

**Case Report**

***Emphysematous Cystitis with Bladder Mass caused by Colovesical Fistula: A Rare Case Report***

**Sistitis Emfisematous dengan Massa Kandung Kemih yang disebabkan Fistula Vesika-Colon:  
Laporan Kasus Langka**

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**ABSTRACT**

*Emphysematous cystitis (EC) is a rare manifestation of a complicated urinary tract infection, and its pathognomonic feature is a gas appearance inside the bladder wall and lumen. Emphysematous cystitis with bladder mass is an extremely rare finding. In this case study, a 59-year-old female presented with dysuria and pneumaturia for two months before admission. Following history taking and physical examination, a CT scan was performed to establish the diagnosis, which revealed thickening bladder wall with free gas appearance, impressing emphysematous cystitis. Urine culture showed no bacterial growth, cystoscopy revealed posterosuperior bladder mass, a biopsy was done followed by fulguration of the bladder and showed no malignancy, and MRI implied emphysematous cystitis with bladder dome adhesions of colon mass with colovesical fistula. After resection of colon anastomosis, colitis was found as the etiology of the colovesical fistula. An accurate diagnosis of the disease and correct treatment would result in a good prognosis and outcome.*

**Keywords:** *Emphysematous cystitis, pneumaturia*

**ABSTRAK**

Sistitis emfisematous (EC) adalah gambaran yang langka dari infeksi saluran kemih dengan komplikasi, gambaran khas dari kondisi ini adalah temuan gas di dalam dinding dan lumen kandung kemih. Sistitis emfisematous dengan massa kandung kemih adalah temuan yang bahkan lebih jarang lagi. Penulis melaporkan seorang wanita 59 tahun dengan disuria dan pneumaturia 2 bulan sebelum masuk rumah sakit. Setelah anamnesis dan pemeriksaan fisik, CT scan dilakukan untuk menegakkan diagnosis. Didapatkan penebalan dinding kandung kemih dengan penampilan gas bebas dengan kesan sistitis emfisematous. Kultur urin tidak menunjukkan pertumbuhan bakteri. Pada sistoskopi ditemukan massa kandung kemih posterosuperior, Biopsi dilakukan diikuti dengan fulgurasi kandung kemih. Hasil biopsi tidak menunjukkan keganasan. MRI memperlihatkan gambaran sistitis emfisematous dengan adhesi fundus kandung kemih dari massa usus besar dengan fistula vesika-kolon. Setelah dilakukan reseksi anastomosis kolon, ditemukan adanya kolitis sebagai etiologi dari fistula vesika kolon. Diagnosis penyakit yang akurat dan pengobatan yang tepat dapat menghasilkan prognosis dan luaran yang baik.

**Kata Kunci:** Pneumaturia, sistitis emfisematous

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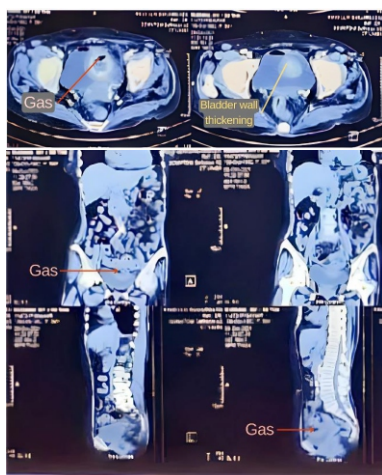
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**INTRODUCTION**

Emphysematous cystitis (EC) is a rare manifestation of complicated urinary tract infections (UTIs), and its pathognomonic feature is gas inside the bladder wall and lumen (1). Emphysematous cystitis is an uncommon clinical entity commonly associated with diabetes mellitus as its significant risk factor. Urinary tract outlet obstruction, immune deficiency, neurogenic bladder, chronic UTIs, and indwelling urethral catheters are other risk factors for this condition (2). Patients with EC may come with various clinical manifestations, from asymptomatic to severe sepsis.<sup>1</sup> The pathogenesis of this condition is still poorly understood, and the causative pathogens commonly associated are gas-forming bacteria, such as *Escherichia Coli*, *Enterococci*, and *Klebsiella pneumonia* (3). Emphysematous cystitis with bladder mass is an extremely rare finding (4). Urine culture is often used to isolate the causative agents. Imaging modalities, such as plain abdominal radiography and computed tomography, play an important role in obtaining a definitive diagnosis of EC (1). CT with high sensitivity and specificity is the gold standard for detecting gas in the bladder wall and establishing the diagnosis.<sup>4</sup> In most cases, EC can be treated with antibiotics combination, glycemic control, and bladder drainage. A 7% EC mortality rate shows that this condition is potentially life-threatening. Early medical intervention may contribute to achieving a better prognosis without the need for surgical intervention (1).

**CASE REPORT**

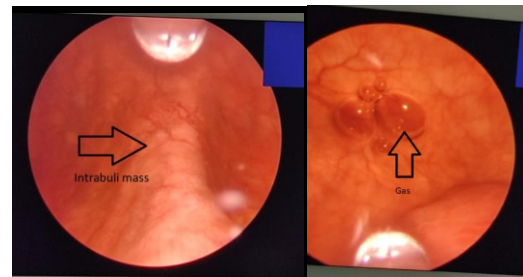
A 59-year-old female presented with dysuria and pneumaturia for two months before admission. The patient complained of pain at the urinary outlet and lower left part of the abdomen and a sensation of incomplete emptying after urinating; the urine color was feculent yellow. Past medical history was insignificant, and the patient had no prior medical examination.



**Figure 1. Gas and bladder wall thickening from MSCT urology axial (up) and sagittal-coronal plane (bottom)**

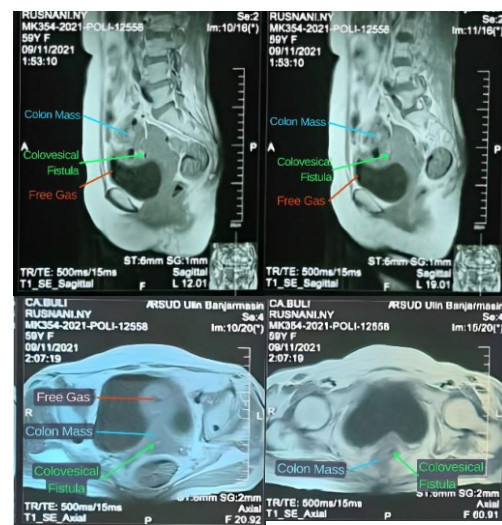
Physical examination showed no abnormalities, blood tests showed normal value of routine blood examination and renal function test, urine culture showed no bacterial

growth, but CT scan with contrast revealed thickening bladder wall with free gas appearance impressed emphysematous cystitis (Figure 1).



**Figure 2. Gas and bladder mass from cystoscopy view**

Cystoscopy resulted in no abnormality in the urethra and bladder neck, but a bladder mass was found on the superoposterior aspect of the bladder wall that compressed the bladder extravasically to the middle. The ureteric orifice showed no abnormalities. Biopsy was done at the bladder triangle, left and right ureteric orifice, posterosuperior aspect, and fundus of the bladder. Post-biopsy fulguration was done, and a 3-way urine catheter No.22 with passive spooling was installed. MRI was done to confirm CT finding of emphysematous cystitis and find any sign of the etiology (Figure 2).



**Figure 3. Free gas, bladder mass, and colovesical fistula showed by MRI in sagittal (up) and axial plane (bottom)**

MRI showed bladder dome adhesions of colon mass, suspected malignancy with colovesical fistula. There was a 5x3x6 cm irregular bowel wall thickening hypointense with T1SE contrast and hyperintense with T2FSE. The patient underwent colonoscopy to have a better view of the colon mass and colovesical fistula. Resection of colon anastomosis followed by fistulectomy was done as the management of colon mass and colovesical fistula, colitis was found as the etiology of the colovesical fistula. It concluded that pneumaturia was caused by emphysematous cystitis which caused by colovesical

fistula (Figure 3).

## DISCUSSION

Emphysematous cystitis is a relatively rare disease caused by gas-forming microbes. EC is less severe than other gas-forming urinary tract infections, with an overall mortality rate of 3-12%. However, when EC is associated with another gas-forming disease within the upper urinary tract, such as emphysematous pyelonephritis (EP), the mortality rate rises to 14-20%. EC commonly happens in older women (60-70 years of age) with uncontrolled and severe diabetes mellitus, which is approximately twice higher in women compared to men. The most common risk factors for complicated UTIs are also risk factors for DM, recurrent UTIs, neurogenic bladder, and urinary stasis secondary to bladder outlet obstruction (1).

Emphysematous cystitis is infrequent but potentially fatal if not treated appropriately. This condition has features similar to uncomplicated cystitis, characterized by lower urinary tract symptoms, such as dysuria, abdominal pain, hematuria, and urinary urgency and frequency, with a pathogenic exception, but with the unique presence of pneumaturia (2). In this case, the patient presented with dysuria and pneumaturia without significant past medical history, including diabetes mellitus; previous milder symptoms might have been ignored and prevented the patient from seeking medical advice.

The exact pathomechanism of pneumaturia remains unclear and poorly understood. In diabetic patients, however, pathogens can produce carbon through fermentation. Since the infection also happens in non-diabetics, tissue proteins and urinary lactulose may serve as substrates. Impaired gas transport due to local inflammation or obstructive processes, which cause an increase of intracellular pressure and simultaneously decrease circulation, may also increase the risk of pneumaturia. The bacterial endotoxin release in complicated UTIs may contribute to inflammation and induce urinary tract paralysis and stasis (2). However, no bacterial growth was found with a urine culture since negative urine cultures are commonly found in patients who have already taken antibiotics (3).

Blood cultures followed with urinalysis and gram staining of the urine and urine cultures are essential for detecting the causative pathogen. Imaging modalities, such as plain abdominal radiography and computed tomography, play a vital role in obtaining a definitive diagnosis of EC (5). Traditional plain film imaging of the abdomen was the most common imaging modality (84%). However, an abdominal X-ray has a very low specificity. Traditional abdomen radiograph was used in only 13% of cases. Computed tomography (CT-scan) may also differentiate and detect other pathologies with air in the urinary tract, namely uro-intestinal fistula, trauma, renal infarction, and instrumentation (6). In this case, blood tests showed normal value of routine blood examination and renal function test. CT scan revealed thickening of the bladder wall with a free gas appearance, suggesting emphysematous cystitis.

In 39% of cases, cystoscopy was used, but the diagnosis was also confirmed radiologically in each case. Cystoscopy

with CT may help diagnose the potential cause, such as enterovesical fistula, and can add information about bladder outlet obstruction, which contributes to emphysematous cystitis. There is no further information regarding the use of MRI to diagnose emphysematous cystitis. The use of MRI may seem limited because gas-forming bacteria can cause signal voids, which are difficult to be detected and interpreted on MRI (7).

In this case, the cystoscopy results showed no abnormality of the urethra and bladder neck, but a bladder mass was found on the superoposterior aspect of the bladder wall that compressed the bladder extravasically to the middle. The ureteric orifice showed no abnormalities. Biopsy was done at five locations: the bladder triangle, left and right ureteric orifice, posterosuperior aspect, and fundus of the bladder. Post-biopsy fulguration was done, and a 3-way urine catheter No.22 with passive pooling was inserted. MRI was done and showed gas inside the urinary vesica, which implied emphysematous cystitis. It also showed bladder wall thickening; bladder wall thickening in infectious cystitis is secondary to underlying chronic conditions, such as hypertrophy of detrusor muscle and recurrent UTIs (8). MRI showed bladder dome adhesions of colon mass, suspect of malignancy with colovesical fistula. There was a 5x3x6 cm irregular bowel wall thickening hypointense with T1SE contrast and hyperintense with T2FSE.

The patient received two kinds of antibiotics, which were ceftriaxone and metronidazole. Parenteral antibiotics, such as ceftriaxone, carbapenem, fluoroquinolone, and aminoglycoside, are some medical therapies used in complicated cystitis, like emphysematous cystitis. These antibiotics combined with metronidazole are used widely, as some case reports, such as Ouraghi et al., reported intravenous ceftriaxone usage (9).

After resection of colon anastomosis and fistulectomy to manage colon mass and colovesical fistule, colitis was found as the etiology of the colovesical fistula. In two-thirds of cases, the most common cause of colovesicular fistulas is the sequelae of diverticulitis with complications. Malignancies are found in 10%-20% of cases, and most are adenocarcinoma of the colon, while 5-7% of cases are caused by Crohn's colitis and usually result from the long-standing disease (10).

Regional enteritis, secondary to Crohn's colitis transmural inflammation characteristic, results in adherence to the bladder with consequent erosion into the bowel and fistula formation (11-12).

In conclusion, emphysematous cystitis (EC) is a rare manifestation of complicated UTIs, and its pathognomonic feature is gas inside the bladder wall and lumen. Early diagnosis and well-planned treatment are essential to minimize morbidity.

Emphysematous cystitis (EC) is a rare manifestation of a complicated urinary tract infection, and its pathognomonic feature is a gas appearance inside the bladder wall and lumen. An accurate diagnosis of the disease and correct treatment would result in a good prognosis and outcome.

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