CASE REPORT

Urinothorax in a child secondary to obstructive renal stone in a solitary functioning kidney: a case report

Muhammad Waqas¹ · Gul Nawaz¹ · Avais Raja² · Ijaz Hussain¹ ·
Muhammad Waqas Iqbal¹

Received: 1 February 2016 / Accepted: 15 June 2016 / Published online: 24 June 2016
© Japanese Society of Nephrology 2016

Abstract Urinothorax or presence of urine in pleural cavity is a highly unusual cause of pleural effusion. It is most commonly secondary to genitourinary trauma and obstructive uropathy. We here by present a case of urinothorax secondary to renal stone disease in a 5-year-old child with a solitary functioning kidney.

Keywords Urinothorax · Renal Stone · Solitary Kidney · Obstructive Uropathy

Introduction

Urinothorax is described as the presence of urine in the pleural space. It is a rare and very unusual presentation of pleural effusion mostly secondary to trauma or obstructive uropathy [1, 2]. Obstructive uropathy leading to urinothorax may be due to prostatic hypertrophy, renal cysts, posterior urethral valve, prostatic carcinoma, renal calculi, and

renal transplantation [1, 8]. Here, we discuss a rare case of urinothorax secondary to renal stone disease in a 5-year-old child with a solitary functioning kidney.

The authors have obtained written informed consent for written and electronic distribution of the report from the patient's parents.

Case summary

A 5-year-old boy presented in the emergency department with complaints of generalized abdominal pain and low grade fever for the past 4 days. The abdominal pain had an acute onset, without any aggravating or relieving factors, associated with multiple episodes of vomiting and a non-productive cough. He had a history of recurrent stone passage and cystolitholepaxy for a bladder stone 1 year ago and a positive family history for pulmonary tuberculosis. On examination, the child was pale with a pulse of 110/min, blood pressure 120/80 mmHg, respiratory rate of 24 breaths/min, and oxygen saturation of 92 % on room air. On auscultation of the chest, there were diminished breath sounds with fine crepts on the bases of the right side. Abdominal examination was unremarkable. The complete blood report revealed a hemoglobin level 10 g/dL, total leukocyte counts 18,200/μL, platelets count 978,000/μL, serum potassium 5.5 meq/L, serum bicarbonate 10 meq/L, serum creatinine 7.7 mg/dL, uric acid level <1 g/dL, and serum albumin 3.7 g/dL. Urine culture was negative. A chest X-ray showed severe right pleural effusion (Fig. 1). A subsequent CT scan abdomen and pelvis without contrast revealed a 15 × 12 × 13 mm calculus at the pelvi-ureteric junction of right kidney causing gross hydronephrosis. There was extensive perinephric fluid and strandings with thickening of the lateral

✉ Muhammad Waqas
waqas899@yahoo.com

Gul Nawaz
drgul2006@yahoo.com

Avais Raja
avais.r23@gmail.com

Ijaz Hussain
drijaz@yahoo.com

Muhammad Waqas Iqbal
waqasiqbal11972@gmail.com

¹ Department of Urology, Shifa International Hospital, Pitras Bukhari Road, Sector H-8/4, Islamabad, Pakistan

² Shifa College of Medicine, Pitras Bukhari Road, Sector H-8/4, Islamabad, Pakistan

Fig. 1 Radiological image chest X-ray: showing right hydrothorax

Fig. 2 Non contrast CT scan showing right pelvi-ureteric stone with mild to moderate hydronephrosis

renal fascia extending inferiorly up to the paracolic gutter. The contralateral kidney was small shrunken with a small stone in the lower pole without any obvious signs of hydronephrosis. There was also mild abdominal ascites (Fig. 2). In the view of a positive family history of tuberculosis contact, we suspected pleural effusion to be secondary to pulmonary tuberculosis. A cystoscopy followed by a right double J stent placement and right thoracostomy was performed. As soon as the thoracostomy tube was inserted, 400 mL pleural fluid drained immediately which was not followed by drainage afterwards. Immediate post-operative chest X-ray was normal (Fig. 3). The serum creatinine came down to 1.69 g/dL on the first post-operative day and 0.54 g/dL on the second post-operative day. Pleural fluid for creatinine was 8.26 g/dL, pH 8.0, total leukocyte count (TLC) 271 per mm³ with polymorph 60 %, protein <0.8 gm/dL, glucose

Fig. 3 Chest X-ray on first post operative day

121 mg/dL, and lactate dehydrogenase (LDH) 86 Units/L. Gram staining, acid fast bacilli (AFB) staining, and *Mycobacterium tuberculosis* (MTB) DNA by polymerase chain reaction (PCR) of the pleural fluid were negative. The chest tube was removed on the first post-operative day. The patient has a quick and uneventful recovery, and was discharged on the third post-operative day. He is planned to be followed-up for definitive management of renal stone disease.

Discussion

Urinothorax is collection of urine in the pleural cavity and is a very rare presentation of pleural effusion [1, 2]. It was first described in 1968 by Corriere et al. in dogs with ureteral obstruction [2]. Further cases were reported in humans as well. It is classified as either obstructive or traumatic urinothorax [3]. Effusion is mostly unilateral and corresponding to the obstructed kidney. Bilateral or contralateral cases are very rare [1]. It is bilateral if there is bilateral obstructive uropathy [4]. It is due to the leakage of urine into retroperitoneal space that migrates to the pleural cavity via diaphragmatic lymphatic or through defects in diaphragm [1, 3, 6].

Patients usually present with dyspnea, flank pain, and fever [2, 6]. Chest X-rays show extensive pleural effusion without any demonstrable etiology [2, 7]. CT scan and nuclear scans may show the presence of a reno-pleural fistula [5].

Diagnosis is confirmed by thoracentesis followed by the biochemical analysis of the drained fluid [2]. The pleural fluid is transudate in nature, fulfilling the Light's criteria with the exception of a raised LDH [1]. The fluid usually has low glucose, low protein, and low pH in most cases [1–3]. A delay in fluid analysis may decrease the sensitivity as the equilibrium between serum and fluid

develops [8]. A pleural fluid to creatinine ratio of more than 1 helps to differentiate urine from bodily fluids [1, 3, 5]. The mainstay management is to unblock the obstructive urinary system and drain the pleural fluid with thoracentesis' [5, 6].

Urinothorax in a child with a solitary functioning kidney with an obstructive renal stone is a rare phenomenon. Searching the following keywords “urinothorax, solitary functioning kidney, renal stone, child” in PubMed and Medline revealed no results.

In our case, the child with a solitary functioning kidney, presented with obstructive uropathy secondary to renal stone disease that lead to a unilateral urinothorax. Fluid analysis showed pleural fluid to serum creatinine ratio of 1.1, proving that the fluid was urine. We highly suspected the composition of the stone to be xanthine due to the decreased level of serum uric acid as stated in the European Association of Urology: Guidelines on Urolithiasis 2015 [9]. The urinothorax was drained with a thoracostomy tube, and the obstructive uropathy was relieved with a double J stent.

In conclusion, unilateral pleural effusion, which is common in pneumonia, malignancy, and tuberculosis, may also be the result of obstructive urological reasons. Urinothorax due to obstructive uropathy, acute glomerulonephritis, nephritic syndrome, trauma, and post-surgical intervention of the kidney should be suspected and ruled out to prevent further morbidity in patients.

Compliance with ethical standards

Conflict of interest The authors have declared that no conflict of interest exists.

References

1. Handa A, Agarwal R, Aggarwal AN. Urinothorax: an unusual cause of pleural effusion. *Singap Med J*. 2007;48(11):e289–92.
2. Laskaridis L, Kampantais S, Toutziaris C, Chachopoulos B, Perdakis I, Tahmatzopoulos A, Dimitriadis G (2012) Urinothorax—an underdiagnosed cause of acute dyspnea: report of a bilateral and of an ipsilateral urinothorax case. *Case Rep Emerg Med* 2012, Article ID 395653:3. doi:[10.1155/2012/395653](https://doi.org/10.1155/2012/395653).
3. Chandra A, Pathak A, Kapur A, Russia N, Bhasin N. Urinothorax: a rare cause of severe respiratory distress. *Indian J Crit Care Med*. 2014;18(5):320–2.
4. Garcia-Pachon E, Romero S. Urinothorax: a new approach. *Curr Opin Pulm Med*. 2006;12:259–63.
5. Wei B, Takayama H, Bacchetta M. Urinothorax: an uncommon cause of pleural effusion. *Respir Med CME*. 2009;2:179–80.
6. Ranjan V, Agrawal S, Chipde SS, Dosi R. Urinothorax: a path, less travelled: case report and review of literature. *J Nat Sci Biol Med*. 2015;6(1):213–6.
7. Batura D, Haylock-Vize P, Naji Y, Tennant R, Fawcett K. Management of iatrogenic urinothorax following ultrasound guided percutaneous nephrostomy. *Radiol Case*. 2014;8(1):34–40.
8. Kamble RT, Bhat SP, Joshi JM. Urinothorax: a case report. *Indian J Chest Dis Allied Sci*. 2000;42:189–90.
9. Turk C, Knoll T, Petrik A, Sarica A, Skolarikos A, Straub M, Seitz C (2015) Guidelines on urolithiasis. European Association of Urology. <http://uroweb.org/wp-content/uploads/EAU-Guidelines-Urolithiasis-2015>. Accessed Jan 2015.