



Case report

Post catheterization Fournier's gangrene involving the entire anterior urethra: case report



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ABSTRACT

Introduction and importance: Fournier's gangrene is necrotizing fasciitis involving the penis, scrotum, or perineal region. This is to report necrosis of the entire anterior urethra by necrotizing infection even though the involvement of the urethra by Fournier's is a very rare presentation. A high index of suspicion is important for early intervention. The main Mode of treatment for Fournier's gangrene is debridement.

Case presentation: This is a case report for a 58-year-old male patient who presented with penile and scrotal swelling after he was catheterized with NG tube for acute urinary retention. The physical finding shows swollen scrotum with ulcerated necrotic glans penis anteriorly. Laboratory result shows leukocytosis and urine analysis is positive for urinary tract infection and ultrasound shows bladder diverticula with normal prostate volume.

He underwent debridement up to the level of membranous urethra and suprapubic catheterization was done. He was treated with antibiotics and wound care and finally, the wound closed. Post-operative cystourethrography was done 9 months later and we offered staged urethroplasty but he decided for permanent SPC.

Discussion: Fournier's gangrene is a fatal rapidly spreading infection that occurs in the perineal area. Involvement of urethra by necrotizing infection following catheterization is very rare presentation and diagnosis is mostly clinical. Once it is diagnosed the management is surgical debridement.

Conclusion: Fournier's gangrene with urethral involvement is a very rare presentation and a high index of suspicion is important for early diagnosis and management. Following the standard procedural steps of catheterization is important to avoid this complication.

1. Introduction

Fournier's gangrene is a rapidly spreading necrotizing infection involving the perineum, genital and perianal area. Infection occurs in those with compromised immunity or the elderly mostly following trauma, perianal condition, or traumatic catheterization [1]. It is an infection that causes necrosis of the subcutaneous tissue and superficial fascia where there is poor blood supply. The risk factors are elderly, alcoholics, diabetes, chronic kidney disease, HIV, malignancy, chronic steroid use, and taking immunosuppressive drugs. Being alcoholic and having diabetes mellitus are the major risk factors for FG.

The presence of a portal of entry in an immunocompromised host is a predisposing factor for Fournier's gangrene. The portal of entry could be

the skin, perineum, or genitourinary tract which leads to inoculation of infectious microorganisms. The incident leading to the inoculation may be so trivial that the patient or physician may fail to notice. Characteristically, FG exists due to synergism between multiple bacteria that theoretically are not highly aggressive when presented alone. The polymicrobial nature of FG with contributions by both aerobic and anaerobic bacteria is necessary to create the production of various exotoxins and enzymes like collagenase, heparinase, hyaluronidase, streptokinase and streptodornase, which promote rapid multiplication and spread of infection. The aerobic bacteria cause platelet aggregation and induce complement fixation, thereby causing acceleration of coagulation. The anaerobic bacteria promote the formation of clots by producing collagenase and heparinase [1,2].

Involvement of the urethra is extremely rare because it is invested by

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Abbreviations

HIV	Human Immunodeficiency Virus
FG	Fournier's gangrene
HIV	Human immunodeficiency virus
CBC	Complete blood count
WBC	White blood cell
PLT	Platelet count
HGB	Hemoglobin
HPF	High power field
CUG	Cystourethrography
SPC	Suprapubic catheter
NG tube	Nasogastric tube

buck's fascia and has an extensive blood supply [3].

Fournier's gangrene leads to fulminant tissue destruction with signs and symptoms of systemic infection including septic shock and multi-organ failure which lead to mortality in 40 % of the cases if it is not treated early and appropriately. A study in the United States found mortality rates of 5–10 % even after proper treatment [3].

Those patients who recover from the infection will have significant morbidity sometimes irreversible loss because of repeated debridement with loss of tissue which has a cosmetic and functional effect.

We are reporting on the case of Fournier's gangrene involving the entire anterior urethra up to the membranous part after nasogastric tube catheterization was done for the patient when he presented with acute urinary retention secondary to benign prostatic hyperplasia.

Case report written based on SCARE criteria [4].

2. Case report

A 58-year-old male patient presented to Menelik II Comprehensive Specialized Hospital emergency outpatient department with worsening penile and scrotal swelling 2 days' duration with associated ulceration over the anterior part of the glans penis, passage of turbid urine, dysuria, urgency, and frequency, high-grade intermittent fever with chills and rigor and loss of appetite. 10 days prior to this presentation, he visited another health facility with a complaint of failure to pass urine for 12 h' duration. He was catheterized with NG tube and the urinary retention was relieved. The tube was removed the same day. The reason for choosing the NG tube could not be elicited. There was no bleeding or significant pain during the insertion of the tube. The patient denied previous urinary voiding or storage symptoms. He has no history of previous surgical intervention or catheterization other than the recent intervention. He denied previous history of treatment for sexually transmitted infection or having a urethral discharge. He has no history of chronic medical illness including diabetes mellitus or hypertension.

Upon examining the patient, he was acutely sick-looking. His vital

signs were blood Pressure - 130/90 mmHg, Pulse Rate – 113 beats/ min, respiratory rate – 24 breaths/min, and oxygen saturation of 98 % with atmospheric oxygen.

Genital examination revealed swelling and tenderness of the whole scrotal and penile skin. There was overlying skin necrosis with ulceration and foul odor. Pertinent investigation results included – CBC with a WBC count of 21,900/uL, Hgb – 15.1 g/dl, Plt – 67,500/uL. Microscopic urine analysis showed WBC: 1–3/HPF, RBC: Many/HPF. Urine dipstick test showed Leukocyte +1 and Blood +3. Serum Creatinine was 0.9 mg/dl and abdominopelvic ultrasound showed prostate size of 29 cc, Bladder which is moderately filled with urine with normal wall thickness. There was an 8.7 cm by 5.6 cm bladder wall diverticulum on the left posterolateral wall. Random blood sugar was normal and antibody serology examination for HIV was Negative.

After securing IV line and resuscitating the patient with crystalloids, he was put on broad-spectrum antibiotics and taken to the operation theater for debridement under spinal anesthesia. Urethral Catheterization was done without difficulty.

Intraoperative finding was extensive skin necrosis of the whole length of the penis with involvement of the dartos fascia. The whole scrotal skin was also necrotic sparing the Tunica albuginea. The testis, buck's fascia, perianal skin, and the lower abdomen were not involved with the necrosis.

Upon evaluation of the Urethra, the whole anterior urethra starting from the meatus including the spongiosum was necrotic up to the level of the membranous urethra. The urethral mucosa was dark, necrotic, and easily friable.

The necrotic urethra from the meatus to the level of the membranous urethra was removed along with the Spongiosum. (Fig. 1) The membranous urethra was closed with vicryl 4-0 suture in a continuous manner and a Suprapubic catheter was inserted.

The patient didn't need any further debridement on the post-operative days. He stayed in the ward for 3 weeks receiving wound care and taking broad-spectrum antibiotics. The patient was then discharged after the wound granulated well. (Fig. 2).

The patient was then transferred to the plastic surgery unit for wound closure. Local random scrotal advancement flap was done after 3 months. (Fig. 3) Voiding cystourethrography was done 9 Months after the procedure. (Fig. 4) Discussion was held with the patient about the options for further management including a staged graft reconstruction but the patient opted to remain on the permanent suprapubic catheter. The remaining healthy urethra was short and perineal urethrostomy was technically not feasible to perform.

3. Discussion

Fournier's gangrene was named by the French dermatologist Jean-Alfred Fournier [5]. It is a form of necrotizing fasciitis of polymicrobial infection involving genitalia and perineal area which leads to the thrombosis of subcutaneous vessels leading to necrosis of the skin, subcutaneous tissue, and superficial fascia with spread of infection along

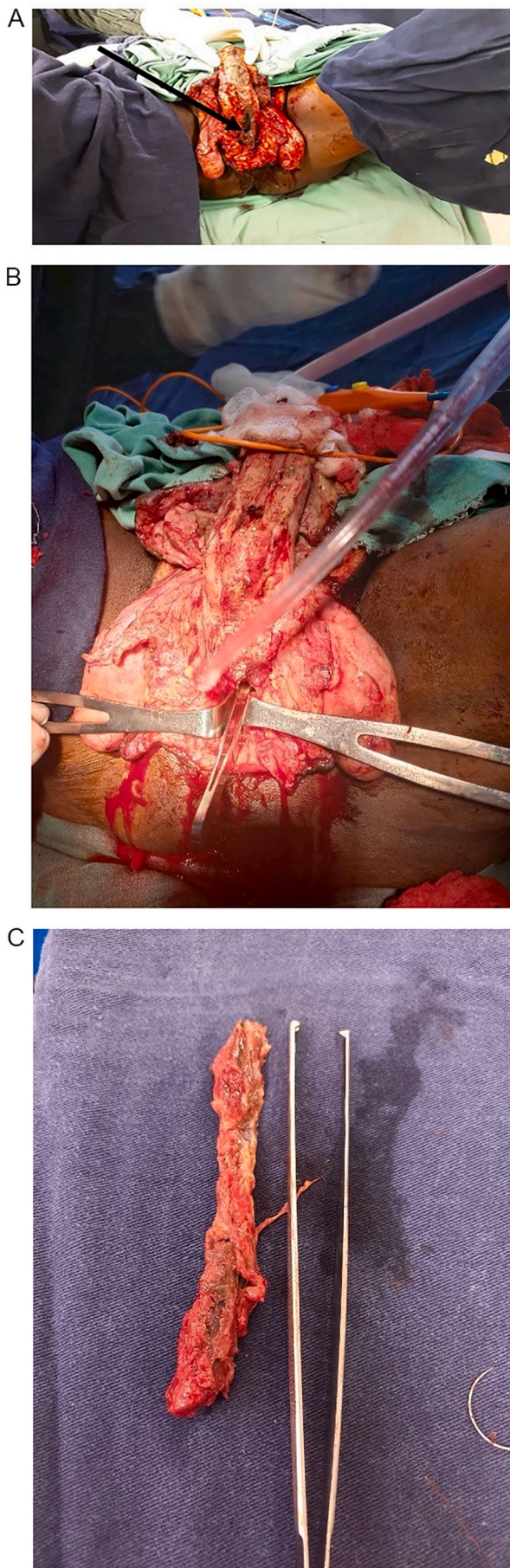


Fig. 1. A: shows necrotic penile and bulbar urethral mucosa (arrow).
 B: after debridement of the entire anterior urethra showing a healthy membranous urethra.
 C: urethral specimen.

the superficial fascial plane [1,3].

The majority of the infection is a polymicrobial infection that is rapidly spreading and arises from the anorectal area (30 to 50 %), genitourinary source (20 to 40 %), and remaining from the dermatologic source following burn or trauma (20 %). It is common in immunocompromised patients with diabetes, malignancy, end-stage kidney, decompensated liver disease, and elderly patients out of these risk factors diabetes is the risk factor accounts for 70 % [6].

There are four types of necrotizing fasciitis where type 1 with polymicrobial infection is the commonest type. Interestingly, the majority of the patients had no etiologic factors for FG and was identified as idiopathic FG. One-third of patients developed FG secondary to etiologic factors, most commonly anorectal infections, urogenital infections, or urologic trauma [7].

Genitourinary infection associated with trauma or stricture is known to be the most common urologic etiology for FG. Recurrent infection of the periurethral glands in pre-existing urethral pathology might result in the formation of periurethral abscess, and subsequent rupture of these infected glands or abscess into the urethral lumen may occur [8].

Fournier's gangrene is one of the severe forms of infection that emergency physicians face. Benign prostatic hyperplasia and urethral stricture are among the commonest causes of bladder outlet obstruction where the patient will develop acute urinary retention and urinary tract infection because of the significant post-voiding residual. Most patients with acute urinary retention present to the emergency outpatient department where either transurethral or suprapubic catheterization is done to relieve the urinary retention. Traumatic catheterization during catheter insertion in infected urine is one cause of the development of Fournier's gangrene. In our patient, he was catheterized by the NG tube which can be a cause of trauma to the urethra because of the rigid nature of the NG tube.

Fournier's gangrene with involvement of the urethra following catheterization is rare and only a few case reports are available so far. Most of the catheterization of the urethra can be done by any well trained health professional but extreme care and proper procedural steps should be followed. Once it fails the expertise of urologist should be sought.

Because of the robust blood supply to the urethra and enclosure within Buck's fascia, involvement of the urethra by Fournier's gangrene is very rare [2,3].

Necrotizing infection causes obliterative endarteritis leading to ischemia and necrosis of skin, subcutaneous tissue, and superficial fascia where bacteria ferment the necrotic tissue and form dishwasher-like fluid. Even though perianal infection is one of the causes of necrotizing fasciitis, genitourinary involvement from perianal infection is rare because of the presence of a central tendon separating the two and deep fascial investment of the lower genitourinary tract with ample blood supply. Involvement of the urethra is a very rare presentation but for those with risk factors, there should be a high index of suspicion. In our case, the patient worsening penile and scrotal swelling of 2 days duration with associated ulceration over the anterior part of the glans penis, passage of turbid urine, dysuria, urgency, frequency, high-grade intermittent fever with chills and rigor and loss of appetite with physical examination finding of swollen and tender scrotum and penile skin. There was overlying skin necrosis with ulceration and foul odor which is a highly suspicious finding for Fournier's gangrene. So diagnosis is mostly based on the clinical finding and based on a high index of suspicion.

Most patients present to the emergency with severe sepsis and treatment with fluid resuscitation, broad-spectrum antibiotics and

(caption on next column)



Fig. 2. shows well granulated wound after wound care.



Fig. 3. shows healed wound after random scrotal advancement flap.

source control with aggressive debridement are the mainstay of management [6]. In addition to the source control, suprapubic catheterization for urinary diversion is one of the management if the source of the necrotizing fasciitis is a urologic source with urethral involvement [8]. Plastic surgery for the coverage of the wound and even a psychiatrist is needed for good cosmetic, anatomic, and psychological outcomes of the patient because of significant morbidity to the patient once he survives the acute condition.

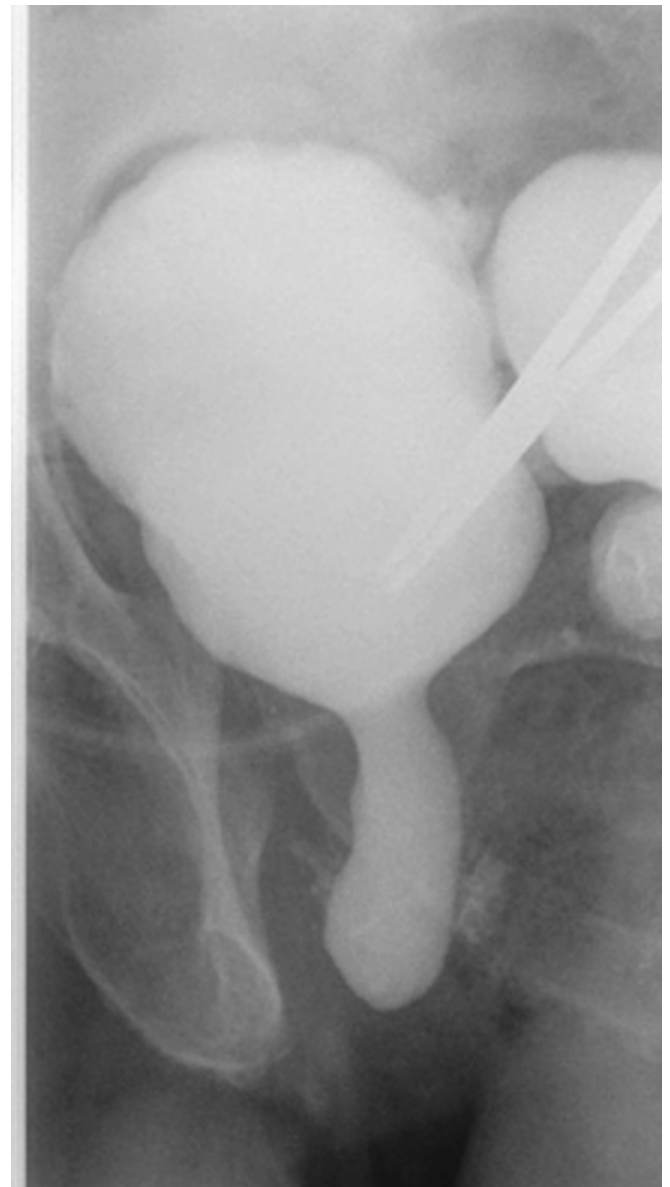


Fig. 4. shows voiding cystourethrogram after 9 months.

Generally, catheterizing a patient with NG tube is not recommended and should not be attempted.

4. Conclusion

Urethral catheterization if not done in a possible aseptic technique, using proper lubrication by a trained health professional can be a risk for iatrogenic urethral injury and can be complicated with Fournier's gangrene. Fournier's gangrene involving the meatus, penile and bulbar urethra is an extremely rare presentation. Standard steps of catheterization should be followed in everyday practice to avoid this devastating complication. If there is any difficulty with catheterization, forceful insertion should be avoided and an expert or urologist should be consulted.

Patient (parent's) consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this

journal on request.

Ethical approval

Ethical approval was provided by the author's institution.

Ethical review committee of the Department of Surgery, College of Health Sciences, School of Medicine, Addis Ababa University on 10/September 2023 G.C

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Author contribution

Kumlachew Tilahun Tamir (MD, Urology Resident): Assisted first surgery, Conceptualization, Methodology, Manuscript writing, and Submission.

Fitsum Solomon Bekele (MD, Assistant Professor of Urology): Operated first surgery, Conceptualization, Reviewed and Edited the final manuscript.

Mezegebe Gedefe (MD, Senior Urologist): Followed the patient and reviewed the final manuscript.

Meki Kiyar Aman (MD, Assistant Professor of Plastic Surgery): Operated wound closure and reviewed the final manuscript.

Mamush Abera Boson (MD, Plastic Surgery Resident): Assisted in wound closure and edited the case report.

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Declaration of competing interest

All authors declare that they have no conflict of interest.

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