CASE REPORT

Isolated Fournier's gangrene of the penis

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Abstract

To share experience on the presentation and management of 4 cases of isolated penile Fournier's gangrene. Clinical and demographic data of four patients with isolated penile Fournier's gangrene seen over an 8-year period (January 2006–December 2013) were reviewed. All patients had intravenous fluid resuscitation, emergency surgical debridement, and broad-spectrum intravenous antibiotics. Fournier's gangrene of the penis was, respectively, due to long segment anterior urethral stricture, penile edema from poorly controlled congestive cardiac failure, penile abrasion from oral sex and idiopathic. The mean age of the patients was 34.3 ± 5.6 years. One patient with urethral stricture had urinary tract infection. The patients presented with a prodromal period of genital pain and fever followed by genital swelling, gangrene, and ulceration. The most common wound swab isolates were *Staphylococcus aureus* and *Escherichia coli*. Only the skin and dartos fascia were affected with sparing of the corporal cylinders. Mean hospital stay was 17.3 ± 3.0 days and mean Fournier's gangrene severity index (FGSI) was 4.0 ± 0.8. Wound closure was achieved by split skin grafting in 2 patients, delayed primary closure in the third and healing by secondary intention in the fourth patient. Subjectively assessed erectile function was preserved in all four patients. Isolated Fournier's gangrene of the penis is very rare. It is associated with low FGSI and sparing of the three corporal cylinders. It may rarely follow oral sexual practice.

Key words: Fournier's gangrene, low Fournier's gangrene severity index, penis, reconstruction, sexual habits

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Introduction

Fournier's gangrene is a rare urological emergency characterized by polymicrobial synergistic infection of the subcutaneous tissues of the perineum resulting in rapidly spreading gangrene. It was first described by the French dermatologist, Jean Alfred Fournier as idiopathic gangrene of the penis and scrotum in five young men in 1883.[1]

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Though Fournier's original description referred to previously healthy young men, a number of predisposing factors are currently recognized and include impaired host defense from conditions such as diabetes mellitus, chronic alcoholism, malignancy, radiotherapy, chemotherapy, and acquired immune deficiency syndrome. Furthermore, local trauma, chronic renal failure, periurethral urine leak, perineal surgery, paraphimosis[2-6] and penile sexual trauma[7-9] have been implicated.

Fournier's gangrene represents <0.02% of hospital admissions with an overall incidence of 1.6 cases per 100,000 males.[10] Usually, the scrotum is the primary site

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of gangrene with spread to other parts of the perineum or anterior abdominal wall. Fournier's gangrene is rarely isolated to the penis. There are only few single case reports of isolated penile Fournier's gangrene in the literature.[7-9,11-14] Literature search revealed only 10 cases [Table 1]. Experience on the presentation and management of 4 cases of isolated Fournier's gangrene of the penis is shared so as to draw attention to this very rare condition. This is perhaps the largest case series of isolated Fournier's gangrene of the penis.

Methods

Following Institutional Ethics Review Board approval, clinical and demographic records of all patients with isolated penile Fournier's gangrene seen over an 8-year period (January 2006–December 2013) were reviewed. Data retrieved include patients age, mode of presentation, laboratory investigation results, Fournier's gangrene severity index (FGSI), predisposing factors, methods of wound closure, duration of admission, and outcome.

The following investigations were carried out in all patients: Urinalysis, urine microscopy and culture, wound swab cultures, blood sugar estimation, retroviral status determination, and complete blood count. Need for additional investigations was directed by the presence of other comorbidities or predisposing factors. These included urethrogram in one patient with obstructive lower urinary tract symptoms (LUTS) and chest X-ray, electrocardiogram, and two-dimensional echocardiogram in another with congestive cardiac failure.

All patients were managed using the standard protocol of wound debridement, intravenous broad-spectrum antibiotic administration, and intravenous fluid support. After collecting wound swabs, all patients were started on intravenous ceftriaxone 1 g daily and intravenous metronidazole 500 mg 8 hourly to cover for Gram-positive and Gram-negative organisms, and anaerobes. Antibiotic regimen was altered based on wound swab culture results if necessary. Patients were converted to oral drugs once infection was well controlled. The patients had urinary diversion. One patient with urethral stricture underwent suprapubic urinary diversion while the other three had indwelling Foley urethral catheters. The urethral catheters were removed after debridement and when penile swelling had regressed. The purpose of urethral catheterization was to safeguard the urethra during debridement. Following debridement, the wounds were dressed with Edinburgh University solution of lime (Eusol A and B). Wound closure was done following resolution of infection. Patients were followed up for a mean period of 8.3 ± 2.1 months. Erectile function was assessed subjectively during the follow-up period in addition to cosmetic appearance of the penis.

Means and standard deviations were calculated using the Epi Info Statistical Package; Version 3.5.1 (CDC Atlanta GA, USA).

Results

Four patients with penile Fournier's gangrene were seen. Fournier's gangrene of the penis was, respectively, due to long segment anterior urethral stricture, penile edema from poorly controlled congestive cardiac failure, penile abrasion from oral sex, and idiopathy. Their mean age was 34.3 ± 5.6 years. All presented with history of acute onset penile pain and swelling involving the entire penile shaft. This was followed by gangrene, ulceration, and foul smelling purulent discharge from the penis. Though the entire penis was swollen, ulceration occurred only on the dorsum of the midpenile shaft in all patients. The glans penis was unaffected by ulceration and only mildly affected by edema. The patient with long segment anterior urethral stricture had voiding and storage LUTS and urinary tract infection. The LUTS preceded the development of Fournier's gangrene by 12 months. The other three patients did not have LUTS. Wound swab cultures grew polymicrobial organisms in all patients. The most common isolates were *Staphylococcus aureus* and *Escherichia coli*. Mean hospital stay

Table 1: Summary of published penile fournier's gangrene papers and predisposing factors

References	No of cases	Case; age; predisposing factor
Bernstein *et al.* 1976[7]	3	Case 1; 31 years; bite during oral sex
		Case 2; 32 years; anal sex
		Case 3; 42 years; bite during oral sex
Mouraviev VB *et al.* 2002[8]	1	Penile self injection of cocaine
Anchi T *et al.* 2009[9]	1	23 years; penile abrasion during oral sex
Yecies T *et al.* 2013[11]	1	Calciphylaxis
Talwar A *et al.* 2010[12]	1	45 years; idiopathic
So A *et al.* 2001[13]	1	Calciphylaxis of the penis
Schneider PR *et al.* 1986[14]	2	Case 1; 46 years; urethral stricture/ periurethral abscess
		Case 2; 52 years; penile Phimosis
Eke N *et al.* 1999[16]	1	65 years; Adenocarcinoma of the rectum and diabetes mellitus

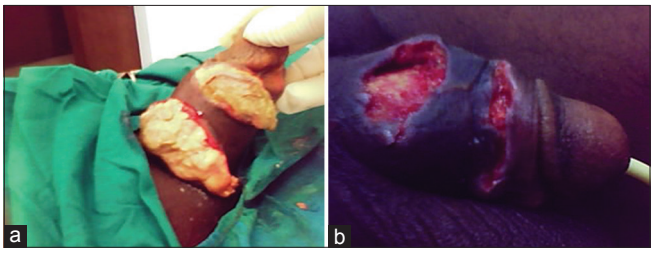

Figure 1: (a) Idiopathic Fournier's gangrene of the penis with skip lesions. (b) Postdebridement picture of Penile Fournier's gangrene showing uninvolved tunica albuginea and corpora carvenosa

Table 2: Clinical characteristics of 4 adult males managed for isolated Fournier's gangrene of the penis

Cases	Case 1	Case 2	Case 3	Case 4
Age (years)	28	32	41	36
Predisposing factor	Penile edema 20 poorly controlled congestive cardiac failure	Long segment penile urethral stricture	İdiopathic	Penile abrasion from oral sex
FGSI	5	4	3	4
Bacterial ısolate	*E. coli* and *P. mirabilis*	*S. aureus* and *E. coli*	*S. aureus* and *P. aeruginosa*	*S. aureus* and *bacteroides*
Hospital stay	21	16	18	14
Wound closure	Split skin grafting	Healing by secondary intention	Delayed primary closure	Split skin grafting
Outcome (cosmesis and erectile function)	Satisfactory	Dorsal penile scar No chordee Patient satisfied with outcome	Satisfactory	Satisfactory

E. coli=Escherichia coli; P. mirabilis=Proteus mirabilis; S. aureus=Staphylococcus aureus; P. aeruginosa=Pseudomonas aeruginosa; FGSI=Fournier's gangrene severity index

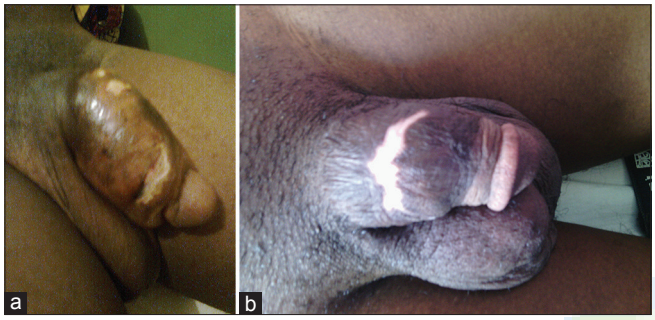

Figure 2: (a) Fournier's gangrene of the penis secondary to anterior urethral stricture disease. (b) Healing by secondary intention without chordee

was 17.3 ± 3.0 days. Mean FGSI was 4.0 ± 0.8. Erectile function was preserved in all patients. The rest of the patient data are shown in Table 2.

Discussion

Fournier's gangrene is rare with a reported overall incidence of 1.6 cases per 100,000 males.[10] The primary site of Fournier's gangrene is usually the scrotum. The penis may be involved as a result of contiguous spread of gangrene. Isolated Fournier's gangrene of the penis is quite rare. This has been attributed to the rich vascular supply of the penis from the pudendal arteries.[11] Penile Fournier's is usually initiated by a traumatic or vascular insult to the penis.[11,12] A number of the known predisposing factors for Fournier's gangrene of the scrotum may be present in penile Fournier's gangrene, or it may be idiopathic. Some etiologic factors specific to the penis have been documented [Table 1]. These include penile abrasion during oral sex[7,9] or following anal intercourse in homosexuals.[7] Furthermore, penile trauma from penile self-injection of cocaine has been documented.[8] It has also been reported to follow calciphylaxis of the penis.[11,13] This is a rare condition in which there is calcium deposition in small and medium-sized vessels of the skin causing ischemic necrosis. Four cases of Fournier's gangrene that were limited to the penis are reported. The predisposing factors are detailed in Table 2.

The pathological sequence of events in penile Fournier's gangrene may not be different from that of the scrotum; with infection of the subcutaneous tissues leading to small vessel thrombosis and gangrene of the overlying skin.[12] In anterior urethral stricture, infection may be introduced into the subcutaneous tissues from within by extravasation of infected urine into the periurethral tissues. In addition, penile edema from any cause may predispose to infection of the subcutaneous tissues because of impaired venous and lymphatic drainage as seen in the patient with congestive cardiac failure. Penile abrasion from oral sex, on the other hand, exposes the underlying subcutaneous tissues to bacterial colonization from the buccal cavity.

The commonest bacterial isolates in this series were *S. aureus* and *E. coli*. Fournier's gangrene is characterized by polymicrobial infection. This polymicrobial infection has been shown to be necessary to create the synergy of enzyme production that promotes rapid multiplication and spread of the infection; with aerobic organisms creating an enabling environment for facultative anaerobes and microaerophilic organisms to thrive.[12] The production of enzymes such as lecithinase and collagenase by the latter leads to the digestion of fascial barriers thus facilitating the rapid extension of the infection and gangrene.[12]

The clinical presentation of penile Fournier's gangrene in this series was similar in many respects to that described in the literature.[7,12,14,15] There was a prodromal period of genital pain and fever followed by genital swelling, gangrene, and ulceration. The glans penis was unaffected by ulceration and only mildly affected by edema. Ulceration occurred on the dorsum of the mid penile shaft in all patients. The tunica albuginea and underlying corpora carvenosa and corpus spongiosum were spared in the 4 cases of penile Fournier's gangrene that were managed. Only the skin and underlying fascia were affected. This is similar to the sparing of the testes

as observed in Fournier's gangrene of the scrotum. This is probably due to the separate blood supply of the corporal cylinders arising from the internal pudendal artery while the skin dartos and bucks fascia are supplied by the external pudendal arteries. Bernstein *et al*.[7] also noted sparing of the corpora carvenosa. However, Yecies *et al*.[11] reported a case of severe Fournier's gangrene of the penis with involvement of the entire penis requiring penile amputation. This patient had calciphylaxis secondary to end-stage renal disease in addition to type 2 diabetes mellitus. He had also been undergoing hemodialysis for >10 years. It is possible that the confounding chronic medical conditions had already compromised the blood supply of the corporal tissues thus giving rise to this unusual presentation and outcome. Similarly, Eke and Onwuchekwa[16] described severe Fournier's gangrene of the penis with autoamputation of the penis.

Interestingly also, despite the continuity of the superficial fascial planes of the penis and scrotum and the dependent position of the scrotum, we have not observed spread of penile Fournier's gangrene to the scrotum, but the converse has been observed quite frequently in our practice. The reason for this is not known.

Fournier's gangrene of the penis was associated with mild systemic toxicity and low FGSI of 4.0 ± 0.8 (range: 3–5). There was no mortality in the 4 cases managed. This was probably due to the low FGSI observed, the small body surface area involved and lower mean age in this series. The FGSI, a modification of the acute physiology and chronic health evaluation II severity score was devised by Laor *et al*.[15] as a way of predicting mortality from Fournier's gangrene. Using a threshold value of 9, Laor *et al*. showed that FGSI >9 was associated with a 75% probability of death and a score of 9 or less with a 78% probability of survival. In his seminal paper, Laor assigned 1% surface area to the penis. He observed an almost 2-fold difference in surface area between the groups that survived and those that did not. This approached but did not reach statistical significance. Subsequently, Janane *et al*.[17] and Altarac *et al*. and Kabay *et al*.[18,19] have confirmed that the extent of body surface area involved by the disease process has a significant impact on the mortality. The mean age in this series is lower than that generally reported for Fournier's gangrene[10] and this may also have contributed to the zero mortality.

The mainstay of treatment of Fournier's gangrene of the penis still remains debridement, intravenous fluids, and intravenous broad-spectrum antibiotics.[12,15] Excising dead and devitalized tissue has a very important role to play in halting the spread of infection. Care should be taken however to avoid excision of healthy tissue, especially on the penis.[12] This is to prevent excessive loss of tissue that could be used for reconstruction. An approach of serial debridement can be useful when in doubt. This allows time for tissues with doubtful viability to be correctly identified as gangrenous or not.

Restoring cosmetically acceptable penile skin cover without compromising erectile function can be a major challenge after penile Fournier's. While remnant foreskin or scrotal skin may be used for penile skin loss coverage, most authorities prefer split thickness skin grafts[7,20-22] for penile skin loss coverage because of the ease of use, versatility, and good take. Split-thickness skin grafts are preferred over full thickness skin grafts for potentially contaminated wounds like Fournier's gangrene.[22] Skin cover was achieved by split skin graft in two patients with extensive loss of penile skin. Our third patient had delayed primary closure of the penile skin with satisfactory result also. This was possible because of the relatively narrow linear defects he had and the laxity of the penile skin [Figure 1a and b]. We observed a skip lesion in this patient. This skip lesion may be due to the rich vascular anastomosis of blood vessels supplying the penile skin and the early presentation.[20] The fourth patient declined further surgical intervention. His wound healed by secondary intention leaving a small dorsal penile scar without penile chordee [Figure 2a and b].

Fournier's gangrene of the penis still remains a rare entity. Fortunately, the corporal cylinders are usually spared and it is associated with only moderate morbidity and currently no documented mortality. Its presence should prompt further questioning about patients sexual habits as most reported cases [Table 1] are related to sexual trauma from oral sex or anal intercourse.

Conclusion

Isolated Fournier's gangrene of the penis is rare. It is associated with low FGSI and sparing of the three corporal cylinders. It has not been observed to spread to the scrotum and it may rarely follow oral sexual practice.

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Conflicts of interest

There are no conflicts of interest.

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