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# Successful perineum and scrotal reconstruction after Fournier gangrene using rotation of a medial thigh fasciocutaneous flap. Report of a case in low-resource settings and literature review

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Case Report

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## ABSTRACT

**Background:** Fournier's gangrene is a form of necrotizing fasciitis involving the perineal and scrotal region. It is characterized by rapid and extensive tissue destruction associated with signs of systemic toxicity. It's a real medical and surgical emergency. The diagnosis is essentially clinical and assisted by imaging in cases of atypical presentation. The urgent medical care associated with extensive surgical debridement helps to reduce the morbidity and mortality of this pathology with devastating consequences. Secondly the treatment will consist of tissue reconstruction when local and general conditions permit.

**Case Presentation:** the authors report the case of a 54-year-old black obese man, who is semi-Bantu ethnic group. He was transported to the emergency department of Douala Laquintinie Hospital (DLH) for painful swelling and offensive smell from bursa and perineal region for 4 days prior to admission. These symptoms were preceded by progressive peri-anal painful swelling unrelated to stool and fever. The diagnosis of Fournier's gangrene following anal abscess was made. The initial care consisted of intensive resuscitation with correction of hydroelectrolytic imbalance, broad spectra antibiotics and analgesics. The patient subsequently underwent major debridement in the operating room. The second stage of management consisted of a cutaneous reconstruction using a rotating fasciocutaneous flap taken bilaterally from each anteromedial aspect of the thighs.

**Conclusion:** Fournier's gangrene is a serious and life-threatening condition. It requires early diagnosis, adequate treatment without delay associating resuscitation measures and extensive debridement in the operating room. The second stage of management consists of tissue reconstruction using skin grafts or fasciocutaneous flaps most often.

**Key words:** Fournier's gangrene, fasciocutaneous flap, reconstruction

## INTRODUCTION

Necrotizing soft tissue infections are a general term that includes necrotizing forms of cellulitis, fasciitis and myositis clinically [1]. These infections could damage various points: the epidermis, dermis, subcutaneous tissues, fascia and muscles. Fournier's gangrene is a rapidly progressive necrotizing fasciitis involving soft tissues of the perineum and external genitalia[2]. This infection, like all other forms of necrotizing fasciitis, is clinically characterized by extensive and fulminant tissue destruction, signs of severe systemic toxicity and high mortality[3]; this mortality rate varies between 7.5 and 50% depending on the series [4,5].

The term Fournier is given to this form of fasciitis by a French dermatologist, Jean-Alfred Fournier in 1883 [6]. This is most often a poly-microbial infection [1,5], the bacterial flora depends on the site of origin. The germs most frequently involved enterobacteria, anaerobes, staphylococcus, streptococcus or fungi. Although several cases of idiopathic infection have been described, the source of infection for etiology is identified in almost 95% of cases[7–9]. The source may be colorectal, genitourinary, cutaneous or traumatic [2]. Colorectal origin is most common with perianal abscesses, colorectal cancer, rectal instrumentation [10]. The urogenital origin is objectified in 17 to 87% of cases [8,11], urethral stricture, urethral instrumentation and indwelling catheterization represent the clinical situations found. The incidence of the pathology varies according to the literature; the usual age of patients varies between 30 and 60 years, although cases in infants have been described. It is an essentially a pathology found in male who is ten times more attacked than women [2]. Notwithstanding the source of the infection, several conditions or factors increase the risk of developing the disease; they are found in 52 to 88% of patients [3]. Situations that depress immunity such as diabetes, alcoholism, chronic kidney disease, glucocorticoid therapy, immunosuppressive therapy, malnutrition and neoplasia [3,12].

Fournier's gangrene is a diagnostic and therapeutic emergency. The clinical presentation varies depend-

ing on the stage of infection, comorbidities and the general condition of the patient. In the early stage, the main manifestations of the disease are: pain (79%), erythema (71%), swelling (81%) [13]; these symptoms sit in the perineal, scrotal, or even at the perianal region. At the later stage, the pain becomes throbbing, the fever is permanent, and the general state deteriorates. There are also signs of skin changes such as bubbles, subcutaneous emphysema, greyish appearance of the skin, foul odor and cutaneous necrosis. Laboratory exams are not a great help to diagnosis but are used to evaluate the impact of the pathology. The CT scan is the imaging examination of choice [5], it helps to define the limits of extension of the disease, and makes it possible to identify the underlying causes sometimes. It should not delay the implementation of the treatment.

The management of Fournier's gangrene is a medico-surgical emergency, it is done in two steps. The first is the acute phases. It consists of resuscitation measures, including electrolyte balance and antibiotic therapy. This is followed by rapid extensive surgical debridement. Once the infectious process is postoperatively controlled and the budding is adequate, the second phase or skin reconstruction step is undertaken. Fournier's gangrene is the most common cause of genital and perineal skin loss [2]. Several processes for recovering losses of substances are described [14]; such as: second-stage wound healing, tension sutures, skin grafts or skin flaps can be used.

We report here a case of Fournier gangrene in a 54-year-old patient following a peri-anal abscess. The reconstruction of the tissues was done using a fasciocutaneous and pedicled flap from the inner thighs. We then carried out a literature review under PubMed and Embase, the key words being "Gangrene, Fournier, necrotizing fasciitis". We reviewed the observational, analytic and clinical case studies published over the last 10 years from May 2008 to May 2018.

## CASE PRESENTATION

This is the case of a 54-year-old black man, who is semi-Bantu ethnic group. He was transported to the emergency department of Douala Laquintinie Hospital (DLH) for painful swelling with an offensive scrotal smell. Seven days before admission, the patient complained of a peri-anal pain which became permanent and was not aggravated by stool. The evolution three days later was marked by increasing of the pain which became an excruciating disability associated with scrotal swelling in the context of fever and chills. The patient is a married man, heterosexual, he had no history of chronic pathologies, there was no history of abdominal or perineal surgery and there was no notion of rectal instrumentation.

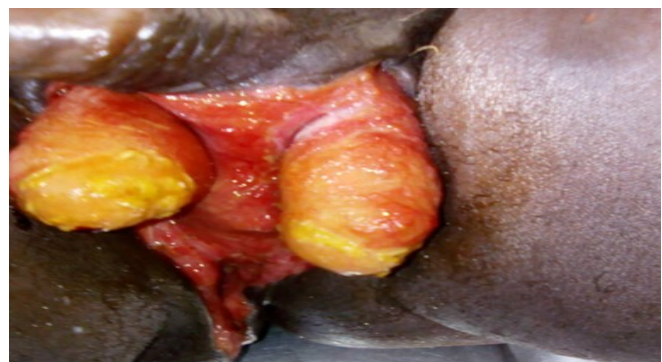
On clinical evaluation the patient was conscious, cooperative and oriented. There was altered general state according to stage 4 WHO classification. The initial parameters were: a blood pressure of 125/78 mm hg associated with tachycardia (104 bpm), tachipnea (24 breaths/min), fever (39.4°C) and good oxygen saturation (97%). We observed a pallor with some signs of dehydration. At the loco regional examination of the genitalia, there was an erythematous scrotal and anterior perineal swelling; it did not involve the penis. The swelling was very painful and associated with areas of necrosis and offensive smell. There was crepitus on scrotal and perineal palpation. The anal region revealed a right peri-anal swelling about 3 cm in diameter: it was warm erythematous and painful with no apparent fistula. The rectal examination and the rest of the examination were not contributory.

For the biological investigations: the full blood count revealed anaemia with Haemoglobin at 6.9 g/dl, microcytic at 79 fl. There was leucocytosis at  $12 \times 10^6 / l$ , with granulocytic predominance. The rest of the biological examination, notably: blood sugar level, transaminases, serum electrolytes and renal function were within normal ranges.

At the end of the clinical examination, we diagnosed a Fournier's gangrene complicating a peri-anal abscess. The initial management consisted in placing

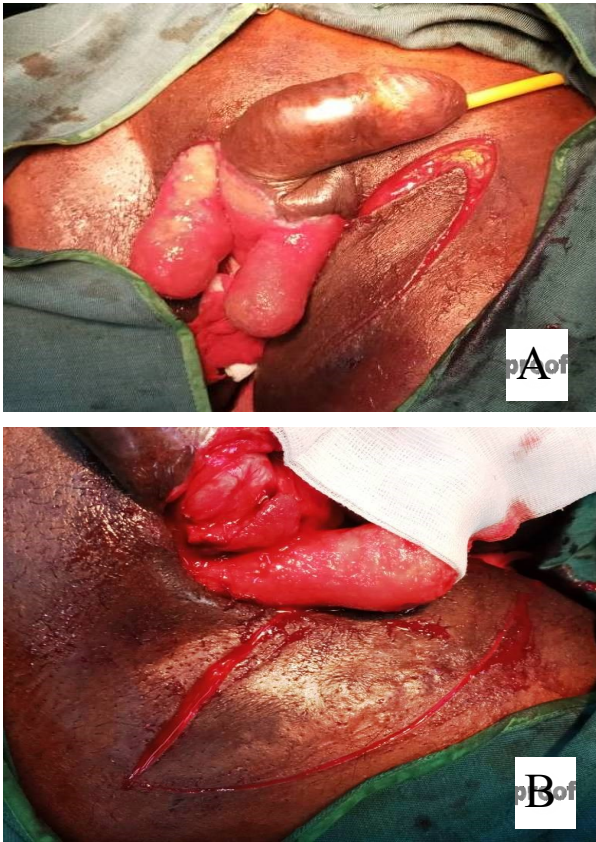
two intravenous lines for hyper hydration, analgesia, triple antibiotics (ceftriaxon, gentamycin and metronidazole) parenterally. Blood transfusion was done. The first unit of blood was transfused pre-operatively and the second unit per-operatively. The indication to urgent surgery was due to the presence of subcutaneous emphysema; also, no morphologic investigations were done. Six hours after admission, scrotal and perineal debridement was done associated with the drainage of an anal abscess under spinal anesthesia. During this initial intervention, the tissue seems inflated with areas of necrosis at the scrotum. Bubbles of air were produced having an offensive smell. Following the persistence of picks of fever at 40°C and pus from the perineal region, a second debridement was done 72 hours later. This permitted appropriate exploration of various zones of pus collection. The analysis of the pus collected per-operatively revealed *Klebsiella oxytoca* sensitive to 3<sup>rd</sup> generation cephalosporin.

We observed favorable results after the second post-operative debridement, pain regression was observed as from the second day. Antibiotherapy was done for 10 days and analgesia, gastric protectors, prevention of thromboembolic disease and sit baths administered three times daily. Following the absence of purulent perineal discharges, signs of wound healing in a clean perineal region (**figure 1**); tissue reconstruction was done in 46 days following initial debridement. We opted for a covering with a pedicled fasciocutaneous rotation flap taken off at the anteromedial sides of the thighs (**Figure 2**). The appearance of postoperative reconstruction is shown in **Figure 3**. Under local postoperative care, we had good flap holding with correct healing and a satisfactory aesthetic appearance.



**Figure 1:** aspect of the scrotal and perineal area after

debridement and local care. Note the cleanliness of the operative wound and satisfactory budding before reconstruction.



**Figure 2:** intraoperative steps: mobilization of the medial fasciocutaneous

A: left side

B: right side



**Figure 3:** post-operative appearance

## DISCUSSION

The first descriptions of this pathology were made by Avicenna (1025) and Baurienne (1764) who described a rapidly extensive idiopathic gangrene of the perineal soft tissue. [15]. The name "Gangrène de Fournier" was attributed to pathology in 1883 by Jean-Alfred Fournier, a Parisian dermatologist. This is a true medical and surgical emergency. The diagnosis is essentially clinical, helped by imaging. It is based on the initial clinical finding of painful scrotal and perineal swelling in a patient with comorbidities[2]. In the evolutionary stage, the pain becomes permanent, throbbing, and atrocious; leading to insomnia associated with a patent clinical infectious syndrome and altered general state. The diagnosis, although difficult at the early stage, becomes obvious in the presence of area of necrosis, an offensive smell from the perineum and the presence of crepitus on palpation. [2,3]. Without management, the course of the disease lends to multiple organ damage and death.

Imaging is a tool to help diagnosis but does not constitute a barrier to starting treatment. Plain radiographs and ultrasonography of soft tissue can show the presence of air. The CT scan is the first intension imaging[5], it can be used in cases where the diagnosis is ambiguous with a high specificity compared to ultrasound and standard radiographs [16]. In case of necrotizing fasciitis, it can highlight tissue inflammation with thickening of fascia, gas, and abscess. It helps to define the limits of debridement and to identify possible etiologies[5,16].

Biological examinations are not very specific [1], abnormalities are leucocytosis, acidosis, coagulation disorders, elevation of creatinine, C-reactive protein, creatine kinase and transaminases. The elevation of the last two biological parameters is highly suggestive of fascial and muscle involvement, which is a factor of distinction with non-necrotizing infections. Several tools to help the diagnose of Fournier's gangrene have been evaluated. The LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) score is the most used one [17]. Initially, this score was used to differentiate necrotizing fasciitis from other types of soft tissue infection. Subsequently, it proved to be

also a good predictor of the severity of the disease [18]. This score is calculated from 6 biological parameters: creatinine, blood glucose, CRP, leukocyte count, hemoglobin, and natremia. This score makes it possible to classify patients in three categories: category 1 with a score  $\leq 5$  (low risk); category 2 with a score between 6 and 7 (intermediate risk); and category 3 with high risk, a score  $\geq 8$ . The probability of the patient having necrotizing fasciitis is  $< 50\%$ , between  $50 - 75\%$  and  $> 75\%$ , respectively. Our patient described above had a score of 8.

Evaluation of the severity of the pathology and the risk of death may be possible using this prognostic score [18]. A score  $\geq 9$  is associated with a Probability of 93.7% of deaths. Once the diagnosis is established, the care is urgent and without delay [19,20], the resuscitation will be aggressive, it will consist in an equilibration of the electrolyte imbalance, an initial broad spectrum antibiotherapy secondarily adapted to the results. Hyperbaric oxygen did not show a net benefit in the prognosis [19], resuscitation will be under close observation of the patient. The debridement should immediately follow the resuscitation as soon as the hemodynamic state of the patient is stabilized; it must be early (less than 24 hours) and the most complete possible [19]. When debridement is delayed, initially perineal gangrene extends rapidly to the anterior abdominal wall and posteriorly extends to the gluteal muscles [1]. Areas of necrosis are a poor reflection of the extent of subcutaneous tissue destruction. Therefore, the debridement must interest all the devitalized tissues, infiltrated by pus, gas and it will have to stop in healthy zone. Note that second-line debridement within 24 to 48 hours may be indicated postoperatively depending on the appearance of the lesions and the clinical condition of the patient [7]. Diversion colostomy and urine diversion or urethral catheterisation may be undertaken to facilitate local postoperative care.

Fournier's gangrene is an extensive necrotizing fasciitis of the soft tissues of the perineum and external genitalia. This is the first cause of skin loss in the

scrotal area [7]. The second stage of management involves soft tissue reconstruction. The good time for this reconstruction is not fixed. It varies according to the locoregional state of the wound. Obtaining an adequate tissue response to local care is a good marker for initiation of reconstruction [2]. This includes the presence of granulation tissue and cleanliness of the wound.

Several plastic reconstruction techniques are possible; the choice of surgical reconstruction depends on the area to be covered, the material available and the financial cost. These techniques have been the subject of several published articles [21]. **Table 1** is a summary and comparative table of these different processes. There is no superior reconstruction technique to another. In addition to the characteristic of the skin defect, the elements to be taken into account in the choice of the reconstruction technique are multiple: the aesthetic appearance as well as the sensitivity of the skin obtained at the end, the number of surgical intervention required, the post-operative complications at the reconstruction area and donor site morbidity. When the loss of substance is localized to the scrotum and constitutes less than 50% of the scrotal surface, delayed primary closure, or scrotal advancement flap may be used. Healing by secondary intention has the disadvantage of lengthening the patient's intra-hospital stay, while the scrotal advancement flap can cause tension sutures responsible for subsequent necrosis. For extensive substance losses, semi-thick mesh skin grafts, free or pediculated fasciocutaneous flaps taken from the anterior part of the abdomen, inguinal region and thigh may be used. At this level, we distinguish the superomedial thigh, inguinal, pudendal and anterolateral thigh fasciocutaneous flaps. In addition to these fasciocutaneous flaps, musculocutaneous flaps may be used. The latter are little used because they provide a thick skin, creating a moist environment that is not favorable to spermatogenesis and promotes maceration, infection [22]. At the end of the reconstruction, the most frequent complications encountered are necrosis of the flap, infection, retractile scars [14].

Table 1: wound closure option for scrotal reconstruction after debridement

Method of skin reconstruction	indications	comments
<b>Delayed Primary closure</b>	Losses of substances limited to the scrotum and constituting less than 25% of the scrotal surface	<ul style="list-style-type: none"> <li>• rapid skin closure</li> <li>• Aesthetic scar</li> <li>• Short hospital stay</li> <li>• However, risk of suturing under tension and thus subsequent necrosis</li> </ul>
<b>Healing by secondary intention</b>	Small losses of substances limited to the scrotum	<ul style="list-style-type: none"> <li>• Those patients required longer hospital stays</li> <li>• Aesthetic scar</li> <li>• Little risk of cutaneous necrosis</li> <li>• It can be assisted by the VAC *</li> </ul>
<b>Scrotal advancement flap</b>	losses of substances limited to the scrotum, less than 50% of the scrotal surface	<ul style="list-style-type: none"> <li>• Produces good skin coverage</li> <li>• Satisfactory aesthetic results</li> </ul>
<b>Skin graft thin split-thickness</b>	Extended substance losses, exceeding the scrotal region	<ul style="list-style-type: none"> <li>• easy to pick up and apply</li> <li>• adapt to irregular surfaces</li> <li>• disadvantage: No direct closure of the donor area</li> <li>• if initial vaginal involvement, no grafting</li> <li>• Morbidity greater than flaps</li> <li>• The lighter a graft is, the easier it takes, but the less aesthetic it is</li> </ul>
<b>Flap</b> fasciocutaneous Free pedicle  Musculocutaneous (adductor minimus, gracilis, and rectus abdominis muscles)	Large losses of scrotal and perineal substances	<ul style="list-style-type: none"> <li>• Reconstruction in one time:</li> <li>• Direct closure of the donor area</li> <li>• Satisfactory aesthetic result compared to grafts</li> <li>• Preservation of the sensitivity of the recipient area in case of pedicled flaps</li> </ul>
	Large losses of scrotal and perineal substances	<ul style="list-style-type: none"> <li>• Benefits similar to Fasciocutaneous flaps, but bring excess tissue creating a moist local environment that is favorable for spermatogenesis</li> </ul>

\*VAC: vacuum-assisted closure

## CONCLUSION

Fournier's gangrene is a medical and surgical emergency. The diagnosis is essentially clinical, helped by imaging and biology. The often-atypical presentation of the disease coupled with high morbidity and mortality requires an urgent diagnosis followed by the implementation of resuscitation measures and aggressive surgical debridement. Tissue reconstruction is the next step in patient management; the knowledge of anatomy, the proper choice of reconstruction method at the appropriate time strongly influence the success of this phase.

## LIST OF ABBREVIATIONS

°C	Celsius degree
BPM	Beat per minute
CT	Computed Tomography
CRP:	C reactive protein
DLH	Douala Laquintinie Hospital
HIV	Human Immunodeficiency Virus
LRIN EC	Laboratory Risk Indicator for Necrotizing Fasciitis

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## STATEMENT OF ETHICS

The authors have no ethical conflicts to disclose. Written informed consent was obtained from the patient for publication of this case report and any accompanying images.

A copy of the written consent is available for review by the Editor-in-Chief of this journal.

Any identifying material has been removed, including the patient's name, date of entry, face or any distinctive features on the pictures taken.

## DISCLOSURE STATEMENT

The authors have no conflicts of interest to declare

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## AUTHORS 'CONTRIBUTIONS

Nwaha and Tchukenkam, contributed in design of the study and writing of the manuscript

Sala, Dongmo, Kabko and Angwafo contributed in critical reading

Nwaha, collected the pictures, and obtained the patient's consent.

All authors have read and approved the final version of the manuscript.

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