

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/radcr

Case Report

Slowly developing urinothorax in a child due to intrapleural migration of DJ stent—a rare complication of percutaneous nephrolithotomy^{☆,☆☆}

Sajad Ahmad para, MS, M Ch(Urology)^{a,*}, Faiz Manzar Ansari, MS^b, Yaser Ahmad dar, MS, DNB^b, Mohammad Saleem Wani, MS, Mch^c, Arif Hamid Bhat, MS, Mch^b, Akil latief lone, MS^b

^aDepartment of Urology, Sher-i-Kashmir Institute of Medical Sciences, c-18 quarter Soura Srinagar, Srinagar 190011 India

^bUrology Sher-i-Kashmir Institute of Medical Sciences, c-18 quarter Soura Srinagar, Srinagar India

^cUrology and Renal Transplant Sher-i-Kashmir Institute of Medical Sciences, c-18 quarter Soura Srinagar, Srinagar India

ARTICLE INFO

Article history:

Received 30 June 2022

Accepted 5 July 2022

Keywords:

Intrapleural DJ stent

Nephropleural fistula

Percutaneous nephrolithotomy

Urinothorax

ABSTRACT

Percutaneous nephrolithotomy is usually considered as safe and effective in the management of renal stones in pediatric population. Urinothorax defined as presence of urine in pleural cavity is a rare complication of percutaneous nephrolithotomy. We present a rare case of slowly developing urinothorax in a 9-year-old boy following PCNL due to migration of DJ stent into the pleural cavity. The case was managed by intracostal tube drainage and repositioning of DJ stent.

© 2022 The Authors. Published by Elsevier Inc. on behalf of University of Washington.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

Introduction

Nephrolithiasis in pediatric population is a serious health problem with an incidence of about 50 cases per 100,000 children [1]. Extracorporeal shockwave lithotripsy is often used as a first line of treatment for pediatric nephrolithiasis. Children are at high risk of stone recurrence because of associate

metabolic, genetic, and anatomical abnormalities. So it is imperative to achieve complete stone clearance [2]. European association of urology advocates percutaneous nephrolithotomy (PCNL) as the primary treatment modality for large pelvic stones >2 cm and lower calyceal stones >1 cm in children [3]. Because of small kidney size and lower tolerance to blood loss, mini PCNL has gained popularity in pediatric nephrolithiasis. Bleeding, pseudoaneurysm formation, renal pelvic perforation, pneumothorax, and surrounding organ in-

Abbreviations: CT, computed tomography; DJ, double J; PCNL, percutaneous nephrolithotomy.

[☆] Work attributed to- Department of Urology Sher-i-Kashmir Institute of Medical Sciences Srinagar India.

^{☆☆} Competing Interests: All authors declare no conflict of interest.

* Corresponding author.

E-mail address: sajadpara96@gmail.com (S. Ahmad para).

<https://doi.org/10.1016/j.radcr.2022.07.022>

1930-0433/© 2022 The Authors. Published by Elsevier Inc. on behalf of University of Washington. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>)

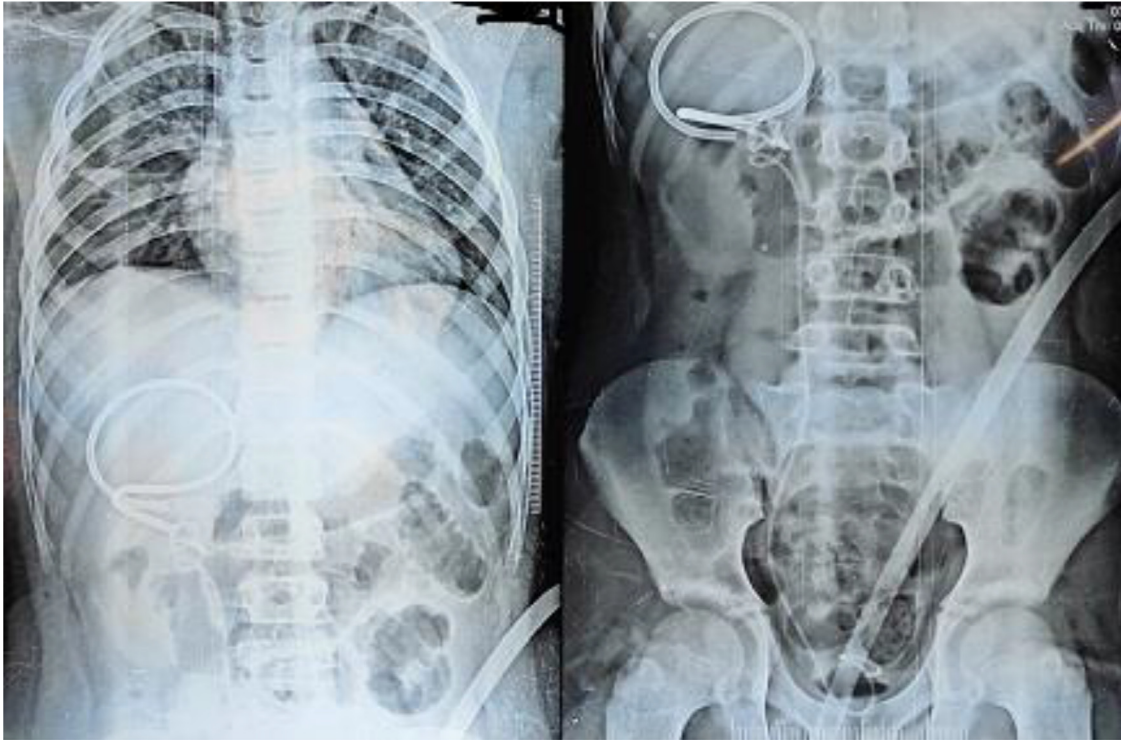


Fig. 1 – X-ray chest and KUB showing normal lung shadow with DJ stent and nephrostomy tube in place.

jury are some known complications of PCNL. We report a rare case of slowly developing urin thorax in a 9-year-old child following mini PCNL due to migration of DJ stent into pleural cavity.

Case report

We report the case of 9-year-old boy who presented to us with right sided nephrolithiasis. Imaging studies revealed a 2.1 cm superior calyceal stone. Metabolic workup of the patient did not reveal any abnormality. Right sided mini PCNL was done under general anesthesia and superior calyceal puncture was made to gain access to the calculus. Stone was cleared and procedure was uneventful. A 4.5 Fr/18 cm DJ stent was deployed and a 10 Fr malecot catheter was placed through the tract at the end of procedure. Postoperative X-ray was done to confirm the clearance of stone and to check the position of DJ stent (Fig. 1). Nephrostomy tube was removed and patient was discharged in stable condition. On the 11th postoperative day patient developed breathlessness and right sided chest pain. X-ray chest was done that showed right-sided hydrothorax and upper end of DJ stent in right pleural cavity (Fig. 2). These findings were confirmed by CT scan (Fig. 3). Emergency right-sided intercostal tube drainage of urin thorax was done and fluid was sent for analysis. A creatinine level of 9.8 was reported in the drain fluid. After patient was stabilized, DJ stent was repositioned under fluoroscopic guidance (Fig. 4) and a perurethral foley catheter was placed to allow the closure of nephropleural fistula. Two days later intercostal

tube drain was removed and patient was discharged in stable condition.

Discussion

Pediatric nephrolithiasis though rare in developed countries, continues to be a major health problem in developing countries. Although shock wave lithotripsy is considered as the first line of management for pediatric nephrolithiasis, PCNL is still the first-line surgical treatment for kidney stones >2 cm or lower pole stones >1 cm and those that do not respond to SWL [3]. Mini PCNL (tract circumference <20 Fr) is considered as safe and effective in the management of renal stones in children [4]. Our center routinely performs mini PCNL with tract circumference of 18 Fr and we have an excellent safety record in pediatric patients. Complications associated with mini PCNL include bleeding, formation of pseudoaneurysm, surrounding organ injury, renal pelvic perforation, pneumothorax, or sepsis. A hydrothorax or pneumothorax can be a life threatening complication known to occur when supracostal puncture is made to gain access to the pelvicalyceal system. It is usually recognized clinically by breathing difficulty, chest pain, decreased breath sounds on the affected side and is confirmed by radiological imaging like X-ray or ultrasound examination of chest. In our patient, supracostal puncture was made to gain access to the stone. Patient didn't had any sign or symptom of hydrothorax or pneumothorax in the postoperative period. X-ray examination of chest done 12 hours after procedure did not reveal any abnormality.

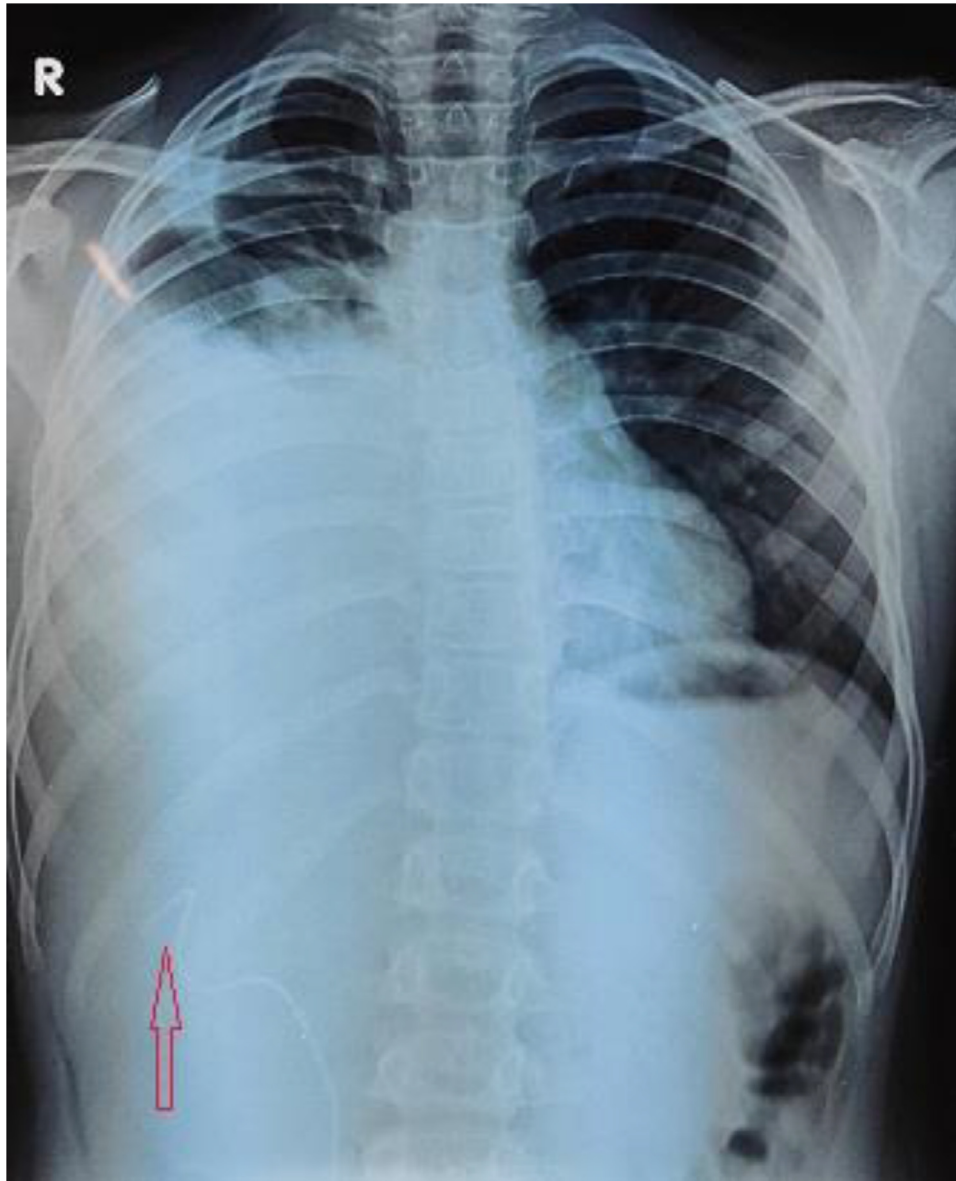


Fig. 2 – X- ray chest showing right sided hydrothorax with upper end of DJ stent inside pleural cavity (red arrow).

Stone clearance and position of DJ stent was confirmed by X-ray KUB that showed stent and nephrostomy tube in normal position.

Urinothorax is defined as the presence of urine in the pleural cavity. It has been reported to occur in obstructive uropathy, traumatic or iatrogenic injury to pelvicalyceal system. Rare cases of urinothorax have also been reported in genitourinary malignancy, metastatic disease, and retroperitoneal inflammatory diseases [5]. Urine may gain access to the pleural cavity via the diaphragmatic lymphatics that open under high retroperitoneal pressure secondary to urinoma around kidney or an anatomical defect between the pleural cavity and pelvicalyceal system. This abnormal flow is augmented by negative pressure developing in the pleural cavity during breathing movements that sucks fluid into it [6]. Our patient developed urinothorax slowly after PCNL. Possible ex-

planation for this complicating event may be that entangled DJ stent got dragged into the pleural cavity at the time of nephrostomy tube removal, resulting in slow efflux of urine into the thorax cavity. Clinically patients with urinothorax present with chest pain, breathing difficulty, cough, decreased breath sounds in the affected side, and low oxygen saturation in seriously affected cases. Our patient presented with chest pain and breathing difficulty on the 11th postoperative day. Radiological imaging aid in the diagnosis of the condition and chest x-ray radiography is the first investigation to document pleural effusion. In our case, x-ray chest revealed a massive right sided effusion with DJ stent inside pleural cavity. CT urography very well documents the nephropleural fistula in most of the cases and is usually used to confirm the diagnosis [7]. In our case, CT was showing DJ stent across an abnormal tract between pleura and pelvicalyceal system. Bio-

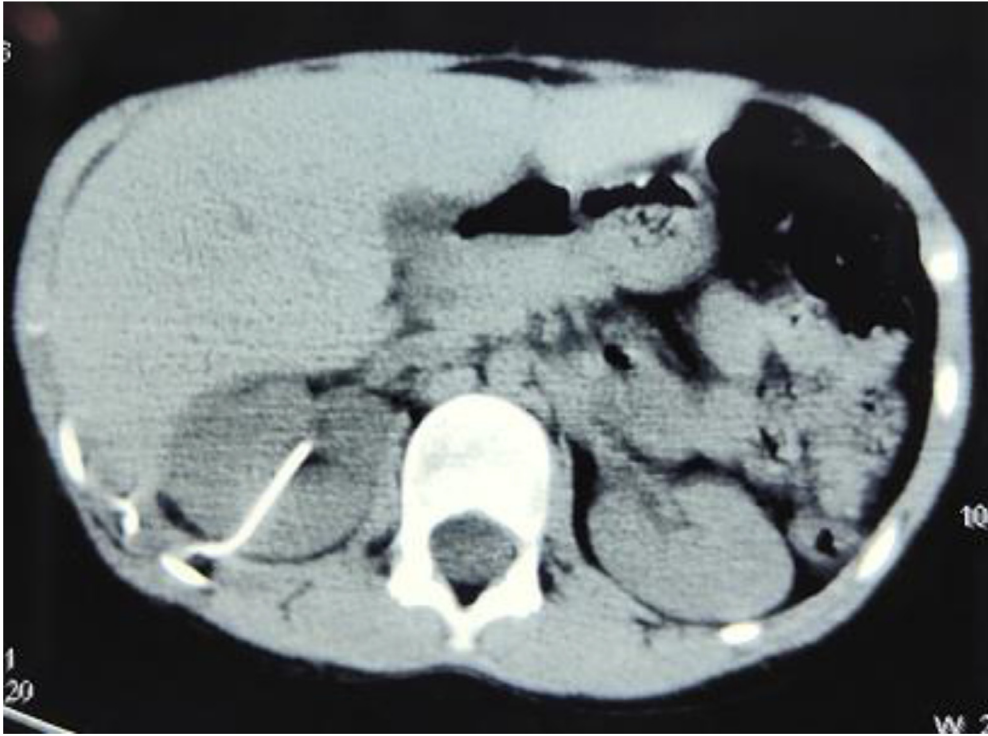


Fig. 3 – CT scan showing right sided urin thorax with upper end of DJ stent emerging out of kidney into pleural cavity.



Fig. 4 – Retrograde pyelography demonstrating small tract extending from superior calyx to right pleural cavity (red arrow).

chemical analysis of pleural fluid is imperative to know the cause of effusion. A pleural fluid/ serum creatinine ratio >1 is usually considered as hallmark of urinothorax. Our patient had pleural fluid/serum creatinine ratio of 25.7, confirming urinothorax.

Management of urinothorax involves thoracentesis or intracostal tube drainage of urinothorax and at the same time treating the primary pathology [8]. In our case intracostal tube drainage was done immediately and stent repositioning was done under fluoroscopy. An indwelling perurethral catheter was placed to allow the closure of fistulous tract.

Conclusion

Urinothorax is a rare complication of PCNL and can have a delayed presentation in some cases. It should be suspected in a post PCNL hydrothorax and confirmed by biochemical analysis of pleural fluid. An intracostal tube drainage and DJ stenting is sufficient to manage the complication in most of the cases.

Author contributions

Sajad Ahmad para - Data Collection and follow up of patients. Faiz Manzar Ansari - photographs. Yaser Ahmad dar - review of literature. Mohammad Saleem Wani - Design. Arif Hamid Bhat - supervision. Akil latief lone - photographs.

Patient consent

Written informed consent was taken from the parents of the patients for publishing the data related to patient. This work is approved by the institution ethical committee with protocol number IEC/SKIMS Protocol #EC32/2022.

REFERENCES

- [1] Sas DJ, Hulsey TC, Shatat IF, Orak JK. Increasing incidence of kidney stones in children evaluated in the emergency department. *J Pediatr* 2010;157:132–7.
- [2] Saldone MC, Docimo SG, Ost MC. Contemporary surgical management of pediatric urolithiasis. *Urol Clin North Am* 2010;37:253–67.
- [3] Tekgul S, Dogan HS, Erdem E. Urinary stone disease, guidelines on pediatric urology. *EAU Urol Guidel* 2015:56–8.
- [4] Jones P, Hawary A, Beck R, Somani BK. Role of mini-percutaneous nephrolithotomy in the management of pediatric stone disease: a systematic review of literature. *J Endourol* 2021;35:728–35.
- [5] Toubes ME, Lama A, Ferreiro L. Urinothorax: a systematic review. *J Thorac Dis* 2017;9(5):1209–18.
- [6] 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.
- [7] Laskaridis L, Kampantais S, Toutziaris C. Urinothorax-an underdiagnosed cause of acute dyspnea: report of a bilateral and of an ipsilateral urinothorax case. *Case Rep Emerg Med* 2012;2012:3–4.
- [8] Austin A, Jogani SN, Brasher PB, Argula RG, Huggins JT, Chopra A. The urinothorax: a comprehensive review with case series. *Am J Med Sci* 2017;354(1):44–53.