

Scientific Evidences on Therapeutic Methods in Treatment of Fournier's Gangrene

REVIEW

Daniel de Macedo Rocha¹, Sandra Marina Gonçalves Bezerra², Lídy Tolstenko Nogueira³, Maria Clara Batista da Rocha Viana⁴, Claudia Daniella Avelino Vasconcelos Benício², Raquel Rodrigues dos Santos⁴, Vanessa Caminha Aguiar Lopes⁵, Suelen dos Santos Silva⁴, Naila Luany Carvalho Brito⁴, Helayne Cassandra Ferreira Macedo¹, Deusiane Pereira da Silva¹, Wanderson Ferreira da Silva¹, Ketiana Melo Guimarães⁴, Emilson Pereira de Araújo⁶, Fábio Marcos de Sousa⁶, Antônio Gilberto Albuquerque Brito⁶, Raimundo Félix dos Santos Junior⁶, Antônio Vieira de Jesus⁶

Abstract

Introduction: Fournier's Gangrene consists of multi-bacterial rapid progression infection, involving genital, abdominal, and perineal region, promoting affected tissue necrosis. Considered a public health problem, compromises the patient life quality, and has high mortality coefficients.

Objective: Analyzing in the literature the therapeutic measures in patients diagnosed with Fournier's Gangrene.

Method: Integrative review from productions picked up in LILACS, IBECs, MEDLINE, PUBMED, and CUMED databases in the period 2005 to 2015. Fournier's Gangrene, Prevalence and Therapy descriptors in English and Portuguese were used. The search amounted to 765 productions, of which 17 were included as a sample for this study.

Results: The analysis regarding the publications enabled the construction of two thematic categories: demographic, epidemiological and clinical aspects of patients diagnosed with Fournier's Gangrene and the therapeutic modalities in treating Fournier's Gangrene. It was observed that the disease is prevalent in males, elderly, and people with diabetes mellitus. The treatment is based on antibiotics, surgical debridement, and skin reconstruction for the affected areas.

Conclusion: The diagnosis, assessment and multidisciplinary early intervention are essential to ensure proper treatment and life maintenance.

- 1 Nursing academic from the State University of Piauí. Scholarship Holder PIBIC UESPI.
- 2 Nurse, Assistant Professor I of State University of Piauí, Stomach Therapist, Doctoral Student of the Graduate Program in Nursing at the Federal University of Piauí.
- 3 Nurse, Associate Professor of the Graduate program in Nursing UFPI.
- 4 Nurse of Hospital Geral Promorar and Hospital Foundation of Teresina.
- 5 Nurse, Student Master's degree of State University of Piauí.
- 6 Doctor in Hospital Foundation of Teresina.

Contact information:

Daniel de Macêdo Rocha.

 daniel_m.rocha@live.com

Keywords

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Introduction

Fournier's Gangrene was described by Jean Alfred Fournier, in 1883, an infectologist that identified five cases of scrotal gangrene in young people with no apparent cause. [1] It is considered urological emergency and consists of multi-bacterial infection that affects the genital and perineal region tissues, with an edema area, necrotic tissue, purulent and fetid exudate, with risk of developing necrotizing fasciitis. The predominant bacteria include *Escherichia coli*, anaerobic organisms, staph and streptococcus, and act synergistically, promoting necrosis in the affected tissues. [2, 3]

This is an unusual infection. However, over time, a significant increase in the number of recorded cases was noted. Thus, Fournier's Gangrene represents a public health problem, with a view to its incidence, prevalence, mortality, and the high costs in the process of treatment and rehabilitation. [3]

The average incidence is 97 cases per year and the prevalence is approximately one case in 7500 patients, predominantly in males, between the third and sixth decade of life and with predisposing comorbidities. In 95% of cases, it is possible to determine the etiology of the disease, which is usually related to trauma, urologic surgeries or genital abscesses, associated with factors such as diabetes mellitus (DM). [4, 5]

In rare conditions, the lesion develops in women of any age group. This is because, when compared to men, they have better drainage of perineal vaginal secretions. [6] In addition, immunosuppression in patients with human immunodeficiency virus and acquired syndrome (HIV/Aids), elderly and malnourished people, poor intimate hygiene, obesity, alcoholism, drug addiction, trauma and low socioeconomic conditions can enhance lesion appearance and progression. [7]

Treatment is complex and varies from surgical techniques, in order to drain secretions and remove necrotic tissue, to carrying out special dressings aiming to preparing the injury for skin reconstruction.

The absence of an effective treatment may come to cause rapid extension of wound, sepsis, multiple organ failure and death. [8]

Considered stigmatizing, Fournier's Gangrene causes impacts on patient life quality, involving the physical, social and mental aspects. Therefore, early diagnosis, adequate treatment and holistic care are essential to minimize complications, reducing mortality and speeding up the healing process. [9]

Thus, in searching for an evidence for improving the rendered care and patient life quality, this study aims to analyze in the literature the therapeutic measures that can be established for a patient diagnosed with Fournier's Gangrene.

Methods

The integrative literature review was chosen for this study. It is a method where the researches are summarized and conclusions are laid down, allowing for synthesizing and analyzing the produced knowledge and providing actions and more effective care and interventions and with better cost-benefit ratio. [10, 11]

In preparing this review, the following steps were used: selecting study question, establishing inclusion and exclusion criteria, defining the information to be extracted from the selected studies, evaluating the included publications, interpreting the results and submitting the review. [11] Thus, this scientific research was conducted from the research question: What are the scientific evidences on therapeutic methods in treating Fournier's Gangrene

Search for articles occurred in the months of November and December 2015, in the following databases: Literatura Latino-Americana e do Caribe em Ciências da Saúde (LILACS), *Medical Literature Analysis and Retrieval System* (MEDLINE Complete) via EBSCO Information Services, Índice Bibliográfico Español en Ciencias de la Salud (IBECS), *Biblioteca Virtual en Salud de Cuba* (CUMED) e PubMed® via

Table 1. Distribution of scientific articles retrieved and selected in the databases, according to key-word combinations. Teresina, PI, Brazil, 2016.

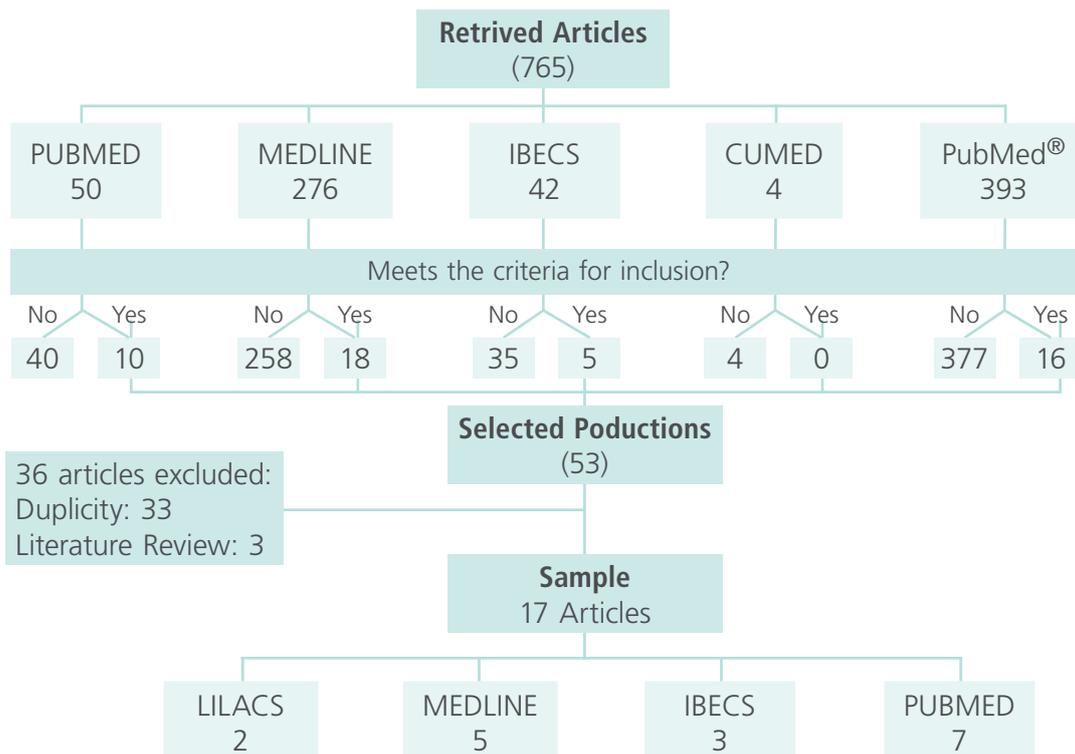
Combinations	LILACS		MEDLINE		IBECS		CUMED		PubMed®	
	AR	AS	AR	AS	AR	AS	AR	AS	AR	AS
Fournier's Gangrene and Therapeutic Prevalence.	10	2	57	5	12	2	1	0	0	0
Fournier's Gangrene and Therapeutics	25	2	140	3	16	0	1	0	1	0
Fournier's Gangrene and Prevalence and Therapeutics	2	0	15	2	4	0	0	0	0	0
Fournier's Gangrene and Prevalence	9	1	62	6	10	3	2	0	128	7
Fournier's Gangrene and Therapeutics	4	3	1	0	0	0	0	0	208	7
Fournier's Gangrene and Prevalence and Therapeutics	0	0	1	0	0	0	0	0	56	2
Total	50	10	276	18	42	5	4	0	393	16

Source: Research data

National Library of Medicine. One used the Health Sciences Descriptors (HSD): Gangrena de Fournier, Prevalência, Terapêutica, in Portuguese, and Fournier's Gangrene, Prevalence and Therapeutics, in English, which presented the same format for the Medical Subject Headings (MeSH), crossing them as shown in **Table 1**.

The articles were accessed through the journal portal of Coordination of Higher Level People Improvement (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES), in an area with recognized Internet Protocol (IP), and reviewed by two reviewers. For selecting the studies, the following criteria were adopted for inclusion: primary

Figure 1: Description for recovery and inclusion of articles. Teresina, PI, Brazil, 2016.



studies articles indexed in the described databases, published in the period from 2005 to 2015, in English, Portuguese or Spanish, with full text available and approaching the theme under study. The studies retrieved in more than one database had been excluded from the research, being considered just once.

Thus, 276 productions were located in MEDLINE, 18 of which met the inclusion criteria and were selected as a sample for this research. In the survey conducted in LILACS database, 50 references were found, 10 of which were included. The search in IBECs amounted to 42 publications, being 5 (five) selected for review. In CUMED, 4 (four) articles were found and no production was selected. The search in PubMed® amounted to 393 references and 16 met the inclusion criteria.

Figure 1 shows the recovery process and selection of articles.

In this step, 53 productions were selected for the full text reading. Later on, 36 productions were excluded, being 33 (thirty-three) for duplicity in the databases and 3 (three) for comprising secondary studies of literature review type. In this manner, 17 articles composed the sample and were analyzed.

For collecting the data, a validated instrument, containing information on authors, country and publication year was used; databases and periodicals; delineation of research and sample; study results and conclusions.

Data analysis and synthesis were performed in a descriptive form and the selected productions were organized in worksheets in Microsoft Excel, proceeding with the construction of tables according to the identified variables. In addition, classification of material and rating by semantic similarity, which allowed for constructing thematic categories: demographic, epidemiological, and clinical aspects of patients diagnosed with Fournier's Gangrene. And therapeutic modalities in treating Fournier's Gangrene.

Results

Table 2 displays the synthesis for the studies selected for this review, which represented the essence

Table 2. Synthesis of productions included in the literature review (n=17) on the treatment of Fournier's Gangrene. Teresina, PI, Brazil, 2016.

Principal author, year, country and journal	Delineation, sample and database	Results and conclusion
Anantha RV [12]; 2013; Canada; BioMed Central infectious diseases	Case study, descriptive and qualitative; N=1; MEDLINE	The patient underwent surgical debridement of scrotum, penis, and anterior abdomen. The scrotum swabs, gram-positive coccus were identified. The treatment was based on antibiotics, surgical debridement, and skin reconstruction.
Sorensen MD [13]; 2009; United States of America The Journal of urology	Epidemiological descriptive and quantitative; N=1680; MEDLINE	The disease prevailed in 1,641 men and 39 women. Overall incidence was 1.6 per 100,000 inhabitants and the age ranged from 50 to 79 years. General mortality rate was 7.5%. Patients were rarely treated in hospital.
Eskitaşcıoğlu T [14]; 2014; Turkey; Ulusal Travma ve Acil Cerrahi Derneği	Retrospective, quantitative and descriptive, N=80; PUBMED	The disease prevailed in men (76), identified in just 4 (four) women, with an average age - 53.5 years. The scrotum was the most affected area and DM was a predisposing factor. The main cause was related to the trauma. Fournier's Gangrene has high mortality rate and early and correct diagnosis may avoid inappropriate treatment or its delay, and patient's death.

Principal author, year, country and journal	Delineation, sample and database	Results and conclusion
Carvalho JP [16]; 2007; Brazil; International Brazilian journal of urology	Retrospective, descriptive and quantitative; N= 80; MEDLINE	All patients performed scrotum and perineal region debridement. Fournier's Gangrene is a severe pathology that should be treated aggressively with debridement and surgical reconstruction of the involved regions.
Omisanjo AO [17]; 2014; Nigeria; Annals of African medicine	Retrospective, descriptive and quantitative; N = 11; MEDLINE	All patients were male. They were submitted late to hospital environment, however, through aggressive and appropriate treatment, it was possible to minimize morbidity and mortality caused by this injury.
Chinchillaa RM [18]; 2009; Spain; Actas urológicas españolas	Observational, retrospective, descriptive, quantitative; N=20; PUBMED	It was predominant in the masculine gender with 61-year average age. The main predisposing factor was DM, the average time of hospitalization was 25.7 days, and general mortality rate was 10%. Early diagnosis and appropriate multidisciplinary and aggressive intervention are essential for proper recovery.
Medina PJ [19]; 2008; Spain; Actas urológicas españolas	Retrospective, descriptive and quantitative; N=90; IBECS	One noted mortality rate - 34.4% - in patients with an average age - 63.0 years. Comorbidities found in 51 patients, being the main DM. Patient's age and presence of risk factors have an impact on the disease prognosis.
Sámano VL [20]; 2007; Spain; Archivos españoles de urología	Transversal, retrospective, and tivo descriptive; N=40; IBECS	Patients were 21 and 93-year old, predominantly males (97.5%). The most common etiological factor was DM-associated urethral stricture. Handling Fournier's Gangrene is multidisciplinary and is based on giving systemic antibiotics, on surgical debridement and skin reconstruction.
Dornelas MT [21]; 2012; Brazil; Brazilian Journal of plastic surgery	Retrospective Cohort; N=23; LILACS	Patients aged between 20 and 50 years, 26.1% with pre-existing comorbidities, being alcoholism and DM the most identified. Mortality rate was 13%. Treatment was based on giving antibiotics, surgical debridement, and skin reconstruction.
Janane A [22]; 2011; Marroco; Actas urológicas españolas	Retrospective, descriptive and quantitative; N=70; IBECS	11.48% mortality rate and 88.5% survival rate. All patients underwent complimentary hyperbaric oxygen therapy and surgical debridement. Metabolic disorders, with the extent of the disease, determine severity and patient's survival.
Neto IJFC [23]; 2012; Brazil; Journal of coloproctology	Retrospective, descriptive and quantitative; N=13; LILACS	Predominance in the masculine gender with 61-year average age. The predominant etiologic Agent was E. coli, and the most widely used antibiotic scheme was association of metronidazol and ciprofloxacin. The average number of surgeries was 2.07 per patient, with realization of derivative osthomy in 53.8% patients. Mortality rate was 30.8%.
Haidari M [24]; 2014; Iran; Journal of the Pakistan Medical Association	Transversal; N=17; PubMed®	Average patient age was 47 years. DM was the most predisposing factor identified. In 58.8%, Fournier's Gangrene was consequent to peri-anal abscess. In all cases, surgical debridement was carried out and, loop colostomy in 23.5%.

Principal author, year, country and journal	Delineation, sample and database	Results and conclusion
Tovar RJ [25]; 2012; Spain; Asian journal of surgery	Retrospective Cohort; N=70; PubMed®	Male gender predominance (88.6%), with 57.9-year average age, 82.9% presence of perineal pain, and 60% fever. DM coexisted in 55.7% of cases. All were submitted to surgical debridement, and 54.3% carried out new debridements. Mortality rate was 22.9%.
Altarc S [26]; 2011; Slovenia; Urologia internationalis	Retrospective Cohort; N=41; PubMed®	Predominance in the masculine gender (39) with 59-year average age. The treatment covered surgical debridement and broad-spectrum antibiotics. Mortality rate was 36.6%. In 19.5% cystostomies were required and, in 14.6%, colostomies.
Ersöz F [27]; 2012; Turkey; Singapore medical journal	Retrospective Cohort; N=52; PubMed®	Of the 52 patients, 12 died and 40 survived. The average debridement was 2.9. Peri-anal abscess was the most common etiology. Colostomy was carried out in 13 patients. Treatment comprised debridement, hyperbaric oxygen therapy, and vacuum closure.
Barreda TJ [28]; 2010; Spain; Cirugía española	Retrospective Cohort; N=41; PubMed®	Predominance in the masculine gender (93%) with 60-year average age. DM was the most common risk factor with 49%, followed by 46% alcohol. Anal origin occurred in 66% of cases. Mortality rate was 29%. Presence of gram-positive bacteria in 93% of cases. Early diagnosis, surgeries, and giving antibiotics assured the proper treatment.

for preparing and analyzing the results, discussion, and conclusion on the treatment of patients diagnosed with Fournier's Gangrene.

Results showed that the publications focused on the year 2012 5 (29.41%), followed by the year 2014 3 (17.65%). It was found in the analyzed publications that the majority comprises international studies 14 (82.35%) and, among these, Spain represented the country with the largest number of productions 5 (29.41%).

Furthermore, it was possible to observe the presence of 14 separate journals, where *Actas Urológicas Españolas* has the largest number of publications 3 (17.65%), followed by the *Urology Internationalis*, that published 2 (11.76%) of the selected studies. Regarding methodological aspects adopted in the productions, 8 (47.05%) showed descriptive, retrospective design, with a quantitative approach, 5 (29.41%) were retrospective cohort studies and the rest were 2 (11.76%) cross-studies, 1 (5.88%) epidemiologic and 1 (5.88%) case study.

Discussion

Fournier's Gangrene represents a global health problem, since it is considered an extremely severe disease due to rapid progression, incidence rates, high prevalence, and mortality and for provoking major impacts on health services and patient life quality.

Demographic, epidemiological, and clinical aspects of patients diagnosed with Fournier's Gangrene

Epidemiological data have revealed that, despite the high rates of mortality, there has been a significant reduction of these coefficients due to early diagnosis and establishment of an aggressive and appropriate treatment. In Spain, in 2008, mortality rate was 34.4% and in 2012 it receded to 22.9%. [19]

As for the demographic aspects, Fournier's Gangrene is prevalent in males, with advanced age, on average 55 years, and in rare conditions, it is identified in women of all age groups. [13, 27] Considering the risk factors for the onset and progression of the injury, DM is the main predisposing factor and it was found in about 55% of cases. Its association with obesity, alcoholism, and smoking increased the chances for developing the disease. [25, 28]

With regard to the causes, the productions have shown that, initially, Fournier's Gangrene was described as an unknown-etiology disease. Through the development of researches, the precedence of an underlying pathological process was noted, such as perineal abscess, urethral infection, neoplasms, and traumas or associated with genital hair removal. [18]

Some studies that evaluated the pathogens found in the injury proved to be a multi-bacterial infection with presence of aerobic and anaerobic bacteria. These are normally not pathogenic; however, when associated with and in favorable conditions, they act synergistically, contributing to the rapid infection spread. [28]

In this way, it is evidenced that skin and muscle involvement caused by this injury is extensive, affecting different parts of the body, such as scrotum, which has prevailed as the most affected by the disease. Other often-compromised areas are perianal region, inguinal region, abdominal wall, penis, and vulva. [14]

In this sense, the selected studies showed that the most important aspect in handling Fournier's Gangrene is identifying and controlling risk factors, as well as the early recognition of the disease. These are ways to ensure the appropriate treatment, minimizing possible complications and promoting life quality for the patient.

Therapeutic modalities in treating Fournier's Gangrene

Among the therapeutic measures, one emphasizes hemodynamic and nutritional support, strict intravenous hydration, broad-spectrum antibiotics, and surgical debridement. Whenever necessary, those were supplemented with urinary or fecal diversion, through cystostomies and colostomies, and skin repair. [14, 21] Thus, in order to promote an appropriate treatment, it is essential to get multidisciplinary approach for health team, including assessing the injury, which usually features a large extent, by the nurse.

Antibiotic therapy represents an initial and fundamental measure, which must be carried out immediately after establishing the diagnosis. The therapeutic scheme is adopted in order to encompass a multi-bacterial flora during the identification of pathogens found in the injury. In the reviewed studies, it was initially recommended to use metronidazol and ciprofloxacin. [23]

Literature has shown that early surgical debridement is required in order establish antibiotic therapy, which aims to remove the devitalized tissue and stop the progression of infection. [29] The extent of necrotized tissue resection, performed in a surgery act, touches the viable tissue and may require additional procedures such as colostomies, indicated in situations where there is a risk for fecal contamination, and cystostomies, where the urine is considered an infection source. [14, 26, 27]

Two studies, one Brazilian and one Spanish, have recommended as an adjunct therapy for treating Fournier's Gangrene, hyperbaric oxygen therapy, for increasing oxygen concentration in the tissues, fighting the anaerobic bacteria and promoting patient's healing. This therapy helps for reducing necrosis extent, removes the exudate, stimulates angiogenesis, and reduces bacterial contamination. [21, 22]

Performing a surgical debridement may cause deformation in the skin and deeper structures, which usually involve the genitalia, perineum, and anterior abdominal wall, extending to extreme cases of penis amputation. Reconstructive surgeries and using new technologies for treating wounds are necessary to optimize wound treatment. [16]

Among these technologies, the nurse has tools for evaluating and treating this injury, such as interactive coverings in order to reduce the bacterial load, absorbing the exudate and maintaining moisture balance. These actions promote wound bed preparation for surgical reconstruction or healing. [30]

Thus, the repairing treatment depends on the injured area, where small losses can be repaired with sutures for approximating the edges. The extensive lesions, in their turn, demand skin grafting, where the thigh fasciocutaneous tissue flap is highlighted, for having a good thickness, ease of rotation, excellent aesthetic aspect and rarely shows necrosis due to good vascularization. [21] Having in view the severity of the disease, early diagnosis and proper treatment, as well as evaluating the injury by the multidisciplinary team, are essential in order to minimize the complications and promote life quality for the patient.

Conclusion

Epidemiological and clinical data of Fournier's Gangrene demonstrated that it is a global public health problem. Although the therapeutic advances are reprehensive, it still has high mortality rates, and requires early diagnosis, planning, and implementation of effective interventions for life maintenance.

Thus, the treatment based on broad-spectrum antibiotics and aggressive surgical debridement are effective in controlling the infectious process, providing surgical reconstruction for the affected areas. In addition, adjuvant therapies should be adopted, such as controlling modifiable risk factors, using hyperbaric chamber, e hemodynamic and nutritional support.

This review explored a consistent sample of studies, arising from scientific journals, with high impact factors. The survey was comprehensive, since it gathered and synthesized articles from different countries and provided bases for expanding knowledge and decision making on the required interventions in order to minimize the impact of the disease, with regard to the patient's life quality and morbidity and mortality rates.

Given these considerations, this study showed how limitations on lack of evidences on the topi-

cal treatment, as well as nursing care in handling Fournier's Gangrene.

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