

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

# Respiratory Medicine Case Reports

journal homepage: [www.elsevier.com/locate/rmcr](http://www.elsevier.com/locate/rmcr)

## Case Report

### A rare case of infected urinothorax

Thomas Glozman<sup>a, \*</sup>, Simrin Kooner<sup>a</sup>, Christian Kostowniak<sup>a</sup>, Robert Pacheco<sup>b</sup>,  
Yikun Zhang<sup>a</sup>, Camille L. Dumas<sup>b</sup>, Amit Chopra<sup>c</sup>

<sup>a</sup> Department of Medicine, Albany Medical Center 43 New Scotland Avenue, Albany, NY, USA

<sup>b</sup> Department of Radiology, Albany Medical Center, 43 New Scotland Avenue, Albany, NY, USA

<sup>c</sup> Department of Medicine, Division of Pulmonary and Critical Care Medicine, Albany Medical Center 16 New Scotland Avenue, Albany, NY, USA

#### ABSTRACT

Urinothorax is a rare cause of pleural effusion. Infected urinothorax is even rarer. Here we present a case of infected urinothorax from renal mass causing obstructive uropathy. Patient improved with pleural drainage and a multidisciplinary approach of treatment between team involving urologist and pulmonologist. This case highlights the complexity in the diagnosis and management of infected urinothorax.

#### 1. Introduction

Urinothorax is defined as the presence of urine in the pleural space. Urinothorax is commonly caused by obstructive uropathy. It rarely gets infected. Here we describe an interesting case of infected urinothorax in the setting of obstructive nephropathy.

#### 2. Case presentation

A 55-year-old woman presented with 1 week of worsening shortness of breath, pleuritic chest pain, and generalized weakness. She had not seen a physician in 30 years and has no known past medical history. She is an active smoker with a 40-pack-year history. She experienced 6 months of fatigue and 20 pounds of unexplained weight loss. On presentation, she was afebrile, blood pressure was 89/54 mmHg with heart rate of 102 beats per minute, respiratory rate of 21 and oxygenation saturation of 97 % on room air. A general examination revealed poor dentition and malnourishment. The lung exam was notable for dullness to percussion and absent breath sounds over the left hemithorax. There was no flank tenderness.

Laboratory studies showed leukocytosis with white cell count of 21,000 cells/ml, profound anemia with hemoglobin of 5.5 g/dl and serum albumin 2.0 g/dl. Initial urine with 3+ leukocyte esterase and marked bacteria. Renal function was within normal limits.

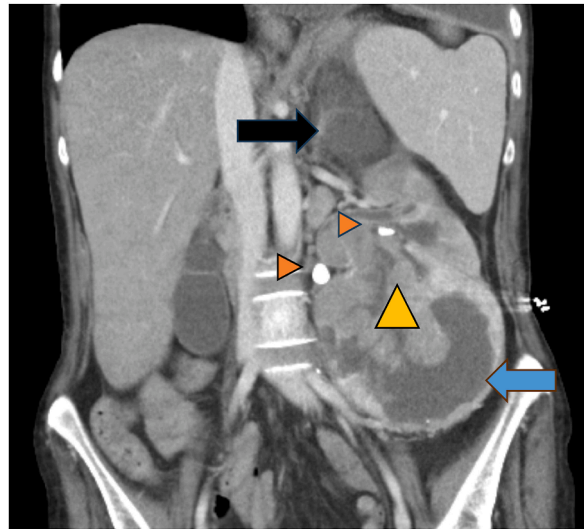
Point of care ultrasonography revealed large left sided loculated echogenic pleural effusion with pleural thickening and flattening of the left diaphragm. Computed tomography (CT) of the chest revealed large multiloculated pleural fluid collections occupying the left hemithorax. CT of the abdomen revealed large heterogenous mass in the left renal pelvis and lower pole with evidence of obstruction, calyceal dilation, and upper pole rupture with a urinoma in the left retroperitoneum (Figs. 1 and 2) that was communicating with the multiloculated pleural fluid collection through a diaphragmatic defect (Fig. 3).

#### 3. Clinical course

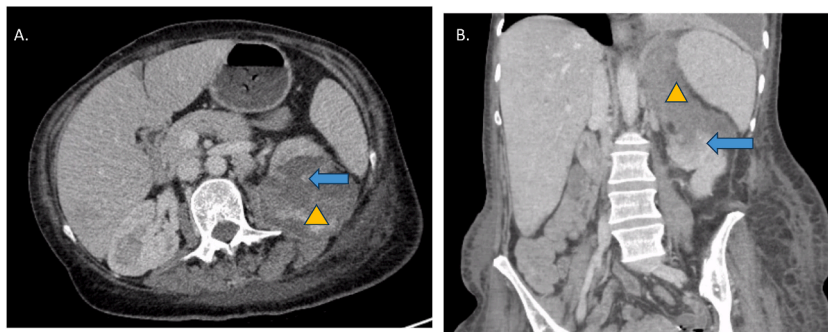
The patient was initiated on broad-spectrum antibiotics. A chest tube was placed with 600 ml of foul-smelling, turbid tan material aspirated during the procedure. Pleural fluid analysis was consistent with empyema with Glucose < 10g/dl, LDH > 10,000 g/dl, and Protein 2.5 g/dl. Pleural fluid creatinine was sent for the suspected diagnosis of urinothorax based on the presence of ipsilateral

\* Corresponding author.

E-mail address: [glozmat@amc.edu](mailto:glozmat@amc.edu) (T. Glozman).



**Fig. 1.** Contrast-enhanced coronal CT of the abdomen and pelvis demonstrates a large heterogenous mass in the left renal pelvis and inferior pole (yellow triangle). Urinoma is identified above the left kidney (black arrow). Also depicted are dilated left renal calyces (blue arrow) and multiple calculi (orange arrowheads). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)



**Fig. 2.** Axial (a) and coronal (b) images from contrast-enhanced CT demonstrate a cortical rupture of the left renal upper pole (blue arrow) resulting in urinoma in the upper left retroperitoneum (yellow triangle). Heterogenous density of the urinoma is due to excreted contrast mixing with urine. (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

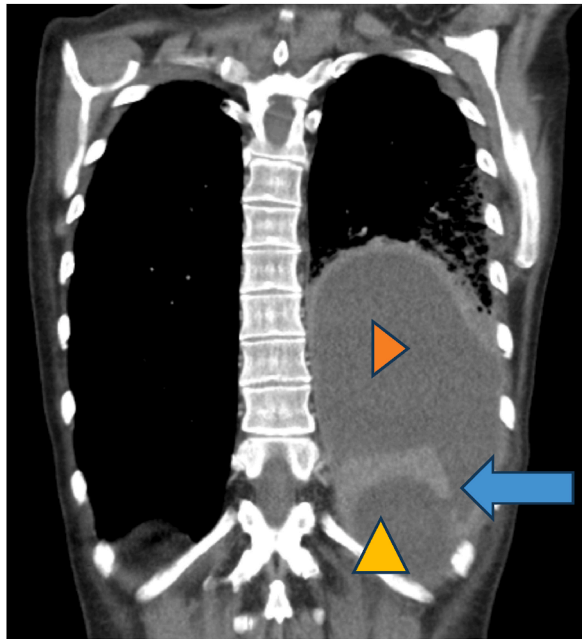
pleural effusion to the obstructive uropathy. Pleural fluid/Serum ratio of creatinine was 2.5:1. The gram stain revealed gram-negative rods and gram-positive cocci. Pleural fluid culture grew multiple organisms including *Escherichia Coli*, *Gardnerella Vaginalis*, and *Peptostreptococcus*. Intrapleural fibrinolytics and DNase was used to facilitate pleural drainage and 3 L of pleural pus was drained over the first 48 hours. Urology was consulted to assist with the management of obstructive uropathy. The initial urological intervention included the placement of a left ureteral stent and placement of abdominal drain for the drainage of retroperitoneal fluid collection. A renal core biopsy was obtained and was consistent with clear cell renal carcinoma. The chest tube was removed 8 days post-placement with a total of 5 L pleural fluid drained. The patient was discharged with outpatient follow-up with Urology for radical nephrectomy.

#### 4. Discussion

Urinothorax is an under-reported condition with limited literature available. This process can occur in any age group with a predominance in men. The most common presenting symptoms are dyspnea, chest pain, abdominal pain, and decreased urine output. Most cases are traumatic in origin [1].

This case is unique in that the urinothorax was superinfected with bacteria that were isolated in cultures from the pleural fluid aspirate. Urine is usually a sterile, pauci-cellular fluid. The cause of urinothorax is most commonly obstructive uropathy but may occur because of traumatic or iatrogenic injury [2]. In a previous review, only 9.3% (3/32) of urinothorax cases cultured grew positive [1]. In general, pleural effusion cultures are positive in 40% of cases, with the most frequently isolated bacteria being strep and staph species [3,4]. However, anaerobes such as *E. Coli*, *Pseudomonas*, *Klebsiella*, and *H. Influenza* are less commonly cultured and rarely in isolation [4].

In this case, multiple pathogens were isolated: *E. Coli*, *Peptostreptococcus*, and *G. Vaginalis* which are commonly found in the GU tract, suggestive of infected urinothorax. There were only four other previously published cases of pleural space infection with *G.*



**Fig. 3.** Contrast-enhanced coronal CT of the chest demonstrates communication of the abdominal urine collection (yellow triangle) with the left thorax through a diaphragmatic defect (blue arrow) and associated large left pleural fluid collection with thick pleural rind (orange arrowhead). (For interpretation of the references to colour in this figure legend, the reader is referred to the Web version of this article.)

Vaginalis isolated [5–8]. An ipsilateral diaphragmatic defect noted on CT scan with communication between urinoma and pleural effusion further suggested a GU tract origin of the effusion.

The pathophysiology of urinothorax is interesting. Two potential mechanisms of urinothorax have been described: (i) obstructive uropathy can result in extravasation of urine causing urinoma formation (Fig. 1) which directly communicates through diaphragmatic pores into the pleural space or through a diaphragmatic defect (Fig. 3) and (ii) indirectly via communication between retroperitoneal and pleural lymphatics [9–12]. The literature suggests that pleural effusion is commonly ipsilateral obstructive uropathy. However, there are seldom case reports of contralateral or bilateral pleural effusions [1,9].

Diagnosis of urinothorax requires a high degree of suspicion, especially in cases of pleural effusions with associated ipsilateral obstructive or traumatic uropathy [2]. A combination of history, physical examination, pleural fluid analysis, and imaging should be used [9]. More importantly, there should be a presence of ipsilateral genitourinary injury or obstruction. Pleural fluid with a creatinine ratio to serum of  $>1.0$  is suggestive of urinothorax, while higher ratios provide increased specificity for diagnosis [9,13,14]. Pleural fluid pH can be low or normal. Urinothorax is one of the causes of acidic transudative effusion other than central venous catheter migration. In a literature review discussing cases published between 1960 and 2016, 49 % of urinothorax were transudative, 23 % were exudative, and the remainder were unclassified. Urinothorax developed within 8 hours to 2 months of the initial inciting pathology. The average time to onset is 2 days and patients with a malignancy-related obstruction have a more insidious onset [9].

Management of urinothorax involves the treatment of underlying obstructive uropathy and pleural drainage. A multidisciplinary approach should be used to relieve urinary obstruction and pleural drainage by involving pulmonology, radiology, and urology. Pleural drainage can be achieved by thoracentesis or chest tube drainage. Pleurodesis is not recommended [9]. In case of infection, broad-spectrum antibiotics should be given to treat the infection.

## 5. Clinical pearls

1. Urinothorax should be considered as a differential diagnosis of pleural effusion ipsilateral to obstructive uropathy.
2. Urinothorax is rarely infected unless there is an infected kidney.
3. Management of infected urinothorax requires a multidisciplinary approach for relieving urinary obstruction and pleural drainage.

## CRedit authorship contribution statement

**Thomas Glozman:** Writing – original draft. **Simrin Kooner:** Writing – review & editing. **Christian Kostowniak:** Writing – review & editing. **Robert Pacheco:** Writing – review & editing. **Yikun Zhang:** Writing – review & editing. **Camille L. Dumas:** Writing – review & editing. **Amit Chopra:** Supervision.

## Declaration of competing interest

None. Thomas Glzman on behalf of all authors.

## References

- [1] María E. Toubes, et al., Urinothorax: a systematic review, *J. Thorac. Dis.* 9 (5) (May 2017) 1209–1218, <https://doi.org/10.21037/jtd.2017.04.22>.
- [2] Santosh Agrawal, et al., Urinothorax: a path, less travelled: case report and review of literature, *J. Nat. Sci. Biol. Med.* 6 (1) (2015) 213, <https://doi.org/10.4103/0976-9668.149182>.
- [3] Rachel M. Mercer, et al., Interpreting pleural fluid results, *Clin. Med.* 19 (3) (May 2019) 213–217 <https://doi.org/10.7861/clinmedicine.19-3-213>, *PubMed*.
- [4] H.E. Davies, et al., Management of pleural infection in adults: British thoracic society pleural disease guideline 2010, *Thorax* 65 (Suppl 2) (Aug. 2010) ii41–53, <https://doi.org/10.1136/thx.2010.137000>.
- [5] L. Calvert, et al., Multiple abscesses caused by in an immunocompetent man, *J. Infect.* 51 (2) (Aug. 2005) E27–29, <https://doi.org/10.1016/j.jinf.2004.08.002>.
- [6] J.C. Legrand, et al., Gardnerella Vaginalis bacteremia from pulmonary abscess in a male alcohol abuser, *J. Clin. Microbiol.* 27 (5) (May 1989) 1132–1134, <https://doi.org/10.1128/jcm.27.5.1132-1134.1989>.
- [7] Lorraine Murray, James Halpin, Brian Casserly, Nuala H. O'Connell, Timothy Scanlon, A Pyo-Hydropneumothorax with Sepsis, Secondary to Gardnerella Vaginalis Infection in a Post-partum Female. *Respiratory Medicine Case Reports*, vol. 26, 2019, pp. 189–192, <https://doi.org/10.1016/j.rmcr.2019.01.007>.
- [8] Simin Wu, et al., Metagenomic next-generation sequencing assists in the diagnosis of Gardnerella Vaginalis in males with pleural effusion and lung infection: a case report and literature review, *Infect. Drug Resist.* 14 (Dec. 2021) 5253–5259, <https://doi.org/10.2147/IDR.S337248>.
- [9] Adam Austin, et al., The urinothorax: a comprehensive review with case series, *Am. J. Med. Sci.* 354 (1) (July 2017) 44–53, <https://doi.org/10.1016/j.amjms.2017.03.034>.
- [10] Joseph N. Corriere, et al., Hydronephrosis as a cause of pleural effusion, *Radiology* 90 (1) (Jan. 1968) 79–84, <https://doi.org/10.1148/90.1.79>.
- [11] Gerald W. Friedland, et al., Neonatal 'urinothorax' associated with posterior urethral valves, *Br. J. Radiol.* 44 (522) (June 1971) 471–474, <https://doi.org/10.1259/0007-1285-44-522-471>.
- [12] Jose R. Salcedo, Urinothorax: report of 4 cases and review of the literature, *J. Urol.* 135 (4) (Apr. 1986) 805 [https://doi.org/10.1016/S0022-5347\(17\)45862-9](https://doi.org/10.1016/S0022-5347(17)45862-9), –08.
- [13] Eduardo Garcia-Pachon, Isabel Padilla-Navas, Urinothorax: case report and review of the literature with emphasis on biochemical diagnosis, *Respiration* 71 (5) (2004) 533–536, <https://doi.org/10.1159/000080642>.
- [14] Eduardo Garcia-Pachon, Santiago Romero, Urinothorax: a new approach, *Curr. Opin. Pulm. Med.* 12 (4) (July 2006) 259–263, <https://doi.org/10.1097/01.mcp.0000230628.65515.86>.