

Fournier's Gangrene: A Genital Catastrophe

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Abstract

Fournier's gangrene continues to be a catastrophic surgical emergency of the male genitalia. Prompt resuscitation, optimum use of antibiotics, extensive debridement, and regular dressings are the mainstay of treatment. However, hastening the process of healing by controlling infection and achieving early demarcation helps in restricting tissue loss as well as rendering the wound amenable to reconstruction. This can be achieved by the use of hyperbaric oxygen therapy. We present a case of extensive Fournier's gangrene, treated by standard modalities and hyperbaric oxygen therapy as an adjunct followed by reconstruction, along with review of literature.

INTRODUCTION

Fournier's gangrene is a severe necrotizing infection, which predominantly involves the soft tissues of the male genitalia. It was originally described by Baurienne in 1764 as an idiopathic, rapidly progressive soft tissue necrosis leading to gangrene.[1] However, the disease was named after Jean Alfred Fournier who, in 1883, presented a case of perineal gangrene in a healthy young man. Fournier himself reviewed the systemic and local factors that predisposed to this fulminant process.[1] Identification of these factors followed by aggressive resuscitation and debridement are pivotal in the management.[2,3] Reconstruction of the genitalia after this devastating infection poses a challenge to the operating surgeon.

We present here a case of extensive Fournier's gangrene involving the entire scrotum, left testicle and the skin over the penile shaft, which was successfully reconstructed after complete remission of infection, along with review of literature.

CASE REPORT

A 25-year-old male patient presented with high-grade fever, swelling and darkening of scrotal skin for two days. There was no history of trauma, diabetes or any preceding trivial infection in the region, including the perineum. Physical examination revealed areas of gangrene involving the entire scrotum, extending to the perineum as well as to the skin covering the shaft of the penis. Laboratory investigations revealed neutrophilic leucocytosis with normal blood sugar levels. The patient was rehydrated and administered a

combination of antibiotics comprising a third generation cephalosporin, amino glycoside and metronidazole in order to be effective against the anticipated spectrum of micro-organisms. The patient then underwent extensive debridement under general anaesthesia. The entire scrotal skin was necrotic and removed. The left testicle was also gangrenous which resulted in a left orchidectomy being done. Part of the perineal skin, as well as a rim of skin covering the shaft of the penis was removed as it was completely gangrenous. The end result of this debridement procedure was that the right testis was left suspended as the entire scrotum was lost. There was an extensive wound in the perineum in continuity with the raw area at the root of the scrotum. The penile shaft was devoid of skin, extending from the coronal sulcus to the base of the penis.

Bacteriological assessment of the swab taken from the lesion on admission revealed abundant streptococci, and staphylococci; antibiotic sensitivity testing was not done. Post-operatively, extensive daily dressings were done using hydrogen peroxide, betadine, glycerine and acriflavine solutions. The initial response of the patients by way of growth of granulation tissue was unsatisfactory with persistent formation of slough necessitating desloughing frequently. (Figure 1) In view of this, three sessions of hyperbaric oxygen therapy were administered. This caused significant improvement in the status of the wound. (Figure 2) Reconstruction was then planned and carried out in a single sitting. (Figure 3) This comprised:

a) Creation of a superficial femoral pouch on the right side to house the right testicle.

b) Freshening of the edges followed by closure of the perineal wound up to the undersurface of the base of the penis.

c) Release and excision of scar tissue followed by split thickness skin grafting of the penile shaft, taking utmost care to ensure as thick a skin graft as possible.

The patient responded well to the surgical procedure. The sutures were removed on the tenth post-operative day with complete healing of the perineal wound, along with excellent take of the skin graft over the shaft of the penis. (Figure 4)

The patient has been following up for the last three months and does not complain of any erectile as well as urinary dysfunction.

Figure 1

Figure 1: Wound status after debridement and dressings



Figure 2

Figure 2: Improved wound status after hyperbaric oxygen therapy.



Figure 3

Figure3: Right testis placed in the superficial femoral pouch along with suturing of perineal wound and split thickness skin grafting of penis



Figure 4

Figure 4: Circumferential skin grafting of the shaft of the penis.



DISCUSSION

Fournier's gangrene was traditionally described as idiopathic gangrene of the scrotum. However, in 95% of cases there is an identifiable cause. The necrotizing process usually originates from a source of infection either in the anorectum, urogenital tract or the skin of the genitalia.[3]

Co-morbid conditions which may further compromise the immune system are commonly seen in patients suffering from Fournier's gangrene. Of the various co-morbid conditions, diabetes mellitus is commonly seen in most patients suffering from Fournier's gangrene.[4]

The severity of the infection is usually attributable to extreme virulence of a combination of micro-organisms acting synergistically in an immunocompromised environment. The commonest organisms are streptococci, staphylococci, enterococci species, anaerobic organisms and fungi.[5] The same organisms are responsible for Meleney's gangrene which has a similar presentation usually involving the anterior abdominal wall. The pathognomic features of Fournier's gangrene on histological examination of the

involved tissues are polymorphonuclear cell infiltration, fibrinoid necrosis of the nutrient vessels leading to extensive necrosis of superficial and deep fascial planes. Micro-organisms are also identifiable within the involved tissues.[5]

Though the exact mechanism underlying the disease still remains debatable, it is an established observation that enzymes (e.g. lecithinase, collagenase etc.) produced by various organisms produce coagulative necrosis of the supplying vessels. As a result, the tissue tension falls and the resultant hypoxia allows growth of facultative anaerobes and micro-aerophilic organisms. These in turn further produce enzymes in large quantities causing digestion of fascial sheets leading to spread of infection.

The commonest presenting feature of Fournier's gangrene is severe tenderness of the genitalia. Quite a few patients may have symptoms of fever and malaise for a few days preceding the genital infection. Genital pain and tenderness lead to oedema of skin culminating into frank gangrene. Extensive subcutaneous crepitus and foul-smelling purulent discharge may then become prominent physical signs. The infection usually follows anatomical planes affecting the scrotum predominantly as was seen in the case presented. However, if this early phase goes undetected or untreated, the infection spreads rapidly to involve not only the underlying structures, but the adjacent areas as well. There is scant literature documenting the involvement of the testis in Fournier's gangrene. In the present case, the left testis was completely gangrenous and had to be removed. The scrotal skin and the underlying fascial layers were completely necrotic and had to be removed as well, resulting in an unsupported dangling right testis. Involvement of the penile skin is uncommon. Localized Fournier's gangrene restricted to the penis has been reported in literature. [6]

Most of these patients, who seek surgical opinion late during the course of the disease, present with septic shock. Hence, rigorous intravenous resuscitation along with a combination of optimum antibiotics is life saving.[7] Once haemodynamic stability has been achieved, radical debridement is mandatory. In view of the immunocompromised state in few patients, immunoglobulin administration has yielded good results.[8] Patients usually require additional sessions of debridement, accompanied with daily dressings. These dressings, using standard antiseptic solutions, help in clearing the necrotic debris, thereby stimulating growth of healthy granulation tissue. Rigorous irrigation with hydrogen peroxide solution and

Betadine followed by use of a combination of glycerine and acriflavine solutions helps significantly. Edinburgh University Solution of lime (EUSOL) is useful in the early stages immediately after debridement to achieve chemical desloughing. Various other chemical agents have been used to achieve desloughing.[9] The response to these remedies may be variable. Many studies have advocated the use of hyperbaric oxygen.[10,11] Hyperbaric oxygen therapy (HBOT) has two-fold effects on the lesion viz. destroys anaerobic organisms, and stimulates neo-vascularisation, thereby preventing extension of the infection and increasing demarcation. [11, 12]

In the case presented, the patient received three sessions of hyperbaric oxygen. This yielded excellent results by way of in-growth of healthy granulation tissue, rendering the wound amenable to reconstruction.

Reconstruction poses a challenge after control of infection in Fournier's gangrene. There are many ways by which this can be achieved.[13] The scrotum is the most commonly affected part. If a part of the scrotum still remains, it can be used to reconstruct or close the defect in order to cover and protect the testis. However, if the entire scrotum is destroyed, the only option available is to create a superficial femoral pouch to house the testis as was done for the right testis in the present case. The effects on repositioning the testis in a different environment require further evaluation with respect to effect on the testicular function.

Loss of penile skin is a major challenge. There are no established reconstructive techniques which can provide skin cover, matching the normal one. Buck's fascia happens to be a very resistant barrier to the spread of infection to the corpora. Skin grafting therefore is the only option available to cover this region. Split thickness skin grafting is usually followed by contracture of the grafted area followed by shortening of the penile length. This can significantly jeopardize the erectile function of the penis. Hence, to reduce the morbidity, a full thickness skin graft is advisable [6]. However, full thickness skin grafts have at times a higher failure rate in this region due to technical problems arising from inability to fix the slippery graft firmly. Hence, in the case presented, we opted for a very thick split thickness skin graft as confirmed by the thickness of the graft itself and significant oozing from the donor site.

In conclusion, Fournier's gangrene continues to be a challenging surgical emergency requiring aggressive treatment in the form of resuscitation, antibiotics and debridement. The use of hyperbaric oxygen is extremely helpful in permitting early reconstruction of the damaged areas.

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