

## Urinothorax - A Rare Cause of Pleural Effusion

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### Abstract

Urinothorax is a rare cause of pleural effusion, which is mostly seen secondary to obstructive uropathy. We report a patient who had nephrolithiasis and underwent percutaneous nephrostomy for treatment of hydronephrosis. The patient developed right-sided pleural effusion, five days after percutaneous nephrostomy, which was later diagnosed as urinothorax. Although rare, urinothorax should be considered in the differential diagnosis of causes of pleural effusion, especially in patients with obstructive uropathy, any form of instrumentation of urinary tract or blunt abdominal trauma. The importance of recognizing this entity lies in the fact that the condition is completely reversible following relief of urinary tract obstruction.

### Key Words

Hydronephrosis (HUN), Thoracentesis, Percutaneous Nephrostomy (PCN), Pleural Effusion, Urinothorax

### Introduction

Urinothorax refers to the presence of urine in the pleural space, is a rare cause of pleural effusion secondary to obstructive uropathy. Corriere et al first described urinothorax in 1968 when they studied urethral obstructions in dogs. (1) Since then only few cases of urinothorax in humans have been reported in the literature. (2) The urine moves into the pleural space from the retroperitoneal space via the diaphragmatic lymphatics or through an anatomical defect in the diaphragm. It has been found that effusion resolves quickly with the removal of the cause of urinary obstruction. (3) The pleural fluid is a transudate that looks and smells like urine and biochemistry evaluation usually confirms the diagnosis. The diagnosis is often made retrospectively when pleural effusion resolves following urinary diversion or relief of obstruction. (4)

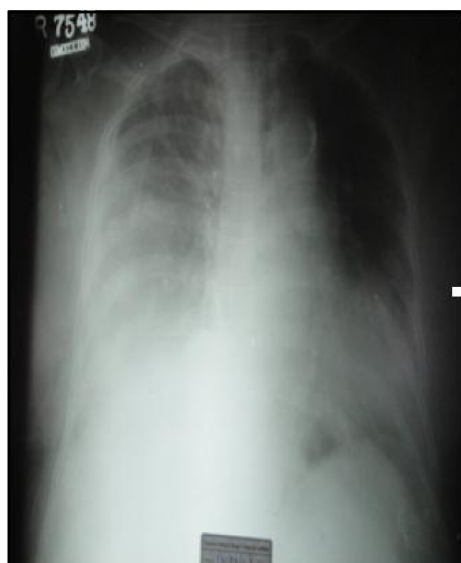
### Case Report

A 75 year old female with fever and progressive increase in breathlessness and a history of decreased urine output was admitted in hospital. The patient had undergone PCN at another institution for treatment of renal calculus induced HUN in the right kidney five days back. There was no history of cough, expectoration, chest pain, dysuria, pyuria, haematuria or abdominal pain. She had a past history of hypertension and was on calcium channel blockers. There was no history suggestive of bronchial asthma and tuberculosis in the past. On examination, the patient was febrile (38.3°C) with a pulse rate of 115 beats/minute, blood pressure of 110/76 mmHg, and a respiratory rate of 30 breaths/ minute. Her physical examination was normal except for diminished breath sounds and dullness on percussion on right side of the chest and local tenderness in the right flank. A chest

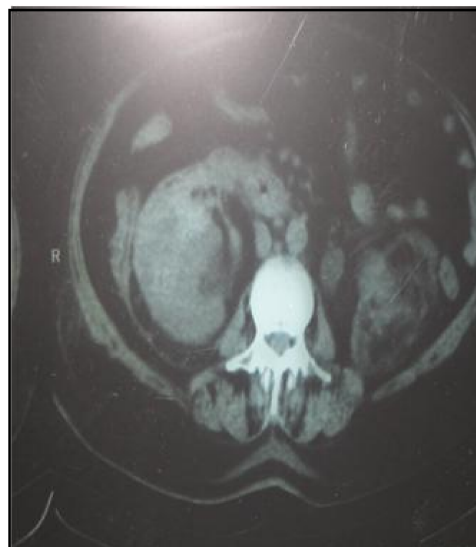
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**Fig. 1 A Chest Radiograph Showing Right-Sided Pleural Effusion**



**Fig.2 CT Abdomen Showing a Large Sub Capsular Collection Located Anteriorly and Posterior, Lateral to Right Kidney with Mild Hydronephrotic Changes**



**Fig. 3 Resolution of Pleural Effusion after Treatment**

radiograph confirmed right-sided pleural effusion. (Fig.1) An ultrasound study showed well-organized collection with septa in the right perinephric space with intact pelvicalyceal system and no calculus. Complete blood count revealed haemoglobin of 10.5 g/dL, total leucocyte count 20,300/microL with predominant neutrophils, and a platelet count of  $5.9 \times 10^5$ /microL. Urinalysis showed 16-30 pus cells/high power fields.

Diagnostic thoracentesis was done which yielded a light yellow fluid with cell count of 5500 / microL with

predominant of polymorphs (87%), pH of 7.2, glucose of 21mg/dl, protein 1 gm /dl, creatinine 6.7mg/dl (pleural fluid creatinine to serum creatinine ratio  $6.7/3.2 > 1$ ). The cultures, gram staining and cytology of the pleural fluid were all negative.

Computed tomography of the abdomen and thorax was performed which showed a large sub capsular collection located anteriorly and posterior lateral to right kidney with mild hydronephrotic changes and small and contracted left kidney. Bilateral pleural effusion (more on right side) was also noted. (Fig2).

The patient was started on broad-spectrum antibiotics and underwent drainage of the perinephric collection under local anaesthesia. The post operative period was uneventful and pleural effusion resolved spontaneously in next 3 days. (Fig3)

Discussion: Urinothorax is a transudative pleural effusion due to retroperitoneal leakage of urine that is believed to enter the pleural space via diaphragmatic lymphatic or through an anatomical defect in the diaphragm. (5,6) The effusion is usually ipsilateral to the obstructed kidney. Contralateral or bilateral cases are

rare. (7) Urinothorax has been associated with wide variety of lesions, including malignancy of the urinary tract, calculi, lithotripsy, blunt and surgical trauma, failed tube nephrostomy, posterior urethral valves or prostatic hypertrophy. To confirm urinothorax, it is necessary to perform thoracentesis in order to evaluate three important diagnostic criteria (8). These are transudative pleural fluid, pleural fluid serum creatinine ratio greater than 1.0 and low pleural fluid pH (usually less than 7.3 and is dependent on the pH of the urine).

Recently, urinothorax has been classified as obstructive (urinothorax associated with a bilateral or a common distal obstructive disease) and traumatic (associated with an evident traumatic, usually iatrogenic, event) (9).

In our case, the pleural fluid was a transudate according to the criteria of Light *et al.* (10) The diagnosis was made in the presence of an urinoma, together with a low pH of the fluid and the high pleural fluid /serum creatinine ratio and spontaneous resolution of pleural effusion after drainage of urinoma.

Despite the fact that there are great number of established etiologies for pleural effusion, there are grounds for believing that there are also unusual pathophysiological mechanisms, seen in certain clinical contexts and from potential iatrogenic interventions so diagnosis of urinothorax requires a high index of suspicion and should be considered whenever pleural effusion occurs in the setting of urinary tract obstruction or a urological intervention (11). Most cases are ipsilateral and all reported cases are transudates by Lights criteria. Wherever urinothorax is suspected, an early thoracentesis is indicated to demonstrate the appearance and smell of the pleural fluid. In addition pH, glucose, protein, LDH and creatinine levels need to be measured .

A simultaneous blood sample should be taken in order to measure the pleural fluid /serum creatinine ratio.the

treatment of urinothorax involves relieving urinary obstruction if present and draining the effusion with simple tube thoracostomy if patient is symptomatic (12).

It is concluded that urinothorax should be suspected and considered whenever pleural effusion occurs in the setting of urinary tract obstruction or an urological intervention.

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