Urinothorax demonstrated on $^{99m}$Tc Ethylene dicysteine renal scintigraphy

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Case

A 35-year-old Asian male presented with complaints of fever, right-sided pleuritic chest pain and shortness of breath of 7 days’ duration, 1 month after a right percutaneous nephrolithotomy (PCNL) by supracostal puncture. On examination, the patient was pale and tachypneic with pulse 120/min and blood pressure 150/100 mm Hg. He had stony dullness with decreased breath sounds in the right mammary, axillary and interscapular areas.

A chest radiograph demonstrated massive right-sided pleural effusion. Thoracocentesis of the right side of the chest yielded about 900 ml of pleural fluid, analysis of which revealed a pleural fluid: serum creatinine ratio of 58 (normal <1), pleural fluid protein 500 mg/dl and sugar 46 mg/dl, with a total leucocyte count of 3000/mm³, all polymorphonuclear leucocytes. Intravenous pyelography (IVP) was non-contributory. In view of the high pleural fluid creatinine concentration, a right-sided urinothorax was suspected and the patient referred for renal scintigraphy.

Radionuclide scintigraphy was performed using $^{99m}$Tc Ethylene dicysteine ($^{99m}$Tc EC). The initial images showed adequate tracer concentration in both kidneys, with good clearance of tracer from the left kidney (Figure 1). There was slow clearance of tracer from the right kidney, with rapid and continuously increasing tracer collection on the right side of the thorax till 2h (Figure 2). No tracer was detected on the left side of the chest. The findings were indicative of a right-sided retroperitoneal transdiaphragmatic communication, resulting in collection of urine in the right pleural cavity (urinothorax). A right intercostal tube drain (ICTD) was inserted and antibiotic therapy started. Retrograde pyeloplasty (RGP) and double-J stenting of the right kidney was planned, but the ICTD output gradually decreased and finally stopped altogether. A repeat chest X-ray showed an expanded right lung with no residual pleural effusion even after clamping the ICTD. The drain was therefore removed and the patient discharged uneventfully.

Discussion

Urinothorax may be of two types: (i) obstructive urinothorax, due to obstructive uropathy (calculi, prostatic hypertrophy, genitourinary malignancies) and (ii) traumatic, following blunt trauma, ureteral instrumentation, surgery or extracorporeal shock wave lithotripsy (ESWL) [1]. Elevated pleural fluid: serum creatinine ratio of >1 is considered a hallmark of this condition, especially when associated with a low pH and low glucose level in the pleural fluid. However, these criteria may not be specific in all cases, especially in the event of an insignificant clinical history [1,2]. Only one previous study has documented the use of scintigraphic renal imaging in the investigation of this condition [3]. The present case demonstrates the utility of $^{99m}$Tc EC scintigraphy as a simple, non-invasive investigation in unequivocally establishing the diagnosis of urinothorax.
References


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Fig. 1. $^{99m}$Tc-EC scan: Sequential dynamic images (posterior projection) showing adequate tracer concentration in both kidneys, with good clearance of tracer from the left kidney and slow clearance from the right kidney. The right side of the thorax is photopenic in the initial frames, and shows collection of tracer subsequently.

Fig. 2. (a) 30 minute posterior static image showing complete drainage of tracer from the left kidney into the bladder; the right kidney shows retention of tracer in the pelvicalyceal system, with collection of tracer in the right side of the thorax.
(b) 2 hour posterior static image showing continuing drainage through the right ureter, with significant buildup of tracer in the right hemi-thorax.