suspected a streptococcal origin.

Bacterial synergism and rapid spread of infection along the fascias to the lower limbs, the inguinal region and the abdominal wall make it a medical-surgical emergency for which a standardized therapeutic attitude has been adopted : Resuscitation, wide spectrum antibiotics, Surgery, OHB (Hyperbaric Oxygen Therapy).

Despite the advent of these whole new therapeutics, FG is still a potentially lethal disease with high mortality rates (16.9–34 %) in larger clinical studies and even 76 % in smaller ones [5, 6]. Others report 0 % and 67 % [7, 8, 9] or even 88 % in others [10].

Patients who survive the infection will undergo reconstructive surgery, with sometimes, severe sequelae in relation with the extent of fasciitis and debridement

It remains a rare pathology. In 1993, 449 cases were reported from 1979–1988, giving an average of 45 cases per year [11]. Since 1989–1998, 973 cases have been reported in the English literature, giving an average annual incidence of 97 cases [7]. In Morocco, 150 cases published during the last 15 years [12, 13]. By way of comparison, in Algeria and in our series, we collected 320 cases from 2002 to 2016 with an average of 23 cases / year (10 to 40).

The main contributing factors are : diabetes [14], genito-urinary and coloproctological infections, and also corticosteroid treatment during the septic phase, malignant tumor [15], hepato-renal insufficiencies [16, 17], local and post-operative trauma, immunodeficiency especially HIV [18], or after transplantation, proctological pathologies, obesity with BMI higher than 30 [19, 20] and alcoholism.

The severity of the disease is due to :

1– The fulminating progression of the infection at the level of the inextensible boxes that are the superficial and deep fascias of the perineum, which continue between them at the root of the limbs at the inguinal and thoraco – abdominal walls and merge at the level of the clavicles [68]. The necrosis of the fascias is pathognomonic of the FG [21] and the propagation speed reported is up to 2–3 cm/h [22].

2– The primum movens is an infection whatever its origin ; this is followed by the triggering of a bacterial synergism, potentiated by the enclosed space represented by the superficial and deep fasciae of the perineum.

This infection is poly-microbial with both aerobic and anaerobic organisms, although not all bacteria involved can be identified in cultures [23]. This combination suggests a synergistic interaction between the different specie.

This interaction causes vascular thrombosis. In fact germs cause platelet aggregation and accelerate coagulation by complement fixation, while some anaerobes promote coagulation [24] by other pathways and produce heparinase.

The *Bacteroides* specie, more preferably, inhibit the phagocytosis then the elimination of certain aerobic germs. Each specie produces, for the others, a growth factor and some associations cause very acute septic states (*Streptococcus*, *Staphylococcus*, *Slostridium*) [24].

The polymicrobial character of the infection was confirmed in a percentage of 54 % and the most common pathogen isolated is *Escherichia coli* (46.6 %) followed by *Streptococcus*, *Bacteroides*, *Enterobacter*, *Staphylococcus*, *Enterococcus*, *Pseudomonas*, *Corynebacterium*, and *Klebsiella pneumoniae* with an average of 3 to 9 species [19, 20, 25]. In other series the most commonly isolated anaerobic micro-organism is *Bacteroides fragilis* [22, 26].

The demonstration of anaerobic germs is particularly problematic. Time and conditions of transport are imperative and represent the main factors of failure ; some of them do not support an aerobic environment more than 30 minutes.

Blood cultures, even in the presence of severe septic syndrome, are usually negative. This negativity does not mean absence of bacteremia, on the contrary, it would mean that there is a strong probability of infection to anaerobes.

Its diagnosis at the beginning can be difficult because of its often atypical presentation mode.

In any case, the use of morphological examinations should not delay the management.

It is usually clinical : discreet erythema, pallor, major pain, continuous pruriginous or stinging phlyctenes,

cyanosis, necrosis, pathognomonic snow cracking present in less than one third of the cases, hyper or hypothermic severe septic syndrome.

The contrast between the very noisy functional signs and the small physical signs at the beginning are characteristic particularly in obvious etiological context or in predisposed state.

Treatment of FG is based on a multidisciplinary and concomitant approach currently well codified : intensive resuscitation and correction of hydroelectrolytic disorders based on Hand and Specific Gravity Scores, Fournier's Gangrene Severity Index (FGSI) [27].

Broad spectrum antibiotics has been recommended to fight the polymicrobial flora characteristic of FG, and to prevent the fungic graft and nosocomial infection in these patients often requiring intensive care, repeated passes to the operating room and prolonged hospitalizations, extensive debridement and resections in order to remove all necrotic and infected tissue, whose parietal decay will be repaired secondarily by reconstructive surgery. This latter must be entered without delay. It remains one of the main prognostic factors. [24]

Hyperbaric Oxygen Therapy (HBOT) : used as an adjuvant treatment, this process has limits and controversial results between defenders [20, 28, 29] and detractors [30, 31]. Its main disadvantages are : process-specific complications, morbidity factor in immune-compromised state, high cost and the need to transfer patients to specialized services [9, 32].

We reviewed our experience of 320 patients affected by FG, 300 among them treated by wide probabilistic antibiotic therapy and the remaining 20 by a targeted one.

This small number is due to the unavailability of bacteriology and biology in our laboratory. We also, could not realize the forecast indexes.

These analyzes were performed by the patients on their own.

We will compare survival and identify the main factors of mortality in the two groups.

Patients and methods

It's a retrospective study of 320 patients with FG, supported at the department of emergency of the university hospital of Sidi-Bel-Abbes ALGERIA, between January 2002 and April 2016.

Were included : Patients whose age is equal or greater than 16 years independently of sex. Gangrenes of the perineum whose starting point was : Coloproctological, urogenital, dermatological, post-traumatic, post-operative.

Were excluded : Peri-anal and perineal suppurations without cellulitis or myonecrosis – Gangrenes not reaching the perineum and not having as starting point, the perineum – Tumor origin

The interrogation sought

The onset and type of symptoms, history of the disease, comorbidities, and treatments in progress, type and number of debridements suffered before admission.

– Clinical examination appreciated the general state, the presence or not of severe septic state and lesional assessment.

The diagnosis of necrotizing fasciitis was based on clinical data of necrotizing fasciitis of the skin, hypodermis with or without necrosis of muscle and systemic progression from the outset or during hospitalization requiring admission to an intensive care unit as defined by the American College of Chest Physicians / Society of Critical Care Medicine (ACCP / SCCM) [33] and then by the consensus conference of Tours in 2000 [34].

The biological assessment has been done according to the availability of the laboratory.

The extent of gangrene was calculated according to monograms, routinely used to assess the extent of burn injuries : the penis, scrotum, and perineum accounted for 1 % surface area, the ischiorectal fossa for 2.5 %, ...[35]

Standardized protocol has been applied for all patients :

- Intensive resuscitation and hydro-electrolyte re-equilibrium measurements.
- Treatments adapted to the pathologies of the patient : hypertension, diabetes...

Broad-spectrum antibiotics started immediately upon admission, according to Consensus recommendations [34].

Penicillin G 20 à 30 millions IU/D associated with an imidazole (metronidazole 500 mg X 3 / d IV) ; Penicillin G may be replaced by :

- Amoxicillin at the dose of 100 mg / kg / day, Imipenem at a dose of 1g X 3 / day, amikacin 20 mg / kg x 1 / day) can be discussed if there is a prior risk of *Pseudomonas aeruginosa* in post-operative FN.

In case of allergy to beta-lactams, the combination fluoroquinolone (Ciprofloxacin 400 mg x 3 / d or ofloxacin 400 mg x 2 / d) + clindamycin plus or less an aminoglycoside is recommended but may not be active in case of postoperative nosocomial infection.

Imperative re-evaluation of initial probabilistic antibiotic therapy between the second and the third day,

when the identification and the sensitivity profile of responsible bacteria is available for the group of patient in whom the bacteriological analysis of the necrotic tissues had been possible, defined as G1.

For the rest G2, the treatment regimen of probabilistic antibiotic therapy has been continued for 10 to 15 days based on the clinical condition of the patient, the rate of white blood cells and the use or not of assisted ventilation.

The admission time to the operating room was between 3 – 6 hours depending on the availability of the emergency operatory room.

Debridement has been repeated every day under general anesthesia ;

It has been extensive from the outset until a satisfactory granulation tissue is obtained and disappearance of any stigma of infecting

The excised tissues were sent to the microbial culture only for 20 of them.

None of our patients have benefited neither of hyperbaric oxygenation therapy nor reconstructive surgery. Led healing was the rule in spite of very important parietal defects in relation to aggressive and extensive debridement.

Indeed, we do not have a reconstruction surgery department. When this was possible, the patient had an isolated room with reduced and controlled parental visits.

It was thoroughly cleaned with a change of sheets and, at the very least, reduced furniture, while the patient was in the operating room.

Statistical analysis was performed with SPSS for Windows, version 11.5 (SPSS Inc., Chicago, IL, USA). The percentage comparisons were made by the chi-square test and comparisons of means were made by the t-test. P-values of less than 0.05 were considered as statistically significant.

Results

The total number of our study was 320 patients. 210 men (65 %) and 110 women (35 %) with a sex-ratio of 1.9. The overall mortality rate was 18.4 % (N = 59) and the average overall age is 49.43 ± 20.12 with extremes of 16–96 years.

Two groups of patients have been selected :

The first group G1 (20) who had the means to carry out their microbiological analyzes and thus benefit from targeted antibiotic therapy.

The second group G2 (300) who benefited of the broad spectrum antibiotherapy.

In the G1 the mortality was 30 % (n = 6). In the G2 it was 17.7 % (n = 53). NS (p = 0.23).

Targeted antibiotherapy had no influence on mortality.

In the G1 there were 6 men dead among 18, 2 women, all of them survived.

In the G2 there were 108 women and 192 men with a mortality for women (n = 6) and for men (n = 47).

The specific gender mortality rate was 5.4 % (n = 6 of 110) for women and 25.2 % (n = 53 of 210) for men.

Based on the average age we divided our patients into two groups : the least and over 50 years. The mean age survivors was 48.98 ± 20.23 and non-survivors was 51.46 ± 19.67 NS (p = 3,4).

In both G1, G2 the difference in mortality was not statistically significant NS, respectively (p = 0.89) and (p = 0.66) between least and over 50 years old patients.

The mean admission delay (days) of survivors was 4.01 ± 2.038 and 7.98 ± 4.861 for non-survivors. The difference was statistically significant (p = 0.001). The mean admission delay was 4.95 ± 1.06 days for the G1 and 4.72 ± 3.242 for the G2 (NS)

Patients report, massive and anarchic medications before admission either in the context of an own or medical prescriptions : Corticotherapy (53.1 %), Antibiotherapy (84.7 %), Association (42.8 %).

The most predisposing factors were diabetes mellitus (28.3 %) and hypertension (23.8 %), the front has been found in 100 % of cases : It was colorectal in 59 %, urogenital in 34 % cases. In women, Bartholin'sitis and obstetric trauma account for 68 % (n = 75) of FN etiology with an excess specific mortality of 53 % (N = 4).

In first-hand patients, fever was present in (45,5 %), and among second-hand patients hypothermia was found in (19 %). Scrotal pain (45 %), erythema was present in 100 % of the patients, purulent flows, perineal edema and localized in external genital organs in 77 % of cases. Edema was extended to the root of the limbs and to the abdominal, inguinal and thoracic walls in 80 % of patients who have suffered from debridement before their admission in our structure.

In the G1 it was 2.6 ± 0.74 and 2.03 ± 0.96 in the G2 NS (p = 0,001) and presenting necrosis in place with different type of drainage.

In the G1 the number of debridement after targeted antibiotherapy was 5.35 ± 1.81 and in the G2 it was 4.68 ± 1.89 . The difference was not statistically significant NS (p = 0.13).

Targeted antibiotherapy had no influence on the number of subsequent debridements.

On the other hand, the total number of debridements directly affected mortality.

It was 4.16 ± 1.092 for survivors and 7.20 ± 2.592 for no survivors and the difference was statistically significant NS ($p = 0,001$)

Wound culture results for the G1 ; No Growth 10 % ($N = 2$) ; Mono microbial flora = 15 % ; ($N = 3$) ; Poly microbial flora = 75 % ($N = 15$).

Of the 20 patients, there were 3 with a single etiologic agent, and 15 others with multiple etiologic agents.

In the single etiology group, we found : Methicillin, Susceptible *S. aureus* (MSSA), Beta-hemolytic Streptococcus, *Klebsiella pneumoniae*.

In the multiple etiologic organisms we found : EC was the most frequently found with (13), it has not been associated with high mortality rate ($N = 2$).

S. aureus (MSSA), Beta-hemolytic Streptococcus were found in similar cases (11), *K. pneumoniae* (9), *Enterobacter faecalis* (7), *Acinetobacter* (6), *Fungus* (4)

Table 1 : Bacterial organisms isolated from wound cultures of patients with FG

Organisms	Total number	Survivors	Non-survivors
E. Coli	13	11	2
Staph aureus	11	1	7
Strepto β H	11	2	5
K. pneumoniae	9	2	4
P. aeruginosa	11	8	3
C. perfringens	6	1	5
Enterobacter faecalis	7	5	1
Bacteroides spp	2	2	0
Acinetobacter	6	6	0
Fungus	4	2	2

6 patients died ; In 4 of them the triad clostridium perfringens *S. aureus* (MSSA),

β hemolytic Streptococcus, was found associated with other strains in a variable way, diversified with a minimum of 4 and a maximum of 9. Fungus was present in two patients who died.

In two patients who died, one had a mono microbial flora (β – hemolytic Streptococcus) in the other no growth was found. The duration of hospitalization was (42 ± 19.08) days in G1 and (42.18 ± 16.84) days in G2, the difference was not statistically significant NS ($p = 0.96$). The healing time with appearance of the first bud was the same in both groups (20 ± 4 days). The targeted antibiotherapy had no influence neither on the period of hospitalization nor on the duration of hospitalization.

Discussion

FG is a synergistic and extensive fasciitis of the perineum and external genital organs. Its fulminate progression evaluated at 2–3 cm / h along the fascia of the perineum, the abdominal wall and the lower limbs (Fig. 1. 2) makes it a surgical emergency whose diagnosis and treatment should be undertaken rapidly and jointly in order to improve its prognosis which remains serious [24, 36, 37].

Recent studies have reported mortality rates of 36,6 % [38], 30 % [39], 23.8 % [40], 17.8 % [41], 4,9 % [42] In the present study, our mortality rate was 18.4 % joining the series of Mehmet Ulug & col [43].

The therapeutic strategy is well codified :

No delay is allowed since this has been correlated with excess mortality in our series and similar others [5, 34, 44, 45, 46].

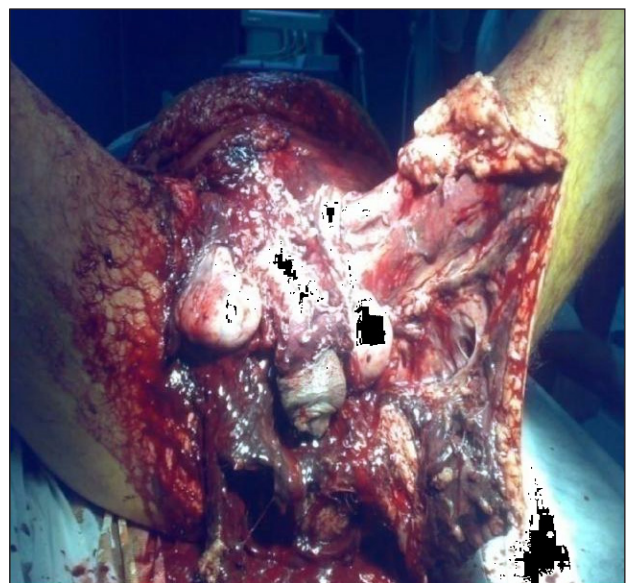


Fig. 1, 2 : Extended necrosis : perineum, scrotum, abdominal wall and the root of the limbs

Broad-spectrum antibiotic treatment for a wide coverage of the polymicrobial flora.

In our series, its re-evaluation and its adaptation to the antibiogram after excised necrotic tissue in 20 patients, did not show a significant difference in mortality between the targeted antibiotic group and the broad spectrum one.

Since 2002, we steadily reduced it from 55 % to 18.4 % in 2016.

The introduction of new antibiotics in the experiment of Clayton et al., [47] did not change the survival rate over a 10-year period. Without surgical treatment, the mortality rate could be close to 100 % [47, 48].

In 40 to 80 % of cases, it is a plurimicrobial flora, and often mixed aero-anaerobic one [45, 46, 49, 50].

In a retrospective study of 182 patients, it has been found an average of 4,4 germs and a mixed aera-anaerobic flora in 46 % or 54 % of the cases. In this same study, only 15 % of patients had a monomicrobial infection [44] confirmed by others [19, 20, 25].

The most common isolated pathogens is *Escherichia coli* (46.6 %). Other contributing Pathogens are *Streptococcal* infection, *Bacteroides*, *Enterobacter*, *Staphylococcus*, *Enterococcus*, *Pseudomonas*, *Corynebacterium*, and *Klebsiella pneumoniae*.

Anaerobes are more difficult to be isolated [22, 51] *Clostridia Perfringens* are also frequently identified [52].

In our study, the flora was polymicrobial 75 % (n = 15), No Growth 10 % (n = 2) ; Monomicrobial flora 15 % (n = 3).

In the single etiology group, we found : Methicillin Susceptible *S. aureus* (MSSA), *Klebsiella pneumoniae*,

β -hemolytic *Streptococcus* associated with fatal septic shock.

Some series found that the existence of initial shock increases mortality up to 40 %, or even more : 60 % in case of streptococcal toxic shock [10, 44, 49, 53].

We did not find *E. Coli* in monomicrobial cultures however it has been the most frequently found in polymicrobial flora with (65 %). This percentage is slightly higher in the literature however it has not been associated with high mortality rate. The triad *clostridium perfringens*, *S. aureus* (MSSA), β -hemolytic *Streptococcus*, was associated with 66 % of mortality unlike some authors who found that outcome was not related to any specific bacterial species [43].

Fungus was present in two patients who died taking into consideration that all our patients have been fully taken care in an emergency service.

We report a combination of at least 4 strains and at most 9, like some series in the literature which average was between 3-9 [19, 20, 25].

Faucher et al., [54] said : “ initial surgery should be a genuine « Search and Destroy » mission, in which all necrotic and infected tissues must be resected, regardless of extent of parietal defects and potential problems of complete closure ”.

Several authors and they are numerous, [9, 55, 56, 57, 58] have advocated the same attitude, the only guarantee of a chance of survival.

We join Burbrich and Hitchcock [59, 60, 61] who were among the first to adopt this attitude. The aggressiveness of the first surgical gesture in our series reduced the number of subsequent debridement and allowed faster patient rehabilitation.

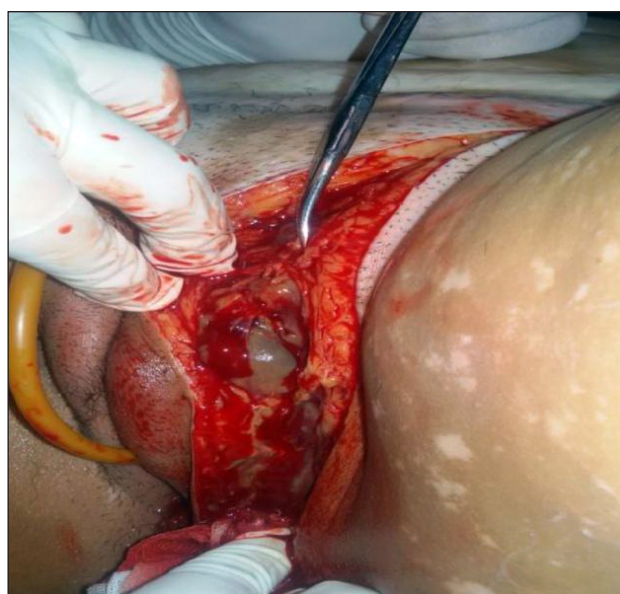


Fig. 3 : Necrosis of the Bartholin gland



Fig. 4 : Extended to the abdominal wall

Targeted antibiotic therapy had no influence on the number of subsequent debridement and the difference between the two groups was not significant.

On the other hand, the number of debridement was higher in non-survivors / survivors and has significantly affected mortality unlike other series [22, 27, 38, 62, 63].

Chawla and others [64, 65, 66], have come to the same conclusion while others have failed to find a correlation between the number of debridement and the mortality rate [7, 67].

The median age in different series is 46.5 and 63.5 years [36] and also 54.5 years [43]. They found no statistically significant difference between survivors and non-survivors.

In contrast, others [27, 39, 47] found that survivors were significantly younger than non-survivors.

In our series age did not influence mortality. The mean age was the same in both groups : survivors and non-survivors.

Targeted antibiotherapy had no influence since there was no difference, in age, between survivors and no survivors in both groups.

Men are ten times more affected than women ; this difference can be explained by a better drainage of the perineal region in women through vaginal secretions [7, 68, 69, 70].

We have not found these values in our series indeed we have 210 Men (65 %) /110 women (35 %) with a sex-ratio of 1.9

The specific mortality was 5.4 % in women (n = 6) and 25 % in men (n = 53)

The overall mortality was 1.8 % in women and 16.5 % in men

Our study contradicts the series led by Czymek R & al [19] wich concluded that the female gender is a risk factor for mortality in patients with Fournier's gangrene and is associated with a higher incidence of inflammation of the retroperitoneal space and abdominal cavity.

In other series, there was no significant difference in mortality between genders [40].

The main risk factors reported in the literature are : diabetes mellitus, hypertension, heart disease, and renal failure, overweight [19, 20, 41, 70]. In our series, in addition, we found the corticotherapy in septic phase. Etiology was found in 75 to 100 % of cases. However cases have been listed as idiopathic [4]. Paty and Smith were the first to recognize the importance of retrograde urography and digestive endoscopy in etiopathogenic research because they conditioned the use of derivations and allowed, by the same to classify the pathology according to its point of starting [1, 22, 71, 72].

Currently, endoscopy and imaging make it possible to find the etiology in 75-100 % of cases [60, 73, 74].

When it is not, it is because this one has been insufficiently researched or the lesions are too advanced, because drowned in a procession of noisy signs.

Etiology was colorectal in 13 to 50 % of the cases and urogenital in 17 to 87 % of cases [7, 69] Other causes include infections and local trauma.

In some series the anorectal and coloproctological entry gates were associated with excess mortality [75, 76, 77].

In our series it was colorectal in 59 % cases and urogenital in 34 % cases and it not has been associated with over mortality as reported.



Fig. 5, 6 : necrosis in place after inadequate initial debridement

On the other hand, gynecological pathology was the leading cause of death in women of all ages with a rate of (53 %) [78, 79].

We will retain as main factors of poor prognosis : the delay of admission, the presence of a septic shock, the high number and the non – extensive nature from the start, the gynecological entrance door, and the use of a massive and anarchic corticotherapy during the septic phase.

Targeted antibiotherapy had no influence on mortality, cicatrization delay or hospitalization stay.

Conclusion

In spite of new and aggressive therapeutics in the management of FG, it remains serious with high mortality and important sequelae.

Broad spectrum antibiotherapy retains its place in centers with constant and high frequency and lack of adequate laboratory facilities. This coupled with a rapid management and an aggressive surgical treatment from the outset allowed us to, no longer consider this disease as a fatality and to improve the chances of survival in a significant way in North Africa.

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Fig. 7, 8 : Second hand patients : septic shock and extended perineum necrosis

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