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Fournier's gangrene as a rare complication in patient with uncontrolled type 2 diabetes treated with surgical debridement: A case report and literature review

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ABSTRACT

INTRODUCTION: Fournier's gangrene is a potentially fatal emergency condition, supported by an infection of perineal and perianal region, characterized by necrotizing fasciitis with a rapid spread to fascial planes. FG, usually due to compromised host, may be sustained by many microbial pathogens.
CASE REPORT: A 66-year-old man, with a history of uncontrolled type 2 diabetes, obesity with BMI 38, chronic kidney failure and chronic heart failure, was admitted to the Emergency Department with a large area of necrosis involving the perineal and perianal regions.
DISCUSSION: Fournier's gangrene is favoured by hypertension, obesity, chronic alcoholism, renal and heart failure. Generally, Fournier's gangrene needs other procedures in addition to wound debridement such as colostomy, cystostomy, or orchiectomy.
CONCLUSION: We report a case of FG found as complication in a patient with uncontrolled type 2 diabetes, treated with effective combination therapy with surgical debridement and antibiotics infusion.

1. Introduction

Fournier's gangrene (FG) is a rare disease which usually affects men. It is characterized by rapidly progressive necrotizing fasciitis of the perianal and genitourinary area [1]. Jean Alfred Fournier described it in 1883 as an idiopathic process found only in young men [2]. The epidemiology has changed considerably since it is currently recognized to occur at any age and in any gender and with several identifiable aetiological factors [3,4]. The report describes a case of a large area of necrosis involving the perineal and perianal region. Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editor-in-Chief of this journal on request.

The work has been reported in line with the SCARE criteria [5] and registered on ClinicalTrials.gov registry (registration ID: NCT04694053; https://clinicaltrials.gov/show/NCT04694053).

2. Case report

A 66-year-old man with uncontrolled type 2 diabetes, obesity, chronic kidney failure and chronic heart failure presented to the Emergency Department with painful swelling in the perianal region. The patient did not deliver to the team any detail regarding relevant genetic information, drug addiction or smoking status. He reported the onset of symptoms about 14 days before his hospitalization, without consulting any doctor due to Covid-19 pandemic. His blood pressure was 175/75, his pulse 112 beats per minute and his temperature 38,5 °C. The physical examination of the perianal region revealed the presence of a large area of necrosis, extended laterally from the root of the thighs, upwards towards the scrotum and downwards towards the buttocks. The necrosis included the entire circumference of the last 3–4 cm of the rectum, extending to the plane of the elevators of the anus (Fig. 1). Laboratory tests showed the presence of anaemia, in addition to increased leukocyte count and decreased levels of bicarbonate, potassium, sodium, calcium, hyperglycaemia, elevated serum creatinine level, azotaemia and hypoalbuminemia.

CT revealed the presence of abscess with maximum diameters 6 × 4 cm and irregular and poorly delineated contours appreciable in the perianal and perirectal sites bilaterally. The terminal portion of the rectum appeared contralaterally displaced, in addition to the presence of some hydro aerial levels. The abscess extended to the level of the elevator anal muscle. The diagnostic imaging test also discovered a thickening of the subcutaneous fat with multiple and diffused gaseous bubbles both in the perianal and mesorectum region. CT found the presence of some small locoregional enlarged lymph nodes (Fig. 2). Consequently, the surgical team discussed the clinical case promptly and made a diagnosis of Fournier's gangrene or necrotizing fasciitis of the perineum.

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Fig. 1. Fournier's gangrene before treatment.

The extension of the pathology would have required the execution of a faecal diversion such a colostomy. However, the overall clinical situation of the patient led the surgical team to proceed differently and to choose a surgical debridement. First therapy planned was the administration of resuscitation intravenous fluid. Subsequently, the surgical team set an antibiotic therapy based on a combination of Metronidazole 500 mg every 8 h for 5 days and Meropenem 1 g every 8 h for 7 days. All the therapies were in agreement with the nephrologist as a result of known patient medical history regarding his chronic kidney failure.

The patient was taken to the surgical room approximately two hours after the access to the Emergency Department. Provenzano D (Surgery Resident) and Zanghì G (Instructor of Surgery) performed an extended surgical debridement to healthy tissue of external genital, as well as perineal, and infrapubic regions. The microbiologic culture of the wound specimen revealed *Escherichia Coli*, so Meropenem and Metronidazole were administered until patient discharge. During hospitalization, the surgeons made three surgical debridement and five surgical wound revisions. The patient was discharged 20 days after the first surgical debridement. The graft was not performed because after the second debridement the site was healing. However, the surgical team scheduled a daily outpatient surgery visit, performing advanced modern wound dressing with Bioactive and Hydrocolloid agents (Condress® and Promogran®) until total healing of the perianal region. (Fig. 3).

Fig. 3. Fournier's gangrene after treatment.

3. Discussion

Fournier's gangrene is favoured by hypertension, obesity, chronic alcoholism, renal and heart failure, as well as congestive heart failure and immunosuppression. The rate of patients affected by Fournier's gangrene who presents diabetes mellitus is estimated between 36–56%, attributed to their small vessel disease, defective neuropathy and immunosuppression [6]. FG is one of the rarest but very serious conditions, which appears as a complication in patients with diabetes mellitus. Patients usually have a BMI > 30 or higher [7]. Colorectal sources such as local infection, abscesses, and colonic perforations, in addition to urologic sources such as chronic urinary tract infection, neurogenic bladder, as well as Bartholin's glands abscess, and hysterectomy in women, may be considered as predisposing factors. Although the overall mortality rate is nearly 20–40%, it can be as high as 70–80% if the patient presents with sepsis, or lower than 10% whether it treated promptly (Table 1).

Most of the patients present fever, purulent collection and sepsis, reporting local discomfort. The diagnosis of FG is made by physical examination [8]. Cellulitis, herpes infection, scrotal abscess, and orchitis could be considered as a differential diagnosis [9]. Ultrasonography, x-rays, and magnetic resonance may be helpful when the diagnosis is uncertain [9]. Radiology studies can be useful to assess the extent of disease. Radiography can show hyperlucency concerning soft-tissue gas; however, it is not effective to detect deep fascial gas. Scrotal contents and, in some cases, testicular involvement can be diagnosed by ultrasonography. CT provides the highest specificity for the diagnosis of Fournier's gangrene and to aid in surgical planning [10,11]; furthermore, it can be also useful

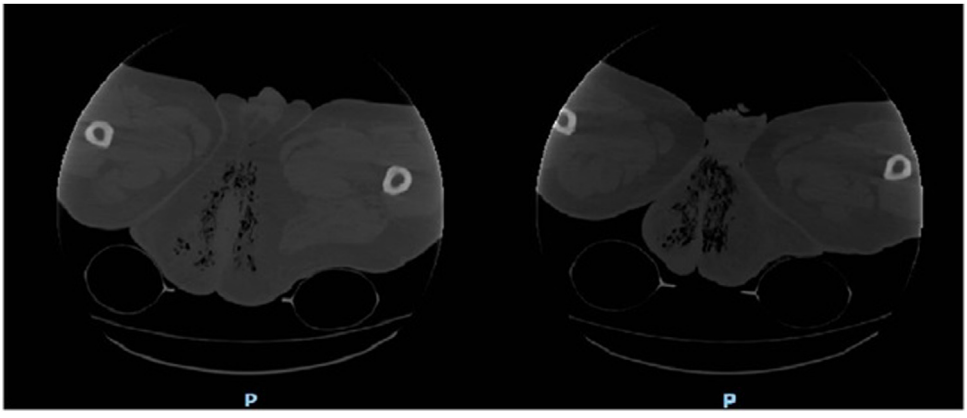

Fig. 2. Computer Tomography of the abdomen and pelvis that showed the extent of disease.

Table 1
Mortality rate in literature.

Primary author	Year	Journal	Number of Fournier's	Mortality rate, %
Heijkoop et al.	2019	ANZ J Surg	14	7
C S Meki et al.	2018	S Afr J Surg	51	27
Chalya et al.	2015	BMC Res Notes	84	29
Erdogan et al.	2015	Eur J Trauma EmergSurg	84	12
Ngugi et al.	2014	AfrHealth Sci	146	21
Ylmazlar et al.	2014	UlusTravmaAcilCerrahiDerg	120	21

to identify the presence of fascial air, muscle and fascial oedema, fluid tracking, and lymphadenopathy. Magnetic Resonance Imaging can be used to evaluate soft tissue and define the extent of inflammatory disease, though it may be used occasionally in cases with unclear findings. Fournier's gangrene is an infection of necrotizing soft tissues and *Escherichia Coli* is the most common microbial pathogen; however, additional pathogens could be found such as Klebsiella, Pseudomonas, Enterococcus, Streptococcus and Staphylococcus Aureus. The polymicrobial nature of Fournier's gangrene, with contributions by both aerobic and anaerobic bacteria, is necessary to create the production of collagenase, streptokinase and hyaluronidase which promote the rapid spread of infection. The platelet aggregation and inhibit of the phagocytosis of bacteria aid further spread of the infection. Bacterial infection spreads from a localized infection as an obliterating endarteritis into an ischemia and tissue necrosis, based on the microbiological agent [12].

The infection tends to spread from the superficial (Colles fascia) to deep fascial planes of the perineum. In patients with severe clinical presentation can be found malodorous drainage in affected sites, with perianal pain, purulent discharge from the perineum and fever; due to these critical conditions, they can rapidly deteriorate to sepsis and multiorgan failure, the most common cause of death [13].

Patients with Fournier's gangrene can be critically ill, so they require immediate resuscitation. Fluid resuscitation, correction of electrolyte imbalances, and broad-spectrum intravenous antibiotics, including agents against aerobic, anaerobic, Gram-positive, and Gram-negative bacteria, must be administered as soon as possible [14]. Gentamicin, clindamycin, and either ampicillin plus Sulbactam or a third-generation cephalosporin are the recommended antibiotics. Agents such as fluconazole, Vancomycin or Piperacillin-tazobactam should be chosen to cover fungal infections [15]. The antibiotic therapy should be continued until the patient becomes clinically stable; tissue samples should be sent for culture and sensitivities in order to target the therapy.

Early surgical intervention is the mainstay of treatment for Fournier's gangrene and the extensive debridement should be performed within the first 12 h of admission [16]. Debridement includes removal of all nonviable tissue and resection until bleeding skin margins are encountered. The wound is irrigated with saline solution after the debridement, followed by accurate haemostasis. It is strictly recommended covering exposed tissue with saline-soaked gauze, which should be changed frequently throughout the day. VAC system can be used to achieve a clean wound to facilitate definitive reconstruction, reduce the length of hospital stay and cost [17]. Hyperbaric oxygen, when combined with debridement and dressing changes, can reduce the healing time [18]; however, in this case, it was not applicable due to the severe heart disease of the patient. In some cases, depending on the extent of the disease, Fournier's gangrene needs other procedures in addition to wound debridement such as colostomy, cystostomy, or orchiectomy; nevertheless, clear indications regarding such procedures cannot be found in the literature. The faecal diversion can prevent wound contamination and promote healing, so it should be considered [19]; however, the choice is at the discretion of the general surgery team and remains controversial [20].

4. Conclusion

Fournier's gangrene remains a surgical emergency, which must be treated by a combination of medical and surgical therapy. The case report describes a large perineal and perianal necrotizing fasciitis as a complication in patients with diabetes mellitus. Due to the extent of the disease, the case could have been treated with a colostomy, as it has been done similarly in previous cases during our experience. However, the combination therapy of surgical debridement and antibiotics infusion was effective. In conclusion, it is required a prompt application of a multimodal approach with intravenous fluid support, antibiotic therapy, correction of metabolic disorders, and an aggressive surgical approach to improve the chance to successful therapy.

Conflicts of interest

No conflicts of interest.

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Ethical approval

Approved by ethical commission of our Hospital in Italy.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

All the Authors (Provenzano D, Lo Bianco S, Vecchio R, Zanghì G) contributed to conceptualization, data curation, investigation, methodology and writing. In addition, Provenzano D, Lo Bianco S and Fedele C supervised and reviewed the manuscript.

Registration of research studies

ClinicalTrials.gov, NCT04694053 available at: https://clinicaltrials.gov/show/NCT04694053.

Guarantor

Dr. Daniele Provenzano.

Provenance and peer review

Not commissioned, externally peer reviewed.

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