A case of Fournier's gangrene necessitating total penectomy

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Fournier's gangrene is an uncommon necrotizing infection affecting the genital and perineal area. Penile involvement in particular is rare owing to its rich vascular supply. In this report, we document a case of Fournier's gangrene involving penile and urethral tissue requiring multiple debridements resulting in significant penile deformity and a non-healing wound. Eventually, the patient underwent penectomy and perineal urethrostomy creation. In this case, penectomy and perineal urethrostomy provide a functional outcome for highly refractory and complex patients with Fournier's gangrene involving penile tissue.

Key Words: Fournier's gangrene, penectomy, perineal urethrostomy

Introduction

Fournier's gangrene is a rare urological emergency characterized by an aggressive necrotizing infection of the genitalia and perineum. Advances in intensive care and medical therapy have significantly improved the mortality of the disease. Historically, mortality ranged between 20%-50%; however, a recent population-based study reported an overall mortality rate of 7.5%.[1,2] The mainstays of treatment for Fournier's include prompt recognition, intravenous antibiotics, aggressive surgical debridement, resuscitation, and correction of metabolic derangements. espite early treatment, Fournier's gangrene is not only associated with significant morbidity and mortality, but also increased health care costs. In a study of 37 patients, Jimenez et al determined that mean health care cost associated with Fournier's gangrene admitted to intensive care and requiring at least one surgical procedure was approximately €25,108 (approximately $31,111).[3] The relative rarity of this disease, even at tertiary care centers, lends to widespread differences in the medical and surgical management.

The degree of surgical debridement is determined by severity of the infection and the location relative to surrounding genitourinary and gastrointestinal organs. While typical acute management involves wide debridement, additional ancillary procedures

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may also be performed with subsequent close follow up including suprapubic tube placement, colostomy, orchiectomy, orchiopexy, and penectomy.[2,4] In a retrospective review of mortality predictors for Fournier's gangrene, performance of penectomy was exceedingly rare affecting less than 1% of patients.[2] In this report, we present the rare case of a patient with highly refractory and complex Fournier's gangrene who underwent partial penectomy with urethrectomy acutely and ultimately required a formal total penectomy and perineal urethrostomy creation.

Case report

A 59-year-old male with uncontrolled diabetes (HgbA1c 9.3), coronary artery disease, hypertension, and hyperlipidemia presented to the emergency department with gross hematuria for 1 week with penile swelling and suprapubic pain. On arrival, he was febrile, tachycardic (HR 113 beats per minute), and hypotensive (BP 95/59 mm Hg). He was managed with a chronic, indwelling urethral catheter for urinary retention secondary to a cerebrovascular accident. The patient also had a history of recurrent urinary tract infections, but no history of abscesses or cellulitis prior to presentation. Clinical examination revealed crepitus throughout the penile shaft, suprapubic pain, and gross hematuria. Initial laboratory results were significant for a marked leukocytosis (WBC 43,000 per µl), acute kidney injury (creatinine 2.2 mg/dL), and metabolic acidosis (HCO3 15.5 g/dL). CT imaging revealed air within the corpora cavernosa tracking to the pelvic soft tissues concerning for a gas-forming infection. The patient's Fournier's gangrene severity index (FGSI) was 14 due to tachycardia, leukocytosis, metabolic acidosis, anemia (hematocrit 28%), and elevated creatinine of 2.2 mg/dL.

A diagnosis of Fournier's gangrene was made promptly and the patient was emergently taken to the operating room. Cystoscopy revealed diffuse soft tissue inflammation and a defect in the ventral surface of the urethra. A suprapubic tube was placed for urinary diversion and debridement revealed a necrotic pendulous urethra that was subsequently excised. At the completion of debridement, all penile skin, Buck's fascia, and the pendulous urethra had been excised. The glans was left intact and the tunica albuginea did not appear to be involved. The scrotum, inguinal area, and perineum were not involved by infection and the wound was initially dressed with wet-to-dry dressing. Wound cultures from the initial debridement grew *Bacteroides vulgatus*, *Clostridium ramosum*, and *peptostreptococcus prevotii*, with urine culture growing *Candida albicans*.

After initiation of aggressive hydration, intravenous antibiotics, and glycemic control in the intensive care unit, the patient returned to the operating room on postoperative day 2 for an exam under anesthesia and a second debridement. The dressing was subsequently changed to wound VAC on postoperative day 5, which remained in place until discharge. Once recovered from the acute illness, the patient was discharged to a long term ambulatory care center and continued to receive wet-dry dressing changes, IV antibiotics, and strict glycemic control. His suprapubic tube remained to gravity drainage and was exchanged monthly.

The patient received local wound care and antibiotics at the ambulatory care center for 7 months. His initial debridement resulted in significant penile deformity with his urethral meatus at the penoscrotal junction, Figure 1. His tissue demonstrated evidence of a poorly healing open wound, but no signs or symptoms of necrotizing infection. Due to his non-healing wound, poor cosmesis and functionality of his existing phallus, and the improbability of using his phallus for future urination or sexual function, he was offered a completion penectomy and perineal urethrostomy after a full discussion of the physical and psychosocial ramifications of these procedures.

After amputation of the penis distally, a perineal urethrostomy using a fasciocutaneous "7-flap" method was performed, as previously described,[5]

Figure 1. Gross penile deformity and chronic infection noted in the residual penile tissue approximately 7 months after initial debridement. Urethral meatus noted at the penoscrotal junction with a Foley catheter in place.

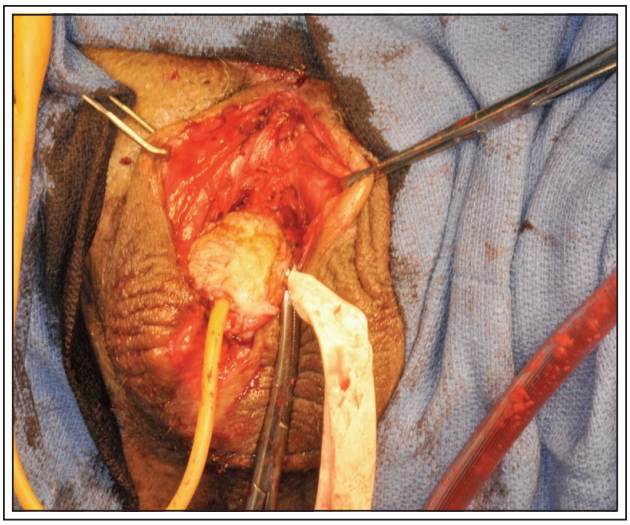

Figure 2. Penile stump dissection at the time of total penectomy with Foley catheter in urethral meatus.

Figure 2. Postoperatively, the patient was discharged uneventfully on day 3. On follow up clinic visits over 2 months, the wound healed completely, the suprapubic tube was capped, and the patient was able to urinate via his perineal urethrostomy successfully, Figure 3.

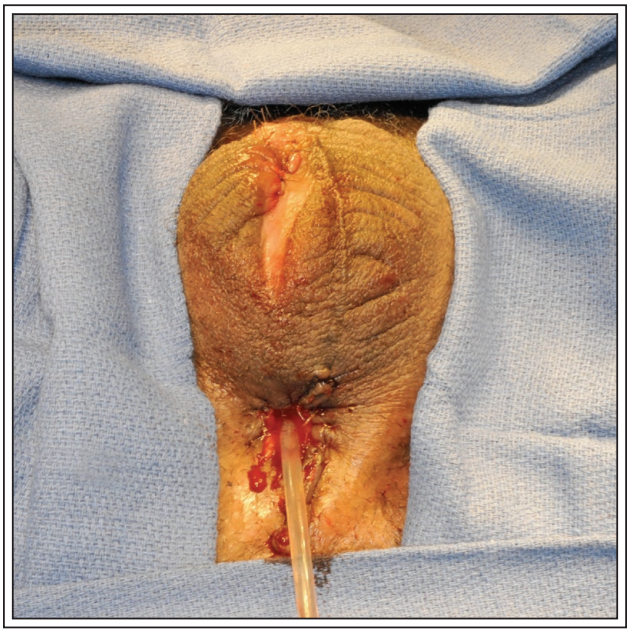

Figure 3. Status post total penectomy and fasciocutaneous 7-flap perineal urethrostomy with Foley catheter through the perineal urethrostomy.

Discussion

Fournier's gangrene is a rare, life-threatening necrotizing infection of the genitals and perineum with a significant mortality rate despite advances in surgical and medical critical care. The most common infectious etiologies are generally categorized as urological, colorectal, and cutaneous in origin. Within urological etiologies, most are secondary to perianal and periurethral infections, scrotal abscesses, urethral strictures, and local trauma.[4] Predisposing factors include uncontrolled diabetes mellitus, immunodeficiency, radiation therapy, malignancy, and advanced liver or kidney disease.[2,4,6] While historic mortality rates range between 20% to 50%, widespread contemporary epidemiologic studies cite less than 10% mortality for this disease, likely due to recent efforts for aggressive surgical debridement, advances in critical care, and modern antibiotic regimens. The Fournier's gangrene severity index (FGSI) was developed to stratify risk in these patients based on presenting vital signs and metabolic abnormalities.[2] Validation studies using the FGSI determined that a score of 9 or greater was sensitive and specific for mortality.[6]

The natural progression of the disease begins as a localized infection in a patient with comorbidities that impair host defense. This infection is usually polymicrobial with the most common pathogens being *enterobacteriaceae*, *bacteroides*, and/or *streptococcus*. The infection propagates aggressively along fascial planes eventually causing endarteritis leading to subsequent thrombosis and tissue necrosis. Clinically, progression is associated with gangrenous changes and crepitus that eventually leads to sepsis, shock, and eventual death if medical treatment is not sought expeditiously.[7] The degree of surgical debridement is dictated by the severity and location of the infection relative to the scrotum, penis, and rectum. In rare situations, the infection spreads into the periurethral tissues necessitating a penectomy and perineal urethrostomy, as required in our index patient.

The corporal bodies are rarely involved in Fournier's gangrene due to the rich vascular supply of the penis. A literature review revealed only 12 cases of Fournier's gangrene isolated to the penis. All of these cases were initiated by a traumatic insult such as a cocaine injection or vascular compromise such as calciphylaxis commonly found in end-stage renal patients.[8] The necessity for penectomy in Fournier's gangrene is exceedingly rare. The primary indication for penectomy is necrotic tissue within the corpora cavernosum or periurethral tissue. In general, if the skin and soft tissue require debriding and the corporal

bodies are intact, a full thickness skin graft can be performed. If further debridement is required, then various techniques for penile reconstruction include gracilis or local flaps to autologous reconstruction with microvascular tissue transfer.[9] However, if more proximal penile tissues are involved, total penectomy and perineal urethrostomy provides effective infection control, while also preserving urinary continence.

In our index patient, given the location of the disease within the penis, it is likely that the urethral catheter was the etiology of infection. Delayed presentation of initial symptoms and uncontrolled diabetes facilitated the spread of the infection along fascial planes. Microvascular disease due to diabetes and hypertension prevented an adequate immune response from controlling the infection in its early stages. He presented with an FGSI of 14 placing him at increased risk for mortality. The patient's overwhelming infection necessitated a debridement that, despite initial aggressive measures, required an eventual penectomy and perineal urethrostomy.

Penectomy and perineal urethrostomy are valuable options in cases of severe Fournier's gangrene involving the penile tissues. This procedure provides a functional and continent outcome in patients who require significant penile debridement and are plagued by chronic infection. Due to the body image change and the potential psychosocial consequences, it is imperative to counsel patients appropriately regarding procedural outcomes and subsequent postoperative support. □

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