

Inflammation and infection

Case of nephropulmonary fistula and literature review

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A B S T R A C T

From the literature, the managements for nephropulmonary fistula were variable. We would like to present our case and review the literature for the best method of care.

The common features were 1) infected kidney; 2) ipsilateral lower lobe pneumonia or pleural effusion; 3) sputum and urine culture growing the same organism. Renal gaseous content may not be present on x-ray or even CT scan.

The choice of management for the nephropulmonary fistula was diverse. However, conservative managements including antibiotics, endourological procedures for stone clearance, percutaneous drainage were not successful. Nephrectomies were required.

Operative tips and anaesthesia preparation recommendations are given.

Introduction

Nephropulmonary fistula is a rare complication of commonly encountered non-functioning kidney with history of infection. We would like to present our case and review the literature for the best method of care.

Case presentation

A 73-year-old gentleman was admitted for left loin pain. He was a smoker, with diabetes and hypertension. Workup showed 2.5cm left upper ureteric stone, left hydronephrosis with paperthin cortex, and left posterior lung base pleural thickening with subpleural fibrosis and atelectasis. MAG3-scan confirmed non-functioning left kidney. He was scheduled for elective laparoscopic left nephrectomy. Before the operation, he was admitted for left lower pole pneumonia, with chest x-ray showing left lower zone infiltration (Fig. 1), bronchoscopy showed no lesion, sputum culture and Tuberculosis PCR were negative. Contrast CT-thorax showed minimal left pleural effusion, mild mucus retention in left bronchus. There were no fistula and no gas seen in the kidney (Fig. 2). Pre-operative chest x-ray showed resolved left lower zone infiltration (Fig. 1). Laparoscopic left nephrectomy was performed with right lateral position. Intra-operatively, the dilated upper ureter down to impacted ureteric stone at iliac crossing was dissected out and ligated, the renal artery and vein were isolated and ligated. The upper pole of kidney was not yet mobilised or dissected. The patient was noted to have desaturation and difficult ventilation with high airway pressure. On-

table bronchoscopy showed large amount of mucus at the contralateral right lung up to right main bronchus level. In view of desaturation, pneumoperitoneum was released, the operation was converted to open transperitoneal approach with left subcostal incision. Left near total nephrectomy was performed with upper pole cortex left in-situ. Air leakage was noted from upper pole, with a fistula tract identified connecting into left pleura. Left chest drain was inserted through left anterior chest wall. Further desaturation and pulseless electrical activity (PEA) was noted. Patient was turned to supine. On-table cardiopulmonary resuscitation was performed with return of spontaneous circulation within 4 minutes. After stabilisation, the edge of the remaining left kidney parenchyma was plicated with absorbable sutures for hemostasis. Sump drain was inserted via the upper pole fistula with the tip placed into the pleural cavity, and the end of the drain brought out via abdominal wall. Tubal drain was placed at renal bed and was brought out via abdominal wall. Endotracheal tube was further advanced into right main bronchus for single lung ventilation. Veno-venous extracorporeal membrane oxygenation (VV-ECMO) was started. Post-operative CT-scan confirmed left nephrobronchial fistula (Fig. 3). Patient was stabilised at ICU, with endotracheal tube shifted back to above carina level. Chest drain and sump drain was connected to suction, with decreasing air leak observed. Chest drain was removed on day 8. Tubal abdominal drain was removed on day 12. Sump drain was removed on day 14. Follow up CT-scan showed collection at left remnant renal bed with drainage performed. The patient had good neurological recovery and had no further complications from the nephrobronchial fistula.

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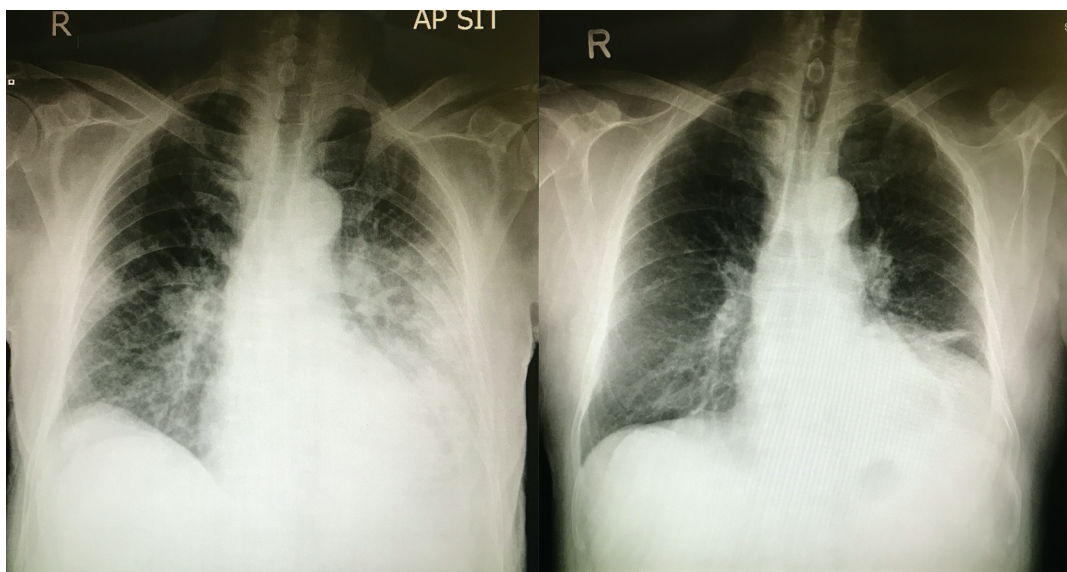


Fig. 1. CXR before and after left lower lobe pneumonia treatment.

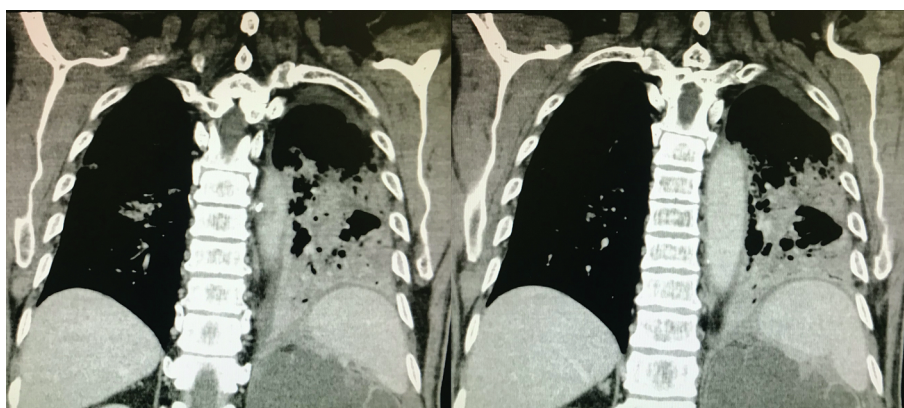


Fig. 2. CT after left lower lobe pneumonia with no fistula tract and no intra-renal gas.

Discussion

The pathophysiology was believed to be related to the Bochdalek's foramen at the lumbocostal triangle. The Bochdalek's foramen is a defect in the posterolateral diaphragm, formed by incomplete closure of the pericardioperitoneal canals by the pleuroperitoneal membrane. It is a relatively weak area of the diaphragm, in which infection can transmit into the thoracic cavity.

Case reports supported the heterogeneous clinical presentations of nephropulmonary fistula,¹ ranging from urinary symptoms like pyelonephritis; to respiratory symptoms like dry cough for weeks or months,^{2,3} or acute respiratory arrest with mucus bronchial blockage⁴; to cutaneous symptoms like discharging sinus with nephrobronchial-cutaneous fistula.

The common features were 1) infected kidney, especially with non-functioning kidneys, obstructing stones, and xanthogranulomatous pyelonephritis; 2) ipsilateral lower lobe pneumonia or pleural effusion; 3) sputum and urine culture growing the same organism. These features should raise the clinician's index of suspicion.

However, from our cases and other reported cases, the chest x-ray can be unremarkable, and renal gaseous content may not be present even on CT-scan.

The choice of management for the nephropulmonary fistula is diverse. However, from various case reports, conservative managements

including antibiotics, endourological procedures for stone clearance, percutaneous drainage were not successful.^{3,5} Those cases ended up with nephrectomy.

Concerning the management of the fistula tract, some authors ligated or plicated the fistula tract,^{2,4} some would put in a drain through the fistula tract and remove post-operatively when output is reduced⁵ (also in our case).

Concerning the airway management, if nephropulmonary fistula is suspected pre-operatively, Uppe suggested for double lumen endotracheal tube with double lung ventilation.² With the presence of double lumen tube in the bronchus, any spillage of pus on the handling kidney can be sucked out through the ipsilateral bronchus, preventing spillage towards the healthy contralateral bronchus. Also, when planning for nephrectomy, if nephropulmonary fistula is suspected pre-operatively, avoiding pneumoperitoneum with open approach, and avoiding lateral positioning with transabdominal approach may be beneficial.

Conclusions

Nephropulmonary fistulas are uncommon and the presentation can be subtle. Association of renal infections and ipsilateral lower lobe lung infections should raise the clinician's index of suspicion. Pre-operative identification of the condition can facilitate the surgeon and the anaesthesiologist.

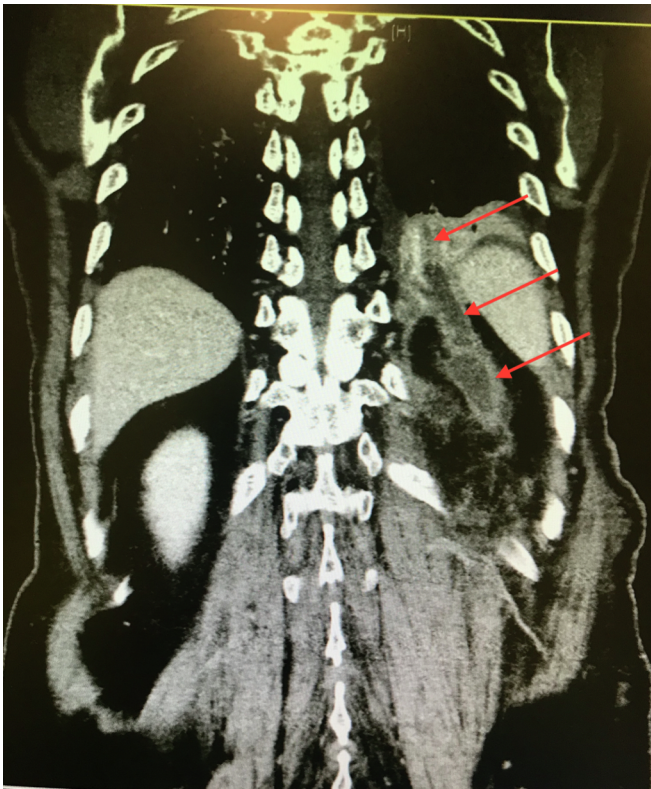


Fig. 3. Post-operative CT showing nephrobronchial fistula tract.

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