

Gangrenous Cystitis: A Rare Case and Review of the Literature

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ABSTRACT

Background

Gangrenous cystitis (GC) is an extremely rare urological emergency characterized by transmural bladder wall necrosis. Fewer cases have been documented in the literature over the past years. This report aims to present a fatal case of GC in a young woman without known comorbidities, potentially triggered by olanzapine-induced urinary retention. This case is accompanied by a review of the literature on similar cases to illustrate diagnostic pitfalls and highlight therapeutic approaches.

Case presentation

A 42-year-old female with no prior medical history, recently started on olanzapine for atypical depression, presented to the emergency department with altered mental status and signs of shock. Physical examination revealed abdominal distension and generalized rigidity. Urgent laparotomy revealed pan-peritonitis and full-thickness bladder necrosis. The patient was transferred to intensive care but died within 24 hours due to multi-organ failure. Histopathological examination showed transmural hemorrhagic necrosis with dense neutrophilic infiltration. Microbiological and neoplastic causes were ruled out.

Clinical discussion

GC is rarely seen today and is typically associated with diabetes, malignancy, or pelvic irradiation. In this case, no traditional risk factors were present. The anticholinergic effects of olanzapine likely led to silent urinary retention and bladder overdistension, resulting in ischemic necrosis. Similar iatrogenic cases have been sparsely described in the literature.

Conclusion

Gangrenous cystitis remains a diagnostic and therapeutic challenge. Clinicians should consider this diagnosis in patients presenting with acute abdomen and urinary symptoms, particularly when exposed to anticholinergic medications. Early recognition and intervention are essential to improve outcomes.

INTRODUCTION

Urinary tract infections (UTIs) represent some of the most frequent bacterial infections observed in medical practice, with an estimated yearly prevalence of 12.6% in women and 3% in men. Nearly six out of ten women will experience at least one UTI during their lifetime ¹. Although uncomplicated infections typically respond well to standard antibiotic regimens, complicated cases may progress to severe outcomes, particularly in patients with predisposing conditions such as advanced age, diabetes mellitus, or structural abnormalities of the urinary tract ².

Gangrenous cystitis (GC) is an exceptionally rare yet potentially fatal sequela of lower urinary tract infection ³. Historically, this condition was mainly reported in association with obstetric trauma or severe pelvic infections before the advent of antibiotics. In recent decades, GC has been increasingly linked to metabolic and iatrogenic factors, including diabetes, chronic urinary stasis, pelvic irradiation, malignant pelvic tumors, and previous urological procedures ⁴.

The precise mechanism leading to GC remains uncertain, but bladder wall ischemia plays a central role. This ischemia may result from sustained overdistension, intense inflammatory response, or compromised local vascular supply. In addition, urinary retention induced by anticholinergic medications, particularly atypical antipsychotics such as olanzapine, has

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been recognized as a predisposing factor due to its inhibitory effect on detrusor contraction, leading to chronic bladder overfilling^{3,5}.

We describe here the case of a 42-year-old woman who developed fatal gangrenous cystitis shortly after receiving olanzapine therapy. Through this case and a review of the literature, we aim to underline the diagnostic difficulties, highlight key clinical indicators, and increase awareness of this rare but devastating urological emergency.

Case presentation

A 42-year-old woman with no significant past medical history presented to the emergency department with recurrent collapses and altered mental status. She had a history of atypical depression, and treatment with olanzapine had been initiated two months prior. On physical examination, the patient was found to be hypothermic, hypotensive, tachycardic (heart rate: 160 bpm), and tachypneic (36 breaths per minute). Her abdomen was distended and exhibited generalized rigidity, while she experienced persistent vomiting. Bladder catheterization revealed pyuria.

Arterial blood gas analysis showed severe metabolic acidosis. Laboratory findings indicated a white blood

cell count of $12 \times 10^9/L$ and acute renal failure. An urgent exploratory laparotomy was performed, revealing diffuse peritonitis and full-thickness necrosis of the urinary bladder.

The patient was then transferred to the intensive care unit in critical condition but sadly died 24 hours later due to multi-organ failure. Microbiological cultures returned negative. Histological examination of the bladder showed widespread transmural necrosis and hemorrhage of the bladder musculature, accompanied by dense neutrophilic infiltration. The serosal surface was covered with fibrinopurulent exudate (Figure 1).

Literature review

We performed a literature review and found that, although the condition is quite rare, it predominantly affects elderly patients, with a slight majority of cases occurring in females. Commonly identified risk factors include diabetes mellitus, chronic urinary retention, and iatrogenic causes, such as pelvic radiation or the use of antipsychotic medications that have anticholinergic effects.

The clinical characteristics, diagnostic findings, and therapeutic outcomes of the reported cases are summarized in Table 1.

Table 1. Summary of Reported Cases of Gangrenous Cystitis

Author (Year)	Age / Sex	Comorbidities / Risk Factors	Etiology	Clinical Features	Diagnosis	Treatment & Outcome
Barrett (1962) ⁶	60 / F	Diabetes, chronic infection, vascular risk	Chronic cystitis and vascular compromise	Incontinence, urgency, pelvic cystic mass	Cystoscopy, histopathology	Debridement, drainage, antibiotics; partial recovery
Devitt & Sethia (1993) ⁷	67 / F	Cervical cancer, radiotherapy, atherosclerosis	Vascular and radiation-related	Not specified	Histology post-cystectomy	Total cystectomy, antibiotics; complete recovery
Ballas et al. (2007) ⁸	78 / F	Diabetes, constipation, neurogenic bladder	Overdistension and ischemia	Abdominal pain, vomiting, oliguria	CT: intramural gas; cystoscopy	Cystostomy, debridement, antibiotics; patient survived
Hinev et al. (2010) ⁹	83 / F	Chronic retention, ischemia risk	Retention-induced ischemia	Acute abdomen	Intraoperative necrosis	Cystectomy + ureterocutaneostomy; favorable outcome
De Rosa et al. (2011) ⁵	42 / M	Previously healthy	Acute retention → ischemia	Acute peritonitis, grey urine	CT, laparotomy, histology	Partial cystectomy; outcome not specified
Brandt et al. (2012) ¹⁰	71 / F	Aortic aneurysm, peripheral vascular disease	Ischemia from emboli	Urosepsis, hematuria	Histology after cystectomy	Cystectomy; recovery

Author (Year)	Age / Sex	Comorbidities / Risk Factors	Etiology	Clinical Features	Diagnosis	Treatment & Outcome
Elalaoui et al. (2022) ¹¹	17 / M	Spinal cord trauma (stab injury)	Chronic urinary retention → ischemia	Peritonitis, crepitus	CT, laparotomy	Radical cystectomy, ureterostomy, prostatectomy; died post-op day 3
Zhou et al. (2023) ¹²	85 / F	Diabetes, catheterization, immunosuppression	Candida glabrata + emphysematous cystitis	Abdominal pain, pneumoperitoneum	CT: bladder gas; cystectomy	Antifungals; survived
Angelopoulos et al. (2023) ¹³	78 / F	Pelvic hematoma	Compression ischemia	Acute abdomen, peritonitis	Imaging + surgical findings	Partial cystectomy, ureterostomies; fatal outcome
Oniwa et al. (2023) ¹⁴	84 / F	Radiation enteritis, pelvic RT 10 years earlier	Radiation-induced arteriopathy	Anuria, pyelonephritis, hydronephrosis	Imaging, autopsy	Autopsy confirmed GC; fatal outcome
Liu et al. (2024) ¹⁵	76 / M	AIHA, MDS, steroids, TURP	Immunosuppression, retention	Sterile pyuria, obstruction, bladder mass	Cystoscopy, CT, histology	Open cystotomy, antibiotics + antifungals; bladder salvaged

M=Male, F=female

DISCUSSION

Gangrenous cystitis (GC) is an exceptionally uncommon and life-threatening urological emergency, with only a few cases documented in recent literature⁹. It is defined by progressive necrosis of the bladder wall, which often begins in the mucosal and submucosal layers and may extend through the entire wall in advanced presentations¹⁶.

The pathogenesis of GC is multifactorial, combining elements of vascular compromise, infectious injury, and mechanical stress on the bladder. Indirect mechanisms include increased intravesical pressure secondary to urinary retention, pelvic tumors, obstructed labor, or vascular occlusion such as thrombosis or arterial ligation. Conversely, direct mechanisms may result from chemical or infectious insult to the mucosa, often associated with intravesical chemotherapy, pelvic radiotherapy, or gas-forming infections, particularly among diabetic patients⁹. Together, these processes trigger ischemic necrosis, which, if not rapidly treated, can progress to perforation, peritonitis, and fatal sepsis¹¹.

It is defined by progressive necrosis of the bladder wall, usually starting in the mucosa and submucosa and, in advanced stages, extending through the entire wall¹⁶. The clinical manifestations are typically non-specific, leading to diagnostic delay. Patients may present with suprapubic pain, dysuria, hematuria,

or systemic signs of infection. In advanced stages, symptoms can resemble those of an acute abdomen, further complicating the clinical picture and worsening prognosis¹⁷. Complications such as vesicocutaneous or colovesical fistulas have been described, illustrating the disease's destructive potential¹⁸.

Imaging studies are indispensable for diagnosis. While ultrasound and cystography provide preliminary insights, computed tomography (CT) remains the most sensitive tool for identifying gas within the bladder wall or adjacent tissues. CT evaluation is particularly recommended in patients presenting with peritonitis or an acute abdomen¹⁹. In the current case, CT findings demonstrated gas collections within the abdominal wall, peritoneum, and psoas muscle—findings that necessitated urgent surgical exploration.

Treatment strategy depends on both the extent of necrosis and the hemodynamic condition of the patient. Early-stage or localized forms may respond to conservative therapy, consisting of intravenous antibiotics, adequate bladder drainage, and supportive measures. In contrast, advanced or septic cases often require surgical management, which may involve debridement, urinary diversion (for example, bilateral ureterostomy), or, in extensive necrosis, radical cystectomy¹⁹.

Despite aggressive therapeutic measures, the mortality

rate remains high—estimated at approximately 35 %²⁰. The rarity of GC, its subtle onset, and rapid deterioration all contribute to delayed recognition and poor prognosis.

Similar to other uncommon cystic or necrotic lesions reported in urological and pelvic pathology, including the cyst of the canal of Nuck described by Kesici et al.²¹ and the fibroadenoma patterns reported by Chauhan et al.²², this entity underscores the importance of clinical vigilance and the need to consider rare causes of lower urinary tract symptoms, particularly in patients with multiple comorbidities or recent medication exposure.

CONCLUSION

GC is an extremely rare but serious urological emergency characterized by rapid progression and high mortality rates. This case illustrates an unusual presentation in a young woman with no known comorbidities, likely triggered by urinary retention induced by olanzapine, a mechanism that is rarely reported in the literature. Our review emphasizes that although diabetes, malignancy, and radiation are the most common predisposing factors, clinicians should be alert to iatrogenic causes, especially in patients taking anticholinergic medications. The nonspecific nature of the clinical presentation and the rapid deterioration of the patient's condition often result in delays in diagnosis. Timely recognition, a high level of clinical suspicion in situations involving urinary retention or sepsis, and early surgical intervention are essential for improving outcomes. Increased awareness and documentation of such rare presentations may facilitate earlier detection and better prognostication in future cases.

Abbreviations

GC= Gangrenous cystitis

CT= computed tomography

UTIs= Urinary tract infections

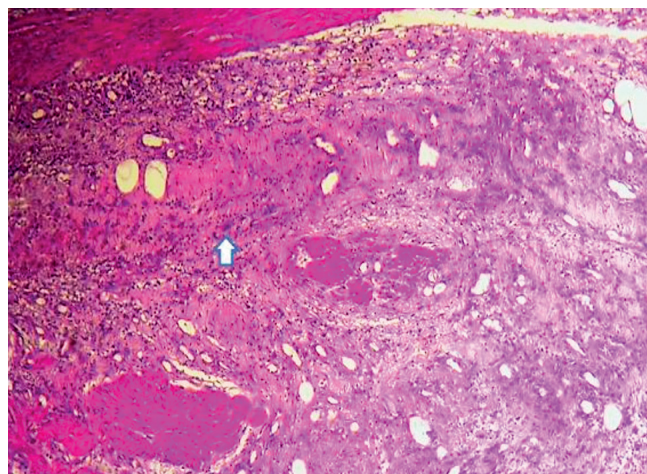


Figure 1. Ischemic necrosis of the bladder muscle (arrow), associated with marked inflammatory changes (Haematoxylin and Eosin, ×200).

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Authors' contribution:

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