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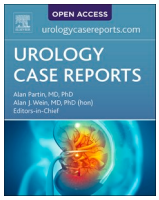

Inflammation and infection

Ischemic gangrene of the penis due to Fournier's gangrene following traumatic transurethral catheterization: A case report

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A B S T R A C T

Fournier's gangrene is a life-threatening fascial infection. We report a case of a 65-year-old diabetic man with a history of obstructive prostate growth who developed ischemic penile gangrene following traumatic transurethral catheterization. Despite initial debridement, progressive necrosis necessitated total penectomy and cystostomy. This case highlights the potential for devastating consequences of failed catheterization and the importance of early urologic intervention.

1. Introduction

Fournier's gangrene, first identified in 1883, is a rare but deadly infection. Initially thought to affect only the scrotum, it's now understood to spread rapidly through the tissues of the genitals, perineum, and anus, potentially reaching the abdomen. Affecting mostly men and those with underlying health issues, it requires immediate medical and surgical attention due to its high mortality rate (between 4.7 % and 40.4 %).[1] Common risk factors include diabetes, cardiovascular disease, chronic alcohol misuse, weakened immune system, kidney disease, and urinary tract instrumentation. Studies show various sources of infection, including skin issues, colorectal problems, urinary issues, diabetes itself, and alcohol abuse.[2,3] Early diagnosis and swift treatment are crucial to improve survival rates. This involves extensive surgical removal of infected tissue (debridement), broad-spectrum antibiotics, fluids to restore hydration, and blood sugar control for diabetic patients.[4]

Gangrene is a serious condition where tissue dies due to lack of blood flow. Signs include discoloration or blackening of the tissue and separation of natural tissue layers. There are three main types: Dry Gangrene: This occurs when blood flow is gradually blocked, causing dehydrated and dead tissue, often a complication of peripheral artery disease. Wet Gangrene: This can start as dry gangrene but becomes infected. It involves swelling, redness, but no gas bubbles. Gas Gangrene: This is a specific type of infection with swelling, gas bubbles detectable on x-rays, and a crackling sound under pressure (crepitus).[5]

2. Case presentation

A 65-year-old man with a long history of type II diabetes mellitus poorly controlled with NPH insulin and obstructive prostate growth treated with an alpha blocker presented with an episode of acute urinary retention after excessive alcohol consumption. He presented to the emergency department and had a transurethral catheter placed traumatically on the third attempt, without apparent urethral trauma but with the output of turbid, foul-smelling urine, for which empirical antibiotic treatment with nitrofurantoin was initiated. Seven days later, he returned to the emergency department with a fever of up to 39 °C, with substantial crepitus of the pubis and purulent, greenish, and foul-smelling discharge through the urethra and skin of the prepuce, the scrotum, digital rectal, and inguinal lymph node examinations were normal with stable vital signs (Fig. 1). Laboratory tests revealed hemoglobin 8 g/dL, white blood cell count 31,000 cells/μL, glucose 250 mg/dL, and creatinine 1.6 mg/dL. Computed tomography (CT) scan demonstrated a 150-g enlarged prostate with multiple abscess with intrinsic gas in the penis, pubis, and abdominal wall and additionally, a transurethral catheter balloon was visualized in the bladder. (Fig. 2). Transfusion of blood products, empirical antibiotic therapy with piperacillin-tazobactam, and insulin therapy were initiated and urology was immediately consulted for Fournier's gangrene.

The patient subsequently underwent urgent surgical debridement of necrotic tissue, revealing non-viable foreskin due to an abscess, with the penile tissue demonstrating adequate macroscopic characteristics with an anterior urethral injury visualizing the passage of the urinary

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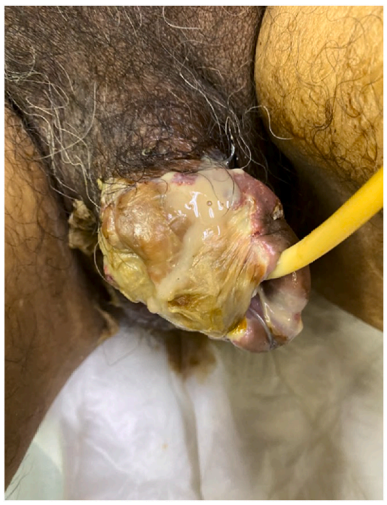

Fig. 1. Preoperative photograph demonstrating copious purulent green discharge emanating from the urethra and prepuce. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

catheter with urine leak and the presence of an abdominal wall abscess (Fig. 3). Daily wound care was continued, but progressive ischemic discoloration leading to total penile necrosis developed (Fig. 4). Penile Doppler ultrasound revealed complete absence of arterial flow, precluding any further intervention by vascular surgery. Finally, the patient underwent total penectomy and cystostomy (Fig. 5), with a favorable outcome and resolution of the condition. He was discharged 7 days later with follow-up appointments scheduled at our outpatient clinic.

3. Discussion

The development of localized ischemic gangrene on the penis is an extremely rare occurrence due to the organ's abundant blood supply and has a high morbidity and mortality due to the high risk of sepsis. In this case, the presentation of penile ischemic gangrene was attributed to a combination of factors: Fournier's gangrene secondary to traumatic transurethral catheter placement, uncontrolled diabetes mellitus, and peripheral artery disease. Computed tomography imaging revealed extensive calcifications consistent with atherosclerosis, further supporting the diagnosis of peripheral artery disease. Despite implementing all available therapeutic measures, the patient unfortunately developed this complication.

Penile Doppler ultrasound can be a valuable tool in guiding treatment decisions. For patients with very small, well-circumscribed lesions

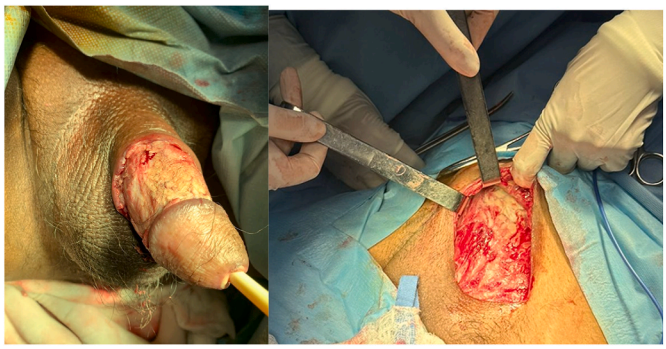

Fig. 3. Postoperative photograph showing successful surgical debridement of necrotic tissue in the penis and abdominal wall.

and residual vascular flow, watchful waiting or revascularization may be employed. However, the absence of blood flow suggests surgical removal of dead tissues, which may justify a total or partial penectomy using ultrasound to determine the extent of necrosis.[6]

The surgical approach for penile gangrene depends on the extent of tissue involvement and the availability of viable tissue for reconstruction. In this case, a total penectomy was performed due to the lack of viable tissue for partial penectomy or reconstruction. The patient was extensively counseled regarding the surgical indication, its potential short-term and long-term consequences, and the placement of a cystostomy catheter. The psychological impact of the procedure was also emphasized. The patient fully understood the information provided and consented to the surgical treatment.

4. Conclusion

Iatrogenic urethral injury and subsequent Fournier's gangrene are potential complications of urethral catheterization. In cases of insertion difficulty, forceful attempts should be strictly avoided. Early consultation with a urologist is recommended to minimize the risk of severe complications. Ischemic gangrene of the penis is a rare complication, this case highlights the potential for devastating psychological and functional outcomes.

CRediT authorship contribution statement

Josué Omar Hernández Martínez: Writing – original draft, Project administration, Methodology, Investigation, Data curation, Conceptualization. **Federico Bertrand Noriega:** Writing – review & editing, Supervision, Resources, Methodology. **Juan Manuel Ramírez Pedraza:** Writing – review & editing, Supervision, Resources, Methodology.

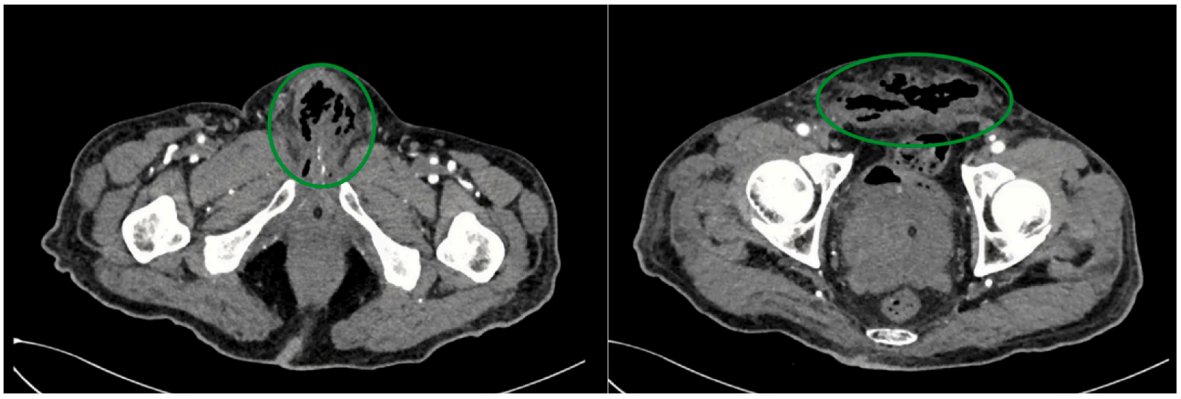

Fig. 2. Key images of CT scan: Enlarged prostate with multiple abscesses containing gas within the penis, pubis, and abdominal wall (green oval). (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

Fig. 4. Progressive ischemic discoloration of penile leading to total dry necrosis developed.

Fig. 5. Postoperative photograph demonstrating successful total penectomy outcome.

Raymundo Arturo Cosío Álvarez: Writing – review & editing, Supervision, Resources, Methodology.

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