

Case Report

A rare case of Fournier gangrene presenting with surgical emphysema of the right upper abdomen

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Introduction

Fournier gangrene is a rapidly progressive necrotising infection of the perineum, perianal region and genital region [1,2]. It is a surgical emergency requiring early identification, resuscitation and aggressive debridement to save the patient [3]. We present a rare case Fournier's gangrene presenting with upper abdominal wall surgical emphysema. A PubMed database search retrieved a few cases of Fournier's gangrene presenting with lower abdominal wall emphysema but none presenting with upper abdominal surgical emphysema.

Case Presentation

A 39-year-old, previously well, male patient presented to surgical casualty with fever, pain and a foul-smelling discharge from the perineal region. The patient was febrile and tachycardic, with a pulse rate of 100 beats per minute, suggestive of an ongoing systemic inflammatory response, but he was haemodynamically stable throughout. On examination, he had signs of a spreading infection in the perineal area with overlying skin necrosis confined to a small area of perineal skin and scrotum (Figure 1). He had severe tenderness over the right side of the upper abdominal wall with subcutaneous emphysema. The left side of the abdomen was soft and non-tender.

Investigations revealed high blood glucose levels. The patient was resuscitated with intravenous fluids, and soluble insulin was started on a sliding scale to tightly control the blood glucose levels. Empiric intravenous antibiotic treatment was started with meropenem and metronidazole after blood culture was taken. An ultrasound scan of the abdomen was performed to identify any intra-abdominal or abdominal wall collections while the patient was prepared for urgent surgical debridement. Ultrasound scan revealed subcutaneous

emphysema of the right upper abdomen with no evidence of intra-abdominal infection. A summary of the results of blood investigations is shown in Table 1.

Table 1: Summary of Investigations

Investigation	Value	Investigation	Value
White Blood Count	23x10 ³ / uL	Serum Na ⁺	135 mmol/L
Haemoglobin	11g/dL	Serum K ⁺	4.5 mmol / L
Platelet count	233x10 ³ / uL	PT/INR	1.2
C-Reactive Protein	240 mg/L	Blood Urea Nitrogen	5 mmol / L
Random Blood Sugar	220 mg/dL	Serum Creatinine	1.1 mg/dL
Urine Ketone bodies	negative	HIV rapid test	negative

PT/INR = PT, Prothrombin Time; INR, International Normalised Ratio

Intraoperatively, it was evident that infection was spreading subcutaneously to the whole of the perineum, left ischio-rectal fossa and bilateral scrotal wall. Extensive and aggressive debridement was carried out as shown in Figure 2. Infected tissue was sent for culture and antibiotic sensitivity testing.



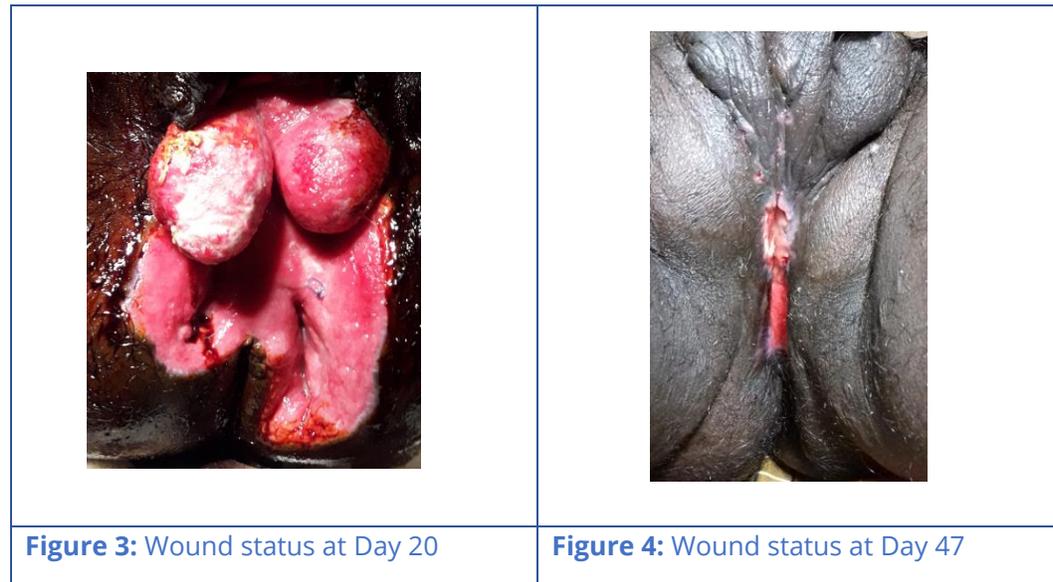
There was no evidence of infection ascending via the Scarpa's fascia. The infection was ascending into the right side spermatic cord. He had a history of right side hydrocoelelectomy done 5 years ago which had led to a defect in the tunica vaginalis. Left side tunica vaginalis was intact and there were no signs of infection ascending on that side. We concluded that

the cause for infection to ascend to the extraperitoneal space on the right side of the abdominal wall was this breach in the tunica vaginalis.

As there was no collection in the extraperitoneal space and no necrosis of tissues in the inguinal canal, a corrugated rubber drain was placed and a wait and watch policy was adopted to treat the extraperitoneal infection.

Resuscitation continued following surgery. Follow-up wound debridement was done two days after the initial debridement. He was asked to do daily sit baths and daily wound dressing was performed in the ward. His blood sugar control improved gradually and the inflammatory markers reduced. Blood culture did not show any growth. Culture of infected tissue demonstrated coliforms which were sensitive to meropenem and co-amoxiclav. Intravenous meropenem was continued for 10 days and then changed to intravenous co-amoxiclav as fever settled and the inflammatory markers improved.

Figure 3 shows the wound status at 20 days. Intravenous antibiotic treatment stopped at day 20 as signs of local or systemic infection were absent. He stayed in-ward for 30 days, following which he was discharged, to continue sit baths and dressing at home.



He was seen on day 40 for tissue cover of bilateral testes. Skin cover for bilateral testes was achieved without tension and the patient was discharged home on the following day. He was seen again on day 47 with a healing perineal wound as seen in Figure 4.

Discussion

Fournier gangrene is a rapidly spreading necrotising fasciitis of the perineal region. It can affect the perineum, scrotum, penis and abdominal wall [1]. A Parisian venereologist, Jean

Alfred Fournier presented a series of otherwise healthy young men presenting with perineal gangrene in 1883, thus the condition bears his name. Even though Fournier described it as an idiopathic condition, subsequent descriptions have often shown identifiable predisposing factors [2].

Adult males are more affected than females and children. Mortality rate is high and varies from 20% to 30%. Literature over the years has shown an increasing incidence of Fournier gangrene [1].

The most common foci of Fournier gangrene are the gastrointestinal tract (30-50%), genitourinary tract (20-40%) and cutaneous injuries (20%) [4]. Co-morbid disease leads to unhindered spread of the infection. Among them diabetes mellitus plays the major role (20% to 70%), as seen in this patient who had uncontrolled diabetes at the time of presentation. Other associations include alcohol misuse, extreme age, malignancy, human immunodeficiency virus infection, malnutrition, long term steroid use, lymphoproliferative diseases and cytotoxic drugs [5].

The basis for the spread of infection lies in the anatomy of the perineal tissue planes. Most often, the infection spreads in the superficial perineal space and is confined to the Colle's fascia (superficial perineal fascia). Colle's fascia is contiguous with the Buck's fascia (deep fascia of the penis), Dartos fascia (deep fascia of the scrotum) and Scarpa's fascia (superficial fascia of the abdominal wall) [2]. Due to these fascial connections, infections of the perineum can spread to the penis, scrotum and abdominal wall. Usually infection does not involve the deep muscle compartments and myonecrosis is rare [1]. Even though perineal infection can spread along Scarpa's fascia onto the lower abdominal wall, abdominal wall involvement is reported in only a few case reports. In this case, we observed unusual spread of infection to the upper abdominal wall. We could find only two previous case reports recording upper abdominal wall and retroperitoneal involvement with Fournier gangrene [6,7]. One patient died due to overwhelming sepsis. More reports are available reporting lower abdominal wall involvement. One case series identified extension of infection into abdominal wall as an independent predictor of high mortality [8].

Polymicrobial synergy and enzyme production is thought to promote rapid growth of bacteria and spread of infection [9,10]. Organisms commonly implicated include *Clostridium*, *Klebsiella*, *Streptococcus*, coliforms, *Staphylococcus*, *Bacteroides* and *Corynebacterium* spp. The polymicrobial synergistic theory explains how a collection of individually low virulence bacteria produce such life-threatening, spreading infection. For example, one bacterium could produce enzymes responsible for coagulation and thrombosis of vessels, leading to production of a hypoxic environment that promotes growth of anaerobes while another bacterium produces enzymes necessary for breakdown of fascial barriers and allows extension of infection. This theory is supported by culture of mixed aerobes and anaerobes

from tissues in Fournier gangrene. Some reports have shown culture of more rare species such as *Candida albicans* [11].

The initial treatment strategy comprises resuscitation of the patient, starting of appropriate empiric antibiotics and aggressive debridement of infected tissues. The empiric antibiotic regime should be effective against *Staphylococcus*, *Streptococcus*, coliforms, *Bacteroides*, *Pseudomonas* and *Clostridium* spp. [12]. Conventionally triple therapy with a third generation cephalosporin or aminoglycoside, penicillin and metronidazole is the regime of choice [12]. Clindamycin has been shown to suppress toxin production and modulate cytokine production [1]. New clinical guidelines recommend the use of carbapenems or piperacillin-tazobactam, as they have a larger volume of distribution and less renal toxicity in comparison to aminoglycosides [2].

Early and effective debridement is necessary to control infection. Multiple studies show that the time to debridement should be as short as possible. However, one study concluded that there was no significant difference in outcome based on time between the onset of symptoms and surgical debridement [13]. But the consensus among general surgeons is that debridement should be done as soon as possible, when the patient is stable after resuscitation [3]. Extent of debridement depends on the extent of spread of infection. Presence of good capillary bleeding and difficult skin separation from subcutaneous tissue can be used as a guide to decide on the margin of excision. Debridement of muscles is generally not required as these are rarely involved. Although in most cases, the testes can be managed without skin or fascial cover, it can be placed in a subcutaneous pouch until definitive reconstruction [1]. Some series have shown the need for orchidectomy when testes are involved with severe infection. Inadequate debridement can lead to the patient being subjected to multiple debridement, multiple anaesthesia and delay in control of infection, which can lead to increased mortality and morbidity [3].

Faecal diversion may be a tempting option to reduce faecal contamination of the wound. But some studies have shown increased mortality associated with diverting stomas [14]. The main factor in deciding the need for faecal diversion is involvement of the anal sphincter. Proprietary faecal diversion systems are available in the market which can be inserted into the rectum and faeces collected in a bag while the perineal wound is protected. These systems may help in avoiding a stoma in patients requiring faecal diversion [15].

In this patient, the anal sphincter was intact and patient compliance was maximal in maintaining perineal hygiene. Patient had maintained once daily bowel motion with perineal salt baths three times a day throughout the treatment period.

Vacuum assisted closure has been studied in patients with Fournier gangrene following wound debridement and shown to minimise skin defect and speed-up the healing process

[16,17]. Other methods studied in speeding up wound healing include hyperbaric oxygen therapy and enzymatic debridement using topical agents [13, 17].

Many reports in the literature show successful reconstruction of the perineal wound using split-thickness skin grafts [1]. Myocutaneous flaps such as a gracilis muscle flap may be useful in dealing with deep perineal defects. Pudendal thigh flaps are popular in reconstructing perineal and scrotal skin defects [18,19]. This flap can be based on the superficial perineal artery which originates from the internal pudendal artery, which is relatively simple to perform and the primary site can be closed primarily.

Another important and often overlooked aspect of successful treatment is psychological and family support. This patient constantly had a positive mind set about continuing treatment which resulted in excellent compliance leading to a favourable outcome.

Conclusions

This case presented a challenge to the health care team with its unusual presentation. Appropriate initial resuscitation, empiric antibiotic therapy with early and effective debridement followed by continued wound care lead to a successful result. Extraperitoneal infection did not require surgical management as the medical therapy contained the infection. Psychological support and efforts to elevate the morale of the patient lead to increased compliance leading to a favourable outcome.

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