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Original Article

Epidemiological study on Fournier syndrome in a tertiary hospital in Jundiaí-SP from October 2016 to October 2018†

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ABSTRACT

Introduction: Fournier's gangrene is a polymicrobial infection caused by aerobic and anaerobic microorganisms, which determine a fast and progressive necrotizing fasciitis, compromising mainly the perineal region and the genital region, being able to evolve to sepsis, multiple organ failure and death. Treatment consists of early surgical diagnosis and debridement, associated with broad-spectrum antibiotic therapy and hyperbaric oxygen therapy.

Objective: Compare the most prevalent epidemiological data of patients with Fournier's Syndrome with the data examined in the literature in order to evaluate the incidence in the analyzed service, treatment form and evolution of the patients with the disease.

Materials and methods: Observational transversal study from the medical records of patients diagnosed with the disease at the São Vicente de Paulo Charity Hospital in Jundiaí, SP, from October 2016 to October 2018.

Results: 23 patients with Fournier's Syndrome, all included in the study, and were analyzed. The most prevalent epidemiological data on the disease, such as age, sex, association with other comorbidities, treatment performed, mortality and early surgical procedure, had obtained a similar data as compared as the medical literature that was in studied.

Conclusion: Despite the recognized severity of Fournier's Syndrome, early diagnosis combined with extensive surgical debridement, broad-spectrum antibiotic therapy and measures and oxygen therapy when available are important measures to contain the rapid progression of the disease, thus decreasing its levels of mortality.

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Estudo epidemiológico sobre síndrome de Fournier em um hospital terciario de Jundiaí-SP de Outubro de 2016 a Outubro de 2018

Palavras-chave:
Gangrena de Fournier
Desbridamento
Antibioticoprofilaxia

RESUMO

Introdução: A Gangrena de Fournier é uma infecção polimicrobiana ocasionada por microrganismos aeróbios e anaeróbios, que determinam uma fascite necrosante rápida e progressiva, comprometendo principalmente a região do períneo e a região genital, podendo evoluir para sepse, falência de múltiplos órgãos e óbito. O tratamento consiste no diagnóstico e desbridamento cirúrgico precoce, associado à antibioticoterapia de largo espectro e oxigenoterapia hiperbárica.

Objetivo: Comparar dados epidemiológicos mais prevalentes dos pacientes diagnosticados com Síndrome de Fournier com os dados já descritos na literatura a fim de avaliar a incidência no serviço em questão analisado, forma de tratamento e evolução dos pacientes com a doença.

Materiais e métodos: Estudo transversal observacional a partir da análise de prontuários de pacientes diagnosticados com a doença no Hospital de Caridade São Vicente de Paulo de Jundiaí-SP, no período entre Outubro de 2016 a Outubro de 2018.

Resultados: Foram analisados 23 pacientes com diagnóstico de Síndrome de Fournier, todos incluídos na pesquisa. Avaliado os dados epidemiológicos mais prevalentes na doença, como faixa etária, sexo, associação com outras comorbidades, tratamento realizado, mortalidade decorrente da doença, período médio de internação, uso de antibioticoterapia e necessidade de procedimento cirúrgico, obtendo-se dados semelhantes com os já descritos na literatura médica.

Conclusão: Apesar da reconhecida gravidade da Síndrome de Fournier, o diagnóstico precoce aliado ao desbridamento cirúrgico extenso, antibioticoterapia de amplo espectro e medidas e oxigenioterapia quando disponível são medidas importantes na contenção da rápida progressão da doença, diminuindo assim seus níveis de mortalidade.

Introduction

Gangrene or Fournier's syndrome, also called necrotizing fasciitis, is classified as a polymicrobial necrotizing soft tissue infection, usually caused by three or four different microorganisms, which may be facultative anaerobic such as Escherichia coli, *Klebsiella pneumoniae* and *Staphylococcus aureus*; anaerobes such as *Clostridium* and *Bacteroides fragilis*; among several others such as Streptococcus, Enterococcus, *Clostridium*, Pseudomonas and Proteus. The infection affects the perineum region and may originate in the urethral or gastrointestinal mucosa.[1,2]

Polymicrobial infection contributes to a varied production of exotoxins and enzymes such as collagenases, heparinases, hyaluronidases, streptokinases.[2,3] In addition, anaerobic bacteria cause platelet aggregation and induce complement fixation, which contributes to coagulation and microthrombi formation. Deep infection generated by commensal bacteria in tissues without abundant blood supply eventually activates inflammatory response, causing vasculitis and endoarteritis obliterans, ischemia, and promoting the development of anaerobic infection and tissue necrosis.[1–3]

Risk factors and pathophysiology related to Fournier's gangrene are pre-existing comorbidities that interfere with the immune system (neoplasms, cirrhosis, neutropenia, HIV infection) and the patient's microcirculatory capacity (diabetes mellitus and hypertension); infection usually begins with loss of tissue integrity of the skin or mucous membranes (hemorrhoids, rectal fissures, episiotomy, trauma, bruising, orchiepididymitis), which give bacteria access to deep tissues.[3–5]

Clinical course of infection and necrosis occurs through sudden pain in the perianal/perineal region with or without scrotal edema; it is commonly associated with purulent or secretion-producing wounds, signs of crackling and skin fluctuation, prostration, pallor, and fever above 38 °C.[5,6] Progression is rapid and begins with a cellulite adjacent to the infection's entry port, associated with macerated skin and fetid odor after deeper tissue involvement and progression of bacterial colonization; the wound presents with necrotic material drainage associated with deterioration of the general condition; finally, extensive necrosis of subcutaneous tissue generates sepsis, multiple organ failure, and death.[2,7,8]

In addition to the symptoms already mentioned, the Fournier's gangrene diagnosis may be supported by laboratory and imaging tests. However, the laboratory pattern is nonspecific and without obvious findings, with anemia, leukocytosis, thrombocytopenia, electrolyte abnormalities, hyperglycemia, increased serum creatinine, azotemia, and hypoalbuminemia.[3,9]

Imaging tests such as CT, MRI, and US can facilitate diagnosis and delimit the lesion, although their use is not necessary or desirable and should not delay surgical intervention in any way, particularly when there are signs of crackling.[2,3,9]

Among the different imaging tests, conventional radiography may be useful for identifying subcutaneous edema and emphysema, which is present in up to 90% of patients with Fournier's gangrene.[2,8,9] Ultrasonography is valuable for its short duration and for determining the extent of the lesion; it an examination of greater importance than radiography.[2,8,9] Computed tomography is the most cost-effective exam among all imaging tests, demonstrates subcutaneous narrowing, inflammation and emphysema, and has the function of identifying the infection origin and determining its extent. Magnetic resonance imaging is rarely used in Fournier's gangrene cases due to the cost-benefit ratio compared with tomography.[2,8,9]

The prognosis of Fournier's gangrene is related to several factors. Although diabetes mellitus is the most common comorbidity of these patients, it is not directly related to higher mortality, which, however, is substantially increased for patients with heart disease and chronic kidney disease on substitution therapy.[4–6] The presence of sepsis or significant laboratory abnormalities at the time of hospitalization is significantly related to mortality, along with the volume of necrotic tissue.[10]

Fournier's gangrene management consists of a pillar of three fundamental principles: 1) rapid and aggressive surgical approach for necrotic tissue debridement; 2) hemodynamic and clinical support; 3) parental administration of broad spectrum antibiotics.[2,3,5,6,8]

Debridement of non-viable structures is considered the most important factor for survival, and may occur in several approaches. Antibiotic administration and absence of surgical debridement is associated with 100% mortality rate.[1,9]

The introduction of antibiotics usually follows the prescription of triple medication with broad spectrum penicillin or third generation cephalosporin, aminoglycosides, and clindamycin or metronidazole.[1,6,8] Drugs may be changed empirically upon initiation of treatment or via blood culture results. After aggressive debridement, open wounds should be treated with sterile coverings or negative pressure therapy and treatment with hyperbaric oxygen therapy.[2,6]

The purpose of the present study is to perform an analysis of the most prevalent epidemiological data on the disease: most affected age group, gender, association with other comorbidities, treatment performed, mortality due to the disease, mean length of stay, use of antibiotic therapy, and need for surgical procedure for treatment at the Hospital de Caridade São Vicente de Paulo de Jundiaí, from October 2016 to October 2018.

Objectives

To obtain epidemiological data of patients diagnosed with Fournier's syndrome from October 2016 to October 2018 and compare these data with those already described in the literature, in order to evaluate the incidence of the disease in the service mentioned, type of treatment and outcome of patients with Fournier's syndrome.

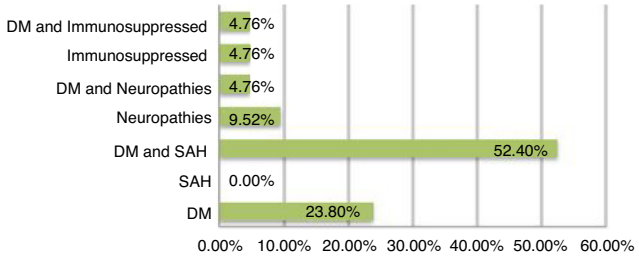

Fig. 1 – Graph of the percentage of patients with predisposing factors.

Table 1 – Extension of the lesion according to the classification of Feres et al., 2001.

Group	Patients	%
I	5	21.74%
II	5	21.74%
III	6	26.08%
IV	7	30.44%

Table 2 – Percentage of deaths according to the classification of Feres et al., 2001.

Grupo	Number os obitoś	%
I	1	20.00%
II	0	0.00%
III	1	16.67%
IV	3	42.85%

Material and method

Retrospective study of 23 patients diagnosed with Fournier's syndrome treated at the General Surgery Service of the Hospital São Vicente de Paulo, Jundiaí-SP, from October 2016 to October 2018.

The study began only after authorization by the Human Research Ethics Committee (CAEE #: 03158918.8.0000.5412).

This study was performed in accordance with the principles established by resolution CNS/MS 466/12 and in accordance with the Good Clinical Practice. From data available in medical records, we could evaluate the most effective type of treatment, as well as the necessary follow-up and assessment of the disease-related morbidity and mortality rates during hospitalization in the service evaluated in this study.

The following variables were recorded: age, gender, ethnicity, previous comorbidities, anatomical region first affected, lesion extent, antibiotic use and antibiotic class, need for surgical treatment, need for reoperation and number of reoperations, need for ostomy, need for ICU admission, length of hospital stay, need for hyperbaric chamber, and number of deaths resulting from the disease.

The results found in the statistical data analysis are shown in Fig. 1 and Tables 1–5, using Microsoft Excel 2014.

Table 3 – Amount of antibiotics used per patient.

Number of antibiotics	Patients
1	0
2	9
3	1
4	7
5	3
6	2
7	0
8	1

Table 4 – Patient × most commonly used antibiotics relationship.

Antibiotic	Patients
Ciprofloxacin	17
Clindamycin	17
Metronidazole	9
Ceftriaxone	8
Tazocin	8

Table 5 – Classification of the extent of necrosis area and correlation with mortality (Feres et al., 2001).[6]

Groups	Description	Mortality
I	Anterior perineum, scrotum and penis or vulva necrosis	12.5%
II	Group I + posterior perineum, perianal region up to 7 cm in diameter, rectum and perirectal fat	34%
III	Group II + sacral, gluteus, inguinal region, and penile necrosis	37%
IV	Group III + abdominal wall, suprapubic region, flank, chest wall, axillary region, and retroperitoneum	68.75%

Results

We evaluated 23 patients diagnosed with Fournier's syndrome, 18 men (78.26%) and 5 women (21.74%). The mean age was 55.6 years, ranging from 31 to 81 years.

When comparing the ethnicity ratio by the total number of patients with the disease, there was a prevalence of whites (56.52%), followed by browns (30.43%) and blacks (13.05%), with no oriental origin patients in the study.

When assessing the presence of comorbidities in the patients, it was found that only two patients had no comorbidities (8.70%), and of the 21 patients with comorbidities, 17 patients (80.95%) had diabetes mellitus, either alone or associated with other comorbidities.

Length of hospital stay ranged from 5 to 68 days, with an average of 20.13 days. The initial lesion was identified in all cases, and the most common origin was perianal (69.56%), followed by primary involvement of the scrotal region (21.74%); only one patient (4.35%) had initial lesion in the inguinal region and one (4.34%) origin of the lesion in the vulvar region.

Based on the anatomical classification according to the extension of the necrosis area, proposed by Féres et al. in 2001, 5 patients (21.74%) belong to Group I (anterior perineum, scrotum and penis or vulva necrosis), 5 patients (21.74%) belong to Group II (Group I + posterior perineum, perianal region up to 7 cm in diameter, rectum and perirectal fat), 6 patients (26.08%) belong to Group III (Group II + sacral, gluteus, inguinal region and penile necrosis) and 7 patients (30.44%) belong to Group IV (Group III + abdominal wall, suprapubic region, flank, chest wall, axillary and retroperitoneal region).

The percentage of deaths was 20% in Group I, 16.67% in Group III, and 42.85% in Group IV —there were no deaths in Group II.

The management of all patients consisted of surgical treatment with antibiotic therapy, associated or not with hyperbaric therapy.

Regarding antibiotic therapy, it was observed that no patient used monotherapy, ranging from 2 to 8 antibiotics per patient, with an average of 3.65 for each patient.

The most commonly used antibiotics were ciprofloxacin and clindamycin, both used in 17 patients, followed by metronidazole (9 patients) and by ceftriaxone and tazocin, both used in 8 patients.

All patients underwent radical surgical debridement ranging from 1 to 15 procedures, with an average of 2.61. Debridement consisted of excision of all necrotic tissue, saline cleaning, with or without drainage. In case of involvement of anal sphincters or wounds with the possibility of contamination with fecal material, colostomy was performed in such patients.

Colostomy was performed in 14 patients (60.87%), with 8 colostomies performed at the initial operation and 6 at reoperations.

Hyperbaric therapy was performed in 13 patients (56.52%), with a number of sessions ranging from 8 to 30 according to the need of each case, with an average of 14.84 sessions. The remaining patients did not receive hyperbaric oxygen therapy due to early death, contraindication to the procedure or it was not necessary due to good granulation of the debrided area.

The need for intensive care unit admission was seen in 19 patients (82.6%), ranging from 1 to 44 days in closed sector, with an average of 10.05 days. Of the five patients who died, all were admitted in a closed sector. The causal factor for death in these patients was septic shock, Adult Respiratory Distress Syndrome (ARDS), and Multiple Organ System Failure (MOSF). Overall mortality was 21.74% (5 patients).

Discussion

Fournier's gangrene, described by Jean Alfred Fournier in 1883, is characterized by an infection caused by synergistically acting aerobic and anaerobic organisms, resulting in a rapidly progressive infection, which is responsible for high morbidity and mortality rates.[1,2,9]

It affects both sexes, with prevalence in males. In the present study, 78.26% of male patients were affected, data consistent with the literature.[3,7,8]

The literature reports that the fifth decade of life is the average age of involvement; the present study found similar data, with a mean age of 55.6 years.

There is no prevalence of ethnicity in patients diagnosed with Fournier's syndrome in the literature.[1–3,7,9]

The current studies of the disease are aimed at identifying predisposing factors for its development. Diabetes mellitus

is the most common comorbidity associated with gangrene, present in 40–70% of patients; other comorbidities that may be associated include immunosuppression (HIV, presence of malignant neoplasms, corticosteroid therapy), neuropathies, renal and liver failure, hypertension, and obesity.[1,2,5]

The present study identified 21 patients with at least one comorbidity; of which, 17 patients (80.95%) had diabetes mellitus, alone or associated with other comorbidities; this shows that the incidence of diabetes associated with Fournier's gangrene in our service is higher than the percentage presented by the literature.

Currently, the initial lesion of Fournier's syndrome is identifiable in almost 100% of cases. According to the literature, urogenital involvement is present in most cases (45%), followed by perianal (33%) and cutaneous (21%) involvement. In our study, the most common initial lesion was of perianal origin (69.56%), presenting a higher incidence when compared to literature data.[2,4,6,10]

The extent of the lesion can be classified according to the anatomical classification by Feres et al.[10] proposing the division of patients into groups according to the extent of the lesion (Table 5). This classification allows the correlation of lesion size with increased mortality from the disease.

In the present study, the number of deaths in Group I was 20%, which is higher than the mortality rate shown by the classification by Feres et al. (2001), but with values lower than estimated by the their classification in Groups II (0% deaths), Group III (16.67% deaths), and Group IV (42.85% deaths).

According to the literature, the treatment consists of hemodynamic stabilization of the patient, associated with broad spectrum antibiotic therapy (for gram-positive skin germs, genitourinary and enteric tract gram-negative and anaerobic germs) and early and aggressive lesion debridement (surgical treatment). In the present study, all patients underwent surgical treatment associated with parenteral antibiotic therapy.[1,2,7,8]

Debridement should be repeated if necessary. The literature shows an average of 3.5 procedures per patient; our study found an average of 2.61 procedures per patient, which is consistent with the literature.[3,5,6,9]

Regarding antibiotic therapy, the literature reports the use of combined antibiotic therapy to better cover the germs involved in Fournier's gangrene, with the use of cephalosporin or aminoglycosides for gram-negative coverage, penicillin for gram-positive coverage, and metronidazole or clindamycin for anaerobic germ coverage[1–3]; our study found an average of 3.65 antibiotics for each patient, with predominance of ciprofloxacin and clindamycin (17 patients), followed by ceftriaxone and metronidazole (8 patients), showing agreement with the data presented in the literature.

Colostomy has been used for fecal diversion in cases of severe perineal involvement. The justification for rectal diversion includes a decrease in the number of germs in the perineal region and better wound healing, and intestinal transit diversion is performed when there is anal sphincter involvement, fecal incontinence or continuous fecal wound contamination. In the literature, the percentage of patients with colostomy is around 15%; our study demonstrated a higher number of colostomies than the literature (60.87%).[2,4,6,8]

The benefits of hyperbaric oxygen therapy include providing adequate oxygenation for neutrophil phagocyte function, inhibiting anaerobic growth by tissue hyperoxygenation, increasing fibroblast proliferation, and increasing angiogenesis. Although still supported by several small, retrospective studies, hyperbaric oxygen therapy should not delay definitive surgical treatment.[2,6,7,9] Our study found hyperbaric therapy in 13 patients, with a number of sessions ranging from 8 to 30, and there is no consensus in the literature on the average number of sessions for hyperbaric therapy.

The mortality rate shown in the literature ranges from 20% to 50%, and the total percentage found in our study was 21.74%, which corresponds to the rates found in the literature. The main causes of death were septic shock, ARDS and MOSF, demonstrating the persistence of high mortality rates due to Fournier' syndrome.[1,2,5,7,8]

The literature has not yet reached a consensus regarding the average number of days of hospitalization and intensive care units stays for patients diagnosed with Fournier's gangrene due to the disease progression variables.[1,2,9]

Conclusion

Fournier's syndrome is still considered a serious clinical entity that causes major deformities, requires various surgical interventions and prolonged hospitalization, in addition to being responsible for a high mortality rate.

In our study, we observed that the extension of the disease to the abdominal wall implied a higher number of deaths, reinforcing the need for early diagnosis, immediate and aggressive surgical treatment, and broad spectrum antibiotic therapy.

The condition should be considered a medical emergency. Thus, considering its severity, a high index of suspicion is necessary for an early diagnosis and all available therapeutic means should be offered, with the objective of controlling the infectious process and reducing the mortality rates resulting from the disease.

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Conflicts of interest

The authors declare no conflicts of interest.

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