







## Original Article

# Fournier's gangrene by perianal abscess

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### ABSTRACT

**Objective:** To describe and analyze the cases of Fournier's Gangrene caused by perianal abscess treated in a tertiary hospital in western Paraná, correlating possible factors that influence mortality, with emphasis on late diagnosis and therapy.

**Methods:** A retrospective and descriptive case series was carried out based on the analysis of medical records of patients with Fournier's Gangrene due to perianal abscess from January 2012 to December 2017.

**Results:** Thirty-one patients with Fournier's Gangrene due to perianal abscess were treated in the period: 26 men and 5 women. Mean age was  $53.51 \pm 14.5$  years. The most prevalent comorbidity in this group was type 2 diabetes mellitus, showing a strong correlation with mortality. The mean time from disease progression, from the initial symptom to the admission at the service, was  $9.6 \pm 6.81$  days. All patients were submitted to antibiotic therapy and surgical treatment, with a mean of  $3.25 \pm 2.89$  procedures/patient. Seven (22.58%) patients died and all of them showed signs of sepsis on admission; only 2 patients with sepsis did not die.

**Conclusion:** The presence of sepsis on admission and type 2 diabetes mellitus were strongly correlated with mortality.

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### Gangrena de Fournier por abscesso perianal

#### R E S U M O

**Objetivo:** Descrever e analisar os casos de gangrena de Fournier por abscesso perianal atendidos em hospital terciário do oeste do Paraná, correlacionando possíveis fatores que influenciem a mortalidade, com ênfase ao diagnóstico e terapêuticas tardias.

**Métodos:** Realizou-se um estudo de série de casos, retrospectivo e descritivo baseado na análise de prontuários de pacientes portadores de gangrena de Fournier devido a abscesso perianal no período de Janeiro de 2012 à Dezembro de 2017.

#### Palavras-chave:

Gangrena de Fournier

Fasciite necrosante

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**Resultados:** Foram tratados 31 pacientes com gangrena de Fournier por abscesso perianal no período, sendo 26 homens e 5 mulheres. A média de idade foi de  $53,51 \pm 14,5$  anos. A comorbidade de maior prevalência neste grupo foi diabetes *melitus* tipo 2, demonstrando forte correlação com mortalidade. A média do tempo de evolução da doença, do sintoma inicial até entrada no serviço, foi de  $9,6 \pm 6,81$  dias. Todos os pacientes foram submetidos à antibioticoterapia e tratamento cirúrgico com média de  $3,25 \pm 2,89$  procedimentos/paciente. Sete (22,58%) pacientes evoluíram para óbito e todos estes apresentavam sinais de sepse na admissão; apenas 2 pacientes com sepse não evoluíram a óbito.

**Conclusão:** Presença de sepse a admissão e diabetes *melitus* tipo 2 foram fortemente correlacionadas com mortalidade.

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## Introduction

The perianal abscess is an acute inflammatory event, which has several etiologies, with the main one being non-specific cryptoglandular infection.<sup>1,2</sup> This pathology manifests itself mainly as local edema, fever and pain.<sup>1-3</sup> When diagnosed early, the treatment consists of simple drainage,<sup>2,3</sup> which can be performed in primary health care. The lack of treatment or ineffective management allows the spread of infection from the perineum to soft tissues, with the subsequent development of necrotizing fasciitis, also known as Fournier's Gangrene (FG),<sup>1-3</sup> thus requiring a surgical approach for debridement, performed in tertiary care.<sup>2-4</sup>

Fournier's gangrene is a polymicrobial infection<sup>3,5-8</sup> and has various causes, and its main cause is the perianal abscess. This condition can lead to sepsis and death, with this evolution being closely correlated with late diagnosis and management, virulence of the involved microorganism, perianal abscess and underlying comorbidities.<sup>1,2,6-8</sup> Therefore, its early diagnosis is extremely important, allowing the implementation of adequate and efficient treatment, thus improving the patient's chances of survival.<sup>1-3</sup>

The treatment of FG consists of vigorous hydration, hydro-electrolytic balance restoration, drainage and broad-spectrum empirical antibiotic therapy.<sup>2</sup> The surgical treatment is performed through broad and radical debridement until healthy tissue is found.<sup>1-3</sup> To reduce fecal contamination and facilitate healing of the perineal wound, intestinal transit diversion through an ostomy can be performed. Moreover, several reconstructive procedures can be used to correct the tissue defect.<sup>2</sup>

Despite the aggressive multidisciplinary and surgical treatment, mortality rates vary between 20% and 40% in most cases but can vary from 4% to 88%.<sup>8,9</sup> This high mortality rate is partly attributable to the aggressive nature of the infection and the underlying comorbidities. The mortality rates are 2 to 3-fold higher in diabetics, elderly patients and in patients with delayed treatment.<sup>1</sup>

Given the severity of the evolution of perianal abscess due to FG with a high mortality rate, the aim of this study is to describe and analyze the cases of Fournier's gangrene due to perianal abscess treated in a tertiary hospital in western Paraná, correlating possible factors that can influence mortality, with emphasis on late diagnosis and therapies.

## Methods

This is a retrospective and descriptive study of case series, based on the analysis of physical and electronic medical records of patients with Fournier's gangrene due to perianal abscess treated at Hospital Universitário do Oeste do Paraná - HUOP in the municipality of Cascavel, state of Paraná, Brazil, from January 2012 to December 2017.

The patients were selected according to the inclusion criteria: a) Patients diagnosed with FG due to probable perianal abscess admitted to HUOP between January 2012 and December 2017; b) Over 18 years of age. The exclusion criteria were: a) Patients with other diagnoses; b) Patients under 18 years of age.

The data from the physical and electronic medical records were recorded on a data collection form containing information on demography, comorbidities, clinical and laboratory presentation, implemented treatment, evolution, complications and mortality (Table 1).

Additionally, the qSOFA score<sup>10</sup> was used to screen for sepsis on hospital admission, considering as positive cases the patients with suspected / documented infection plus a score of 2 or 3 on the qSOFA. With the help of complementary exams on hospital admission, the diagnosis of sepsis was supported by a SOFA score<sup>10</sup>  $\geq 2$ . Moreover, a mortality predictor score, the Charlson Comorbidity Index (CCI),<sup>11,12</sup> was also used, as shown in Table 1.

Efforts were made to maintain the confidentiality of the information collected and the anonymity of the patients involved in the study. This research project was approved by the Research Ethics Committee of Universidade Estadual do Oeste do Paraná (UNIOESTE) at its Campus in Cascavel / PR, under n. 56997516.1.0000.0107.

## Statistical analysis

The numerical variables were tested according to the distribution of normality by the Shapiro-Wilk test and, as they had a normal distribution, they are shown as means and standard deviations. Fisher's exact test was used for the correlations proposed according to the study aim. For the qualitative variables, frequency distributions were performed and shown as

**Table 1 – Data collection instrument.**

| Gender | Age (years) | Comorbidities                          | CCI | Pre-diagnosis evolution (days) | Hospital length of stay (days) | Total procedures performed | Presence of sepsis on admission | Death |
|--------|-------------|--|-----|--------------------------------|--------------------------------|----------------------------|---------------------------------|-------|
| M      | 50          | DM2                                    | 3   | 7                              | 11                             | 3                          | –                               | –     |
| M      | 47          | Absent                                 | 0   | 6                              | 8                              | 1                          | –                               | –     |
| M      | 23          | Paraplegia and CKD                     | 4   | 4                              | 41                             | 14                         | –                               | –     |
| F      | 77          | DM2 and SAH                            | 4   | 10                             | 13                             | 6                          | YES                             | YES   |
| M      | 74          | Smoking                                | 4   | 14                             | 20                             | 1                          | –                               | –     |
| M      | 51          | DM2                                    | 2   | 14                             | 14                             | 2                          | –                               | –     |
| M      | 62          | SAH, cardiopathy and smoking           | 4   | 15                             | 27                             | 4                          | –                               | –     |
| M      | 68          |  | 2   | 7                              | 15                             | 3                          | –                               | –     |
| M      | 53          | SAH, DM2, dyslipidemia and cardiopathy | 4   | 6                              | 35                             | 7                          | YES                             | YES   |
| F      | 61          | DM2 and SAH                            | 4   | 30                             | 10                             | 1                          | –                               | –     |
| M      | 47          | Smoking                                | 1   | 15                             | 31                             | 4                          | –                               | –     |
| M      | 69          | DM2 and SAH                            | 3   | 5                              | 17                             | 3                          | –                               | –     |
| M      | 73          | SAH                                    | 3   | 15                             | 20                             | 1                          | –                               | –     |
| M      | 40          |  | 0   | 7                              | 9                              | 2                          | –                               | –     |
| F      | 51          | DM2, SAH, smoking and obesity          | 4   | 10                             | 26                             | 5                          | YES                             | YES   |
| M      | 78          | SAH and smoking                        | 4   | 30                             | 17                             | 1                          | –                               | –     |
| M      | 63          | DM2 and smoking                        | 5   | 7                              | 55                             | 5                          | YES                             | YES   |
| F      | 54          | DM2                                    | 2   | 4                              | 24                             | 4                          | –                               | –     |
| M      | 73          | DM2 and CKD                            | 7   | 2                              | 2                              | 1                          | YES                             | YES   |
| M      | 35          | Smoking                                | 1   | 5                              | 3                              | 1                          | –                               | –     |
| M      | 38          | Smoking                                | 1   | 15                             | 5                              | 1                          | YES                             | –     |
| F      | 31          |  | 0   | 16                             | 8                              | 1                          | –                               | –     |
| M      | 41          |  | 0   | 7                              | 10                             | 2                          | –                               | –     |
| M      | 46          |  | 0   | 8                              | 2                              | 1                          | YES                             | YES   |
| M      | 48          | DM2 and SAH                            | 1   | 9                              | 16                             | 4                          | –                               | –     |
| M      | 58          | SAH and chronic liver disease          | 4   | 5                              | 12                             | 3                          | –                               | –     |
| M      | 56          | DM2 and obesity                        | 2   | 1                              | 42                             | 6                          | YES                             | –     |
| M      | 31          | Smoking                                | 1   | 7                              | 3                              | 1                          | –                               | –     |
| M      | 44          | DM2 and cardiopathy                    | 2   | 5                              | 2                              | 1                          | –                               | –     |
| M      | 50          | Obesity                                | 1   | 7                              | 129                            | 9                          | –                               | –     |
| M      | 67          | DM2 and SAH                            | 4   | 7                              | 29                             | 3                          | YES                             | YES   |

Source: The authors.

CCI, Charlson Comorbidity Index; M, Male; F, Female; DM2, Type 2 Diabetes Mellitus; CKD, Chronic Kidney Disease; SAH, Systemic Arterial Hypertension.

absolute numbers and percentage. The information obtained from medical records was shown in tables.

## Results

The sample consisted of 31 individuals treated during a 6-year interval, and most were males (Table 2). All patients had Fournier's gangrene on admission. Therefore, all of them were started on broad-spectrum antibiotic therapy, associated with surgical treatment for infection control, in addition to concomitant treatment of the associated conditions.

Of the comorbidities seen in the sample, type 2 diabetes mellitus (DM2) was the most frequent (45%), followed by sys-

temic arterial hypertension (35%). Other comorbidities such as chronic kidney disease, heart disease, obesity, dyslipidemia and chronic liver disease were also present, but at lower frequencies (<10%). Nine (29%) patients were septic on admission. The Charlson Comorbidity Index (CCI) mortality predictor score was calculated, and the results ranged from 0 to 7, with the mean of survivors being 2.04 and the mean of non-survivors, 4.

A total of 101 surgical procedures were performed, with an average of  $3.25 \pm 2.89$  procedures / patient. The patient with the highest number of interventions underwent 14 procedures. Colostomy was performed in 5 patients (16%) to control fecal contamination and cystostomy in 2 (6.45%), since surgi-

**Table 2 – Clinical profile of patients with FG due to perianal abscess, HUOP 2012 – 2017.**

| Variables                      | Results             |
|--------------------------------|---------------------|
| Male                           | 26 (83.87%)         |
| Female                         | 5 (16.13%)          |
| Age                            | 53.51 ± 14.56 years |
| Type 2 Diabetes Mellitus       | 14 (45.16%)         |
| Systemic Arterial Hypertension | 11 (35.48%)         |
| Smoking                        | 9 (29.03%)          |
| Alcohol use                    | 6 (19.35%)          |
| Pre-diagnosis evolution        | 9.6 ± 6.81 days     |
| Sepsis on admission            | 9 (29%)             |

Source: The authors.

**Table 3 – Surgical procedures in patients with FG due to perianal abscess, HUOP 2012 – 2017.**

| Type of surgical procedure    | Number of procedures performed |
|-------------------------------|--------------------------------|
| Debridement                   | 85                             |
| Colostomy                     | 5                              |
| Anorectal abscess drainage    | 3                              |
| Cystostomy                    | 2                              |
| Flaps                         | 2                              |
| Reconstructions               | 1                              |
| Other procedures <sup>a</sup> | 3                              |
| Total                         | 101                            |

Source: The authors

<sup>a</sup> Lower limb fasciotomy, scrotal abscess drainage and exploratory laparotomy.

cal debridement and / or infection-related edema affected the penile region, causing obstruction. Nineteen (61.29%) patients required further surgical debridement during the same hospitalization (Table 3).

In our sample of 31 patients, the mean hospital length of stay was 21.16 ± 23.93 days. Five (29.7%) patients remained in the Intensive Care Unit (ICU). Seven (22.58%) patients died, all of which had signs and symptoms of sepsis on admission, with  $p=0.00001$ . Other variables, such as DM2 and hospital length of stay, were also tested in relation to mortality (Table 4). The surviving patients were discharged and followed at the HUOP wound outpatient clinic.

## Discussion

Fournier's gangrene is a relatively uncommon condition, with an estimated incidence of 1.6 cases per 100,000 men,<sup>13</sup> with a peak incidence between the fifth and sixth decades of life; however, the incidence is increasing due to the increase in the population's life expectancy.<sup>9</sup> In our sample of 31 patients with FG due to perianal abscess seen over a 6-year period, the vast majority of patients, 83.87%, consisted of male patients and the mean age was 53.51 ± 14.56 years, in line with the epidemiological profile of the reviewed studies.<sup>4,6,7,9,13,14</sup>

Comorbidities comprise an important risk factor for the occurrence of FG, with DM2 being the condition with the great-

est association in the literature.<sup>3,4,7,15</sup> When correlating DM2 to the mortality in FG due to perianal abscess, we demonstrated a  $p=0.01941$ . Of the patients in our study, 45.16% were diabetics and 35.48% were hypertensive individuals. Five patients did not report any comorbidities. However, after the statistical analysis, there was no correlation between DM2 and the presence of perianal abscess as a probable cause of FG. Patients who died had a two-fold increase in the Charlson Comorbidity Index score, thus showing that comorbidities are a positive predictor of mortality.

The mortality rate related to FG reported in the literature, from ancient times to the present day, is about 20%.<sup>4,8,9</sup> In our study, this rate was 22.58%. According to Tenorio et al.,<sup>8</sup> late diagnosis and intervention have a high correlation with mortality. For Azolas et al.,<sup>16</sup> this association is not a significant risk factor at the statistical analysis. In our research, it took patients 4-30 days to access tertiary care; when analyzing it in numbers, there is an average of 9.6 days between symptom onset and diagnosis, which is considered a long time.

When correlating mortality with a period  $\geq 7$  days of pre-diagnostic evolution, we demonstrated a  $p\text{-value}=0.34$ , demonstrating the little relevance of this variable in our sample. The absence of difference can be justified by the relatively small sample, leading to a Beta error. Moreover, the hospital length of stay is a major risk factor for mortality, with  $p=0.055$ .<sup>16</sup> This condition occurs mainly due to the patient's septic disorder and the number of surgical interventions the patient has undergone.<sup>15</sup>

In our sample, the sepsis on admission factor was associated to all cases of death,  $p=0.00001$ . Of the 31 assessed patients, 9 had signs and symptoms of sepsis on hospital admission, of which 7 died. None of these patients had the opportunity to have the perianal abscess drained prior to the FG complication. Also, not all septic patients were admitted to the Intensive Care Unit (ICU), since, of a total of 9 septic patients, only 5 remained in the ICU. This situation is due to the scarcity of ICU beds on the admission day; therefore, these patients ended up receiving intensive care in the emergency room or infirmary bed, until a vacancy was available or until they showed clinical improvement. Of the 4 patients in this condition, two died on the second day of hospitalization, even before the change of sector could be attained, and the other two showed clinical improvement and did not require ICU admission.

Moreover, 101 surgical procedures were performed, with an average of 3.25 ± 2.89 procedures/patient. When dividing the surgical interventions into two groups, survivors and non-survivors, the average of interventions among non-survivors was 4/patient, while the average among survivors was 3/patient. This fact reinforces that the first surgery performed must be of ample resection, debriding all necrotic tissue until healthy tissue is found.<sup>1,2,6,15,16</sup>

## Conclusions

Considering the above, we can conclude that the correlation between the pre-diagnostic time of evolution and mortality did not show a significant association. This situation can be justified by the fact that our sample includes only patients

**Table 4 – FG mortality due to perianal abscess related to variables, HUOP 2012 – 2017.**

|  | Mortality     |               | p       |
|--|---------------|---------------|---------|
|  | Yes (total 7) | No (total 24) |         |
| Pre-diagnosis evolution $\geq 7$ days  | 5             | 16            | 0.34823 |
| Presence of sepsis on admission        | 7             | 2             | 0.00001 |
| Patient with Type 2 Diabetes Mellitus  | 6             | 8             | 0.01941 |
| Hospital length of stay $\geq 20$ days | 4             | 8             | 0.18240 |

Source: The authors

in tertiary health care; therefore, we did not obtain statistical parameters to make comparisons between patients that were treated early and those treated late.

Also, we can affirm that there was a strong correlation between mortality and signs of sepsis at admission, with  $p=0.00001$  and, also, between mortality and DM2, with  $p=0.01941$ . Moreover, we realized that even with current therapeutic advances and a multidisciplinary approach, FG continues to show prolonged hospital length of stay and high mortality rates.<sup>8,9,15</sup>

These data indicate the need for improvement in primary health care services, with training in the diagnosis of perianal abscesses, optimization of treatment and early referral of these patients to a specialist. Thus, there will be a reduction in the morbidity and mortality of this disease, since these are potentially preventable issues with an early intervention, either by identifying and draining of the abscess in the Basic Health Unit or through treatment at the tertiary level.

### Conflicts of interest

The authors declare no conflicts of interest.

### REFERENCES

- Vasilevsky CA, Gordon PH. Benign anorectal: abscesso and fistula. In: Wolff BG, Fleshman JW, Beck DE, Pemberton JH, Wexner SD, editors. The ASCRS Textbook of Colon and Rectal Surgery. Editora Springer; 2006. p. 192–214.
- Varut L. Anorectal emergencies. *World J Gastroenterol*. 2016;22:5867–78.
- Stevens DL, Bryant AE. Necrotizing soft-tissue infections. *New England J Med*. 2017;377:23.
- Dornelas MT, Correa MPD, Barra FML, Correa LD, Silva EC, Dornelas GV, et al. Síndrome de Fournier: 10 anos de avaliação. *Rev Bras Cir Plást*. 2012;27:600–4.
- IJFC Neto, Sia ON, Rolim AS, Souza RFL, Watte HH, Robles L. Clinical outcomes of Fournier's gangrene from a tertiary. *J Coloproctol*. 2012;32:407–10.
- Aridogan IA, Izol V, Abat D, Karsli O, Bayazit Y, Satar N. Epidemiological characteristics of fournier's gangrene: a report of 71 patients. *Urol Int*. 2012;89:457–61.
- Ersoz F, Sari S, Arikan S, Altioek M, Bektas H, Adas G, et al. Factors affecting mortality in Fournier's gangrene: Experience with fifty-two patients. *Singapore Med J*. 2012;53:537–40.
- Tenorio CEL, Lima SVC, Albuquerque AV, Cavalcanti MP, Teles F. Risk factors for mortality in fournier's gangrene in a general hospital: use of simplified fournier gangrene severe index score (SFGSI). *Int Braz J Urol*. 2018;44:95–101.
- Camargo L, Garcia-Perdomo HA. Gangrena de Fournier: revisión de factores determinantes de mortalidad. *Rev Chil Cir*. 2016;68:273–7.
- Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et al. The third international consensus definitions for sepsis and septic shock (Sepsis-3). *JAMA*. 2016;315:801–10.
- Charlson ME, Pompei P, Ales KL, MacKenzie R. A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chronic Dis*. 1987;40:373–83.
- Charlson ME, Szatrowski TP, Peterson J, Jeffrey G. Validation of a combined comorbidity index. *J Clin Epidemiol*. 1996;47:1245–51.
- Benjelloun E, Souiki T, Yakla N. Fournier's gangrene: Our experience with 50 patients and analysis of factors affecting mortality. *World J Emerg Surg*. 2013;8:13.
- Altarac S, Katušin D, Crnica S, Papeš D, Rajković Z, Arslani N. Fournier's gangrene: etiology and outcome analysis of 41 patients. *Urol Int*. 2012;88:289–93.
- Santos DR, Lovison K, Roman ULT, Westphalen AP, Netto FS. Profile of patients with Fournier's gangrene and their clinical evolution. *Rev Col Bras Cir*. 2018;45:e1430.
- Azolas RM. Factores de riesgo para mortalidad en gangrena de Fournier. *Rev Chil Cir*. 2011;63:270–5.