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Pneumoperitoneum Caused by Gangrenous Cystitis: An Unusual Presentation

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ABSTRACT : Pneumoperitoneum is most often associated with gastrointestinal perforation, but rare extra-digestive causes exist. Gangrenous cystitis is a severe and uncommon bladder infection that can exceptionally lead to pneumoperitoneum. We report a case of pneumoperitoneum secondary to gangrenous cystitis in a 31-year-old patient initially hospitalized for dorso-lumbar trauma. The postoperative course was complicated by a severe urinary tract infection. One month later, abdominal computed tomography revealed pneumoperitoneum with a thickened, heterogeneous bladder wall suggestive of gangrenous cystitis. Emergency surgical exploration showed a necrotic, gangrenous bladder without any gastrointestinal perforation. Gangrenous cystitis can rarely present with pneumoperitoneum and mimic gastrointestinal perforation. Early recognition and prompt surgical management are crucial for patient recovery.

KEYWORDS : Pneumoperitoneum – Gangrenous cystitis – Bladder perforation - Complicated urinary tract infection

INTRODUCTION

Pneumoperitoneum is classically associated with perforation of a hollow digestive organ and most often requires urgent surgical management. However, in rare situations, it may be of extra-digestive origin. [1]

Gangrenous cystitis represents an exceptional and severe form of bladder infection characterized by necrosis of the bladder wall that may progress to perforation. [2]

The association of pneumoperitoneum with gangrenous cystitis is extremely rare and may mimic digestive perforation.

We report the case of a patient presenting with pneumoperitoneum secondary to gangrenous cystitis, and we discuss the diagnostic and therapeutic aspects.

CASE REPORT

A 31-year-old patient was admitted to the neurosurgery department for management of a dorso-lumbar trauma following a fall from the first floor. The patient underwent lumbar laminectomy with pedicle screw fixation at the L2–L3 and D11–D12 levels.

The postoperative course was marked by the occurrence of a severe urinary tract infection complicated by pelvic peritonitis, for which the patient underwent surgery. An exploratory laparotomy with peritoneal lavage and drainage of the space of Retzius was performed

One month later, due to clinical deterioration, the patient presented an altered level of consciousness with a Glasgow score of 12/15, as well as bilateral lower limb edema . the Abdominal clinical examination was limited because of the patient's neurological condition.

Laboratory tests revealed leukocytosis at 12 $\times 10^3/mm^3$ associated with an elevated C-reactive protein level of 116.9 mg/L. Urine cytobacteriological examination demonstrated a urinary tract infection caused by a multidrug-resistant organism.

An abdominopelvic computed tomography scan was performed, revealing a markedly thickened and heterogeneous bladder wall with a necrotic–hemorrhagic appearance suggestive of gangrenous cystitis. The examination also demonstrated two fistulas tracts : an anterior fistula communicating with the abdominal wall and a posterior fistula in contact with the rectum (Figure 1). In addition, infiltration of the peritoneal fat associated with a moderate pneumoperitoneum involving the supra- and infra-mesocolic compartments was observed(Figure 2), without evidence of intraperitoneal fluid collection.

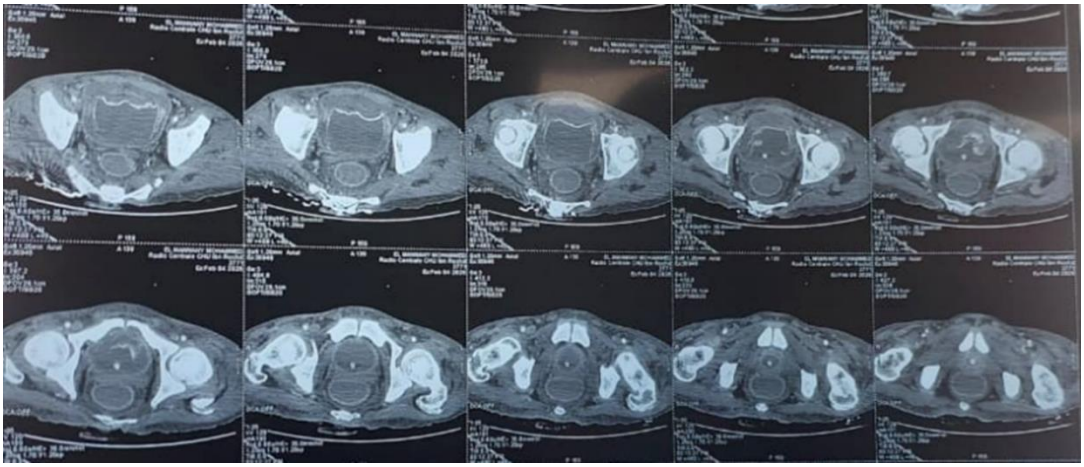

Figure 1 : Abdominopelvic CT scan showing a markedly thickened and heterogeneous bladder wall with a necrotic appearance

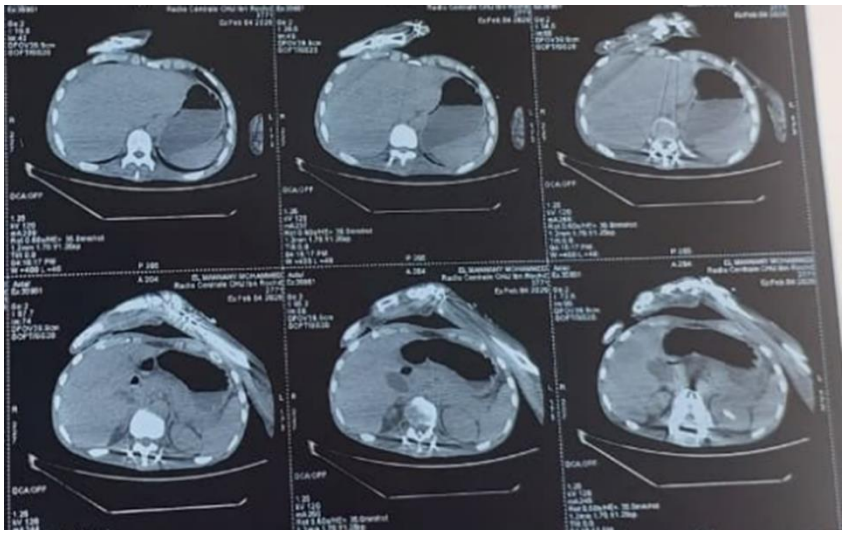

Figure 2 : Abdominopelvic CT scan demonstrating a pneumoperitoneum located in the supra-mesocolic compartments

In view of the biological and radiological findings, the indication for emergency surgical exploration was established, and the patient was immediately transferred to the operating room.

Intraoperative exploration revealed no signs of peritonitis in the supramesocolic compartment and no evidence of gastrointestinal perforation (Figure 3). However, it demonstrated a sclerotic, gangrenous, and necrotic bladder with extensive dissection of all bladder wall layers (Figure 4), associated with multiple perivesical purulent collections. Resection (debridement) of the necrotic bladder tissues was performed (Figure 5) with the creation of bilateral ureterostomies.

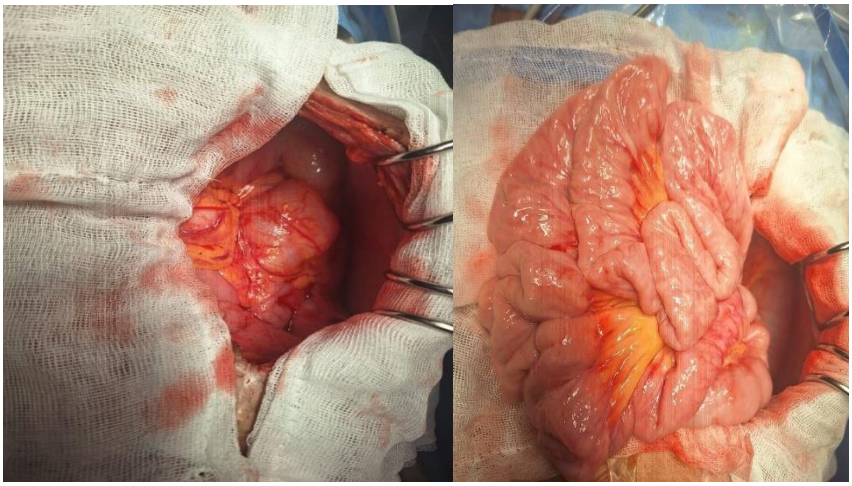

Figure 3 : Intraoperative exploration showing the absence of digestive perforation and no signs of peritonitis in the supramesocolic compartment.

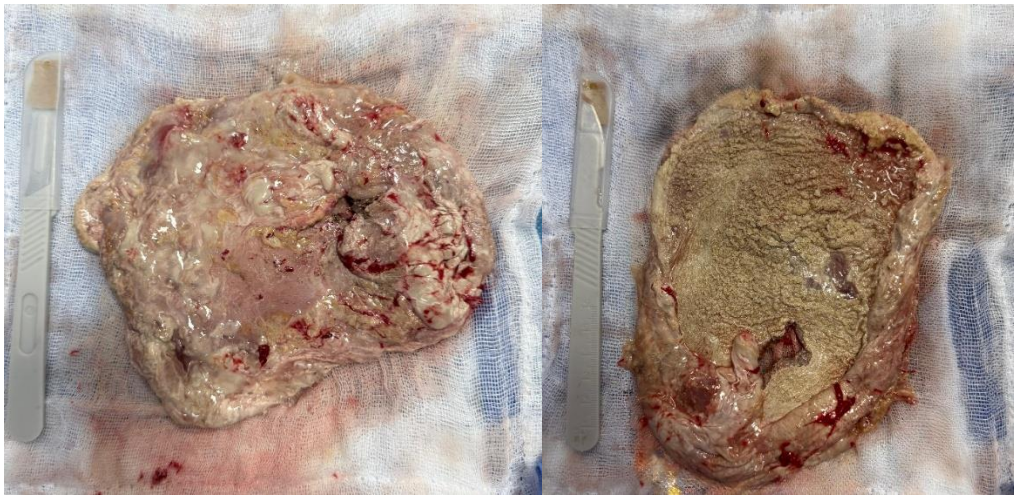

Figure 4 : ntraoperative view showing a gangrenous and necrotic bladder with extensive dissection of the bladder wall.

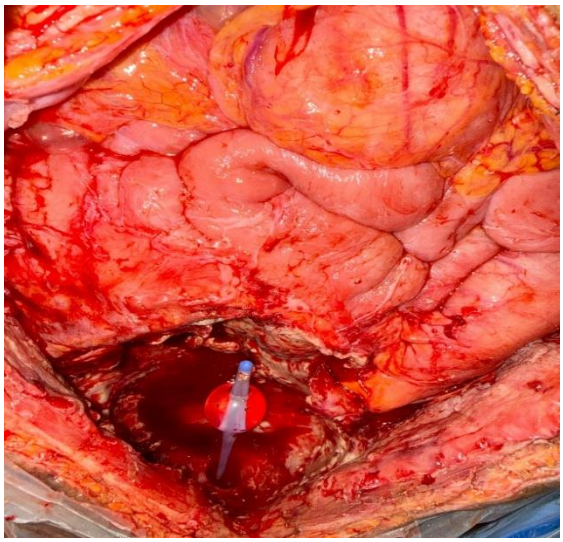

Figure 5 : Intraoperative image after surgical debridement of necrotic bladder tissues

Postoperatively, the patient developed hemodynamic instability requiring intensive care management with norepinephrine infusion. The clinical course was marked by the occurrence of an irreversible cardiorespiratory arrest.

DISCUSSION

Gangrenous cystitis is a rare condition that has been recognized since the 17th century [3]. The first case was described by Willis in 1650 [4], and only a limited number of cases have been reported in the contemporary literature [5]. Most of the reported cases were published several decades ago, during a period when antibiotics were not as widely used as they are today. With the widespread use of antibiotics, gangrenous cystitis has become a rarely reported entity [5].

The exact pathogenesis of bladder wall necrosis remains unclear [6]. However, several predisposing factors have been described in the literature. The most frequently reported include diabetes mellitus, immunosuppression, chronic urinary retention, bladder outlet obstruction, and pelvic trauma, as observed in our patient. These conditions may lead to impaired bladder vascularization and bacterial proliferation, ultimately resulting in necrosis of the bladder wall [7].

Gangrenous cystitis is characterized by necrosis that may involve the mucosa, submucosa, or the entire bladder wall, sometimes leading to bladder perforation and acute peritonitis. Its diagnosis is often delayed due to nonspecific clinical manifestations, which frequently mimic those of acute cystitis [2]. However, the clinical course may rapidly progress to an acute abdomen [8].

Computed tomography (CT) is considered the imaging modality of choice for the diagnosis of gangrenous cystitis; however, it is often performed only when the patient presents with signs and symptoms of an acute abdomen [8].

The presence of pneumoperitoneum in a patient with gangrenous cystitis may suggest bladder perforation. When associated with intraperitoneal free air, it usually indicates an intraperitoneal perforation that often requires surgical management [9].

It remains difficult to determine the need for abdominal surgical exploration, particularly when attempting to differentiate between bladder perforation and gastrointestinal perforation, based solely on clinical signs of peritonitis or CT findings [10].

Management primarily relies on surgical treatment, including debridement of necrotic bladder tissues and adequate drainage. Partial cystectomy may be considered when the trigone is preserved, whereas extensive necrosis requires total cystectomy to ensure adequate management and healing [11].

However, the literature considers gangrenous cystitis complicated by intraperitoneal perforation to be an extremely rare condition [8].

CONCLUSION

Gangrenous cystitis is an exceptionally rare cause of pneumoperitoneum. It should be considered in the differential diagnosis of pneumoperitoneum in the absence of an obvious gastrointestinal perforation, particularly in patients with urinary or metabolic risk factors.

Computed tomography (CT) plays a key role in guiding the diagnosis, and early management is essential to improve the prognosis.

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