

Case of urinothorax - A rare presentation

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ABSTRACT

Urinothorax (UT) is a rare and often undiagnosed condition, defined as the presence of urine in the pleural cavity due to the retroperitoneal leakage of urine (known as urinoma) into the pleural space. It is a rare cause of pleural effusion and is secondary to traumatic or obstructive reasons. UT is usually a transudate pleural effusion. Its diagnosis requires a high degree of clinical suspicion, because the respiratory symptoms tend to be absent or mild and urological signs tend to dominate. Thoracocentesis followed by measurement of creatinine in the pleural fluid is a procedure to establish the true diagnosis. The average pleural fluid-to-serum creatinine ratio is in the range of 1.09–19.8. Pleural fluid-to-serum creatinine ratio >1 is the diagnostic criterion of UT. We report a case of UT associated with trauma.

KEY WORDS: Thoracocentesis, urinoma, urinothorax

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INTRODUCTION

The presence of urine inside the pleural space is called urinothorax (UT). It is a rare cause of pleural effusion and is secondary to traumatic or obstructive reasons.^[1,2] At the present time, increased awareness of this entity coupled with the availability of advanced imaging and scintigraphic techniques has resulted in the increase of cases of UT being diagnosed.^[3] Thoracocentesis followed by the measurement of creatinine in the pleural fluid is a procedure to establish the true diagnosis.

CASE REPORT

A 72-year-old male patient with a history of road traffic accident came with complaints of abdominal tenderness, severe breathlessness with no pulse, and blood pressure. The patient's condition was critical; resuscitation was done in casualty, and the patient was revived and admitted to the respiratory intensive care unit. General condition was

very poor, and the patient was hemodynamically unstable. Respiratory system examination revealed bilateral decreased breath sounds in bases, and per abdomen examination revealed right-side flank tenderness. Routine investigations done for the patient revealed hemoglobin – 10 g/dl, total leukocyte count (TLC) – 14,800 cells/mm³, blood urea nitrogen (BUN) – 26 mg%, serum creatinine – 1.7 mg%, serum uric acid – 4.4 mg%, serum sodium – 131 meq/l, serum potassium – 3.6 meq/l, serum lactate dehydrogenase (LDH) – 378 U/L, in liver functions serum glutamic-oxaloacetic transaminase – 24 IU/L, serum glutamic-pyruvic transaminase – 34 IU/L, serum bilirubin – 0.55 mg%, serum protein – 5.1 g%, coagulation profile revealed deranged, prothrombin time (PT) – 22 s, and international normalized ratio (INR) – 1.62. X-ray chest showed bilateral nonhomogeneous opacities more on the right side [Figure 1]. Ultrasound examination was done, and it revealed a well-defined retroperitoneal collection (volume: 318 ml) in the right posterior pararenal space extending

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along the right psoas muscle. Contrast-enhanced chest tomography chest [Figure 2] and abdomen revealed moderate right and mild left pleural effusion with underlying atelectasis and a large retroperitoneal collection [Figure 3] in the right posterior pararenal space displacing right kidney anteriorly possibility of posttraumatic urinoma. Subsequently, ultrasound-guided diagnostic and therapeutic thoracentesis was done which revealed transudative effusion with smell of urine, pleural fluid cytology total leucocyte count (TLC) – 10,000 cells/mm³, protein – 1.7 g/dl, sugar – 82 mg/dl, pleural fluid LDH – 212 U/L, and creatinine – 24.7 mg%. Pleural fluid LDH-to-serum LDH ratio is <0.6 indicative of transudate as per Light's criteria, and pleural fluid creatinine-to-serum creatinine ratio is 14.52, which is highly indicative of UT. Ultrasound-guided aspiration of retroperitoneal fluid collection also showed the same values as pleural fluid. Opinion of urologist was sought, and exploratory laparotomy was planned.

Exploratory laparotomy was done with adhesiolysis. Intraoperatively, the findings were ruptured right kidney with pyo-urinoma, and perinephric and periureteric

urinoma with transdiaphragmatic urinary fistula [Figure 4] to the right-side thorax was seen. Drainage of retroperitoneal collection right nephrectomy, right ureteral mobilization with drainage of urinoma with marsupialization of fistulas, repair of diaphragmatic fistula, and bilateral intercostal chest tube insertion was done. Postoperatively, the patient was on mechanical ventilation and inotropic support. Chest radiograph displayed ill-defined patchy opacities in bilateral middle and lower zones. The patient's hemoglobin was 7.1 gm% for which 4-unit packed red blood cells was transfused. Postoperatively, the patient's condition started improving. Arterial blood gas analysis showed pH – 7.53, PCO₂ – 28, PO₂ – 181, bicarbonate – 23 meq/l, and TLC – 14,900 cells/mm³. Subsequently, TLC was 10300, sodium/potassium – 131/3.7 meq/l, serum creatinine – 0.9 mg%, and total intake output – 2250/2000 ml, and the patient started accepting orally. The patient developed a fever with chills and rigor on the 6th day postoperative, which was on/off in nature, relieved by intravenous antibiotics and antipyretics. The patient's general condition started deteriorating with fever being persistent, toxic look,



Figure 1: Bilateral pleural effusion more on the right side



Figure 2: Computed tomography thorax section showing bilateral pleural effusion



Figure 3: Computed tomography abdomen section showing retroperitoneal collection

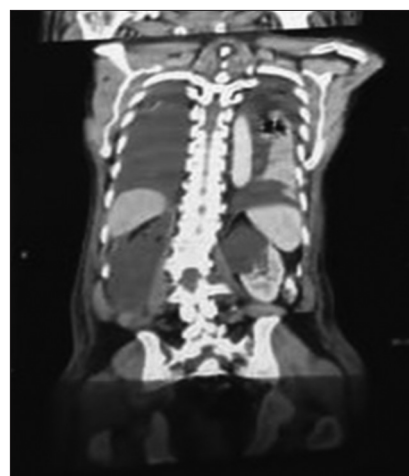


Figure 4: Computed tomography abdomen section showing transdiaphragmatic rent

poor appetite, and (TLC 17200) platelet count – 3.51 lakh/mm. Urine microscopy came positive for 8–10 pus cells/high-power field (HPF). The patient's general condition continued to be critical, and subsequently, percutaneous tracheostomy was done. Bronchoscopy was done which showed inflamed airways on the left side. Bronchoalveolar lavage (BAL) was taken and sent for investigation. BAL report revealed 20–25 cells/HPF and budding yeast-like cells. Kidney function test showed BUN (81 mg%), creatinine (2.9 mg%), Na^+/K^+ (157/3 mg%), platelet count (0.2 lakh/mm³), PT (33.7 s), and INR (2.59). Chest radiograph [Figure 5] showed an increase in opacity in bilateral lower zones. The patient's attendant had requested to discharge him due to his deteriorating condition; hence after explaining all the risks involved in discharging, the patient was discharged on request.

DISCUSSION

Pleural effusion as a result of urinary tract obstruction is referred to as UT. A variety of obstructive lesions of the urinary tract or trauma have been reported to cause UT such as prostatic hypertrophy, renal cysts,^[4] urethral valves, prostatic carcinoma, renal calculi,^[5] and renal transplantation.^[6] Usually, the pleural effusion is ipsilateral to the obstructive urinary lesion, but contralateral effusion has also been reported^[7] as in our case. However, the high pleural fluid creatinine-to-serum creatinine ratio (14.52) confirmed the diagnosis of UT. Awareness of this condition and the appropriate diagnostic tests, performed early, is most important for the diagnosis and treatment of UT. Treatment of the primary cause to relieve obstructive uropathy usually results in the resolution of the pleural effusion, similarly as was observed in the present case. UT can be divided into two categories: (1) obstructive UT due to bilateral obstructive uropathy and (2) traumatic UT due to unilateral traumatic injury of the urinary system, mostly iatrogenic.^[8] Ours is a rare case of transudative traumatic pleural effusion. There are two theories under debate concerning the mechanisms

responsible for the transdiaphragmatic evasion of urine. (1) Urine may travel through lymphatic drainage into pleural space or (2) retroperitoneal urine firstly enters the peritoneal cavity and afterward travels through direct trans-diaphragmatic passage into the pleural cavity.^[9] The average pleural fluid-to-serum creatinine ratio is in the range of 1.09–19.8.^[1] UT is clearly an uncommon cause of pleural effusion.^[10] The chest radiograph revealed a pleural effusion [Figure 1], and thoracentesis led to high suspicion of UT due to a distinctive urine smell. The distinctive urine smell and its subsequent biochemical analysis with a characteristic of transudate except for the high LDH levels and the pleural fluid-to-serum creatinine ratio confirmed the diagnosis of UT. Renal scintigraphy with technetium-99m diethylenetriaminepentaacetic acid, technetium-99m ethylenedicycysteine, or with technetium-99m mercaptoacetyltriglycine-3 can also demonstrate any extravasation of urine from the region of the kidney or ureter.^[9,11] Due to hemodynamic instability, our patient could not be subjected to further investigation. The fluid in UT is usually straw-colored with a distinctive ammoniacal smell. In the majority of cases, the fluid is transudative according to Light's criteria, with biochemical features of low glucose, low protein, and low pH, but elevated LDH levels.^[12,13] The most important biochemical parameter is the pleural fluid creatinine-to-serum creatinine ratio which is >1 and mostly >10 .^[3] In our case, it is >14 . UT should be included in the differential diagnosis of pleural effusion in patients with a recent urinary tract disorder even with features of pleural exudates.^[14] Intravenous pyelography can reveal the leakage of contrast from the retroperitoneal space to pleural cavity, but sometimes, this examination may prove to be noncontributory.^[9,11,12,15,16] Abdominal and thoracic computed tomography scanning is indispensable in the detection of pleural effusion and of underlying urinoma. The correction of the underlying cause usually leads to resolution of UT; however, in the present case pleural drainage with a thoracostomy tube and nephrectomy allowed the resolution of the problem and complete lung re-expansion. The treatment of UT is relatively straight forward. The correction of the underlying cause usually suffices, resulting in the spontaneous resolution of the UT,^[17,18] if the pleural effusion persists, then drainage of the urine through an intercostal thoracic tube is recommended^[3,18,19] as done in our case. The majority of the cases of UT are ipsilateral with the urinoma. However, there are rare cases of bilateral and contralateral UTs^[3,16,20] and our case was bilateral UTs.

CONCLUSION

Although UT occurrence is rare, physicians need to maintain a high degree of clinical alertness and include it in the differential diagnosis of pleural effusion. Its presentation is usually ipsilateral; however, it may also present bilaterally or contralaterally. Correction of the underlying cause is usually sufficient for the spontaneous and prompt resolution.



Figure 5: X-ray chest with bilateral intercostal chest tubes and opacities

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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