

Post-Percutaneous Nephrolithotomy Ruptured Pseudoaneurysm of Renal Artery Causing Renal Ischaemia

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ABSTRACT

A relatively uncommon but significant consequence that can follow renal trauma, renal biopsy, percutaneous nephrostomy, percutaneous nephrolithotomy (PCNL), and surgeries such as partial nephrectomy is renal artery pseudoaneurysm (RAP) formation. We report a 44-year male patient, a chronic case of bilateral nephrolithiasis, who underwent PCNL for the treatment of a left-renal pelvic stone but later presented to the accident and emergency department of this hospital with complaints of massive haematuria, fatigue, and left flank pain. Following initial assessment, a CT renal angiogram confirmed a leaking pseudoaneurysm of the interlobar artery at the upper and middle calyces junction with blood products in the pelvicalyceal system and proximal ureter causing obstruction. Due to severe anaemia, the patient underwent a blood transfusion and unfortunately developed a transfusion reaction, which was managed conservatively. Based on the overall clinical picture and radiological signs of impending renal ischaemia on the CT scan, the plan for open surgery was finalised as our hospital was not equipped with the facility for endovascular treatment.

Key Words: *Percutaneous nephrolithotomy, Endovascular embolisation, Renal artery pseudoaneurysm.*

How to cite this article: Malik MH, Naseem K, Shakoor A. Post-Percutaneous Nephrolithotomy Ruptured Pseudoaneurysm of Renal Artery Causing Renal Ischaemia. *JCPSP Case Rep* 2025; **3**:245-247.

INTRODUCTION

Leaking pseudoaneurysm of the renal artery is a very rare complication occurring in less than 1% of patients, most commonly following endoscopic procedures including percutaneous imaging-guided biopsies and about 0.6% in open surgeries.^{1,2} CT renal angiogram and conventional angiography are commonly used for the diagnosis with an accurate anatomical marking of the aneurysmal sac. With the presentation of this rare entity to the scientific community, especially urologists, we intend to inform that inclusion of this devastating vascular complication in differential diagnoses is crucial if a patient presents with alarming symptoms including haematuria, lumbar pain, or clinical signs of anaemia after undergoing an intervention.²

CASE REPORT

A 44-year male with a known history of bilateral renal and left proximal ureteric stones underwent double J stenting on the left side to relieve obstruction, which was unsuccessful, and the stent was dislodged. After further consideration, a specialist urologist decided to perform a left percutaneous nephrolithotomy (PCNL) via the lower-pole approach.

Two days after the procedure, the patient experienced increasing pain in the left lumbar region which was later associated with haematuria. On his initial follow-ups with his primary surgeon, he was managed conservatively but no investigations were planned. On his 2nd follow-up after a week, he presented with massive haematuria and was urgently referred to the emergency department.

Upon admission to the emergency department, the clinical examination revealed significant conjunctival pallor, borderline hypotension, and tenderness in the left flank. Laboratory tests showed haemoglobin levels of 7.1 g/dl and a white blood cell count of 19,000 cells per mm³. Serum creatinine and urea levels were increased. Ultrasound abdomen demonstrated raised echogenicity of the left kidney with poorly demarcated corticomedullary differentiation and a large complex echogenic material in the pelvicalyceal system.

A request for a computed tomography (CT) angiogram was made despite deranged renal function tests in the best interest of the patient on clinical grounds. CT scan was performed with the dedicated protocol of renal angiography in the radiology department. It demonstrated an arterialised sac of about 16 × 11 mm in size at the level of interlobar arteries in the upper pole of the left kidney (Figure 1). The left-sided double J stent was found to be misplaced, with its proximal end coiled distal to the pelviureteric junction (Figure 1). The kidney parenchyma showed diffuse poor differentiation of the cortex and medulla in the left kidney as compared to the normal right side (Figure 2), signifying gross ischaemic changes. Additionally, a large radio-dense calculus was observed in the lower calyx of the right kidney without any signs of obstruction.

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Received: October 31, 2024; Revised: December 25, 2024;
Accepted: January 17, 2025
DOI: <https://doi.org/10.29271/jcpspcr.2025.245>

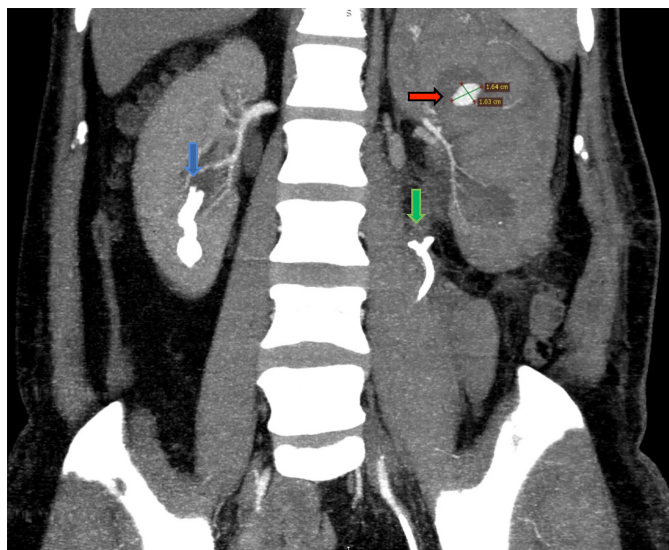


Figure 1: CT angiogram maximum intensity projection (MIP), coronal view demonstrating an arteriased sac at the location of interlobar arteries of the upper pole (red arrow). The green vertical arrow shows a displaced DJ stent. The blue vertical arrow shows a large radiodense calculus in the lower calyx of the right kidney.

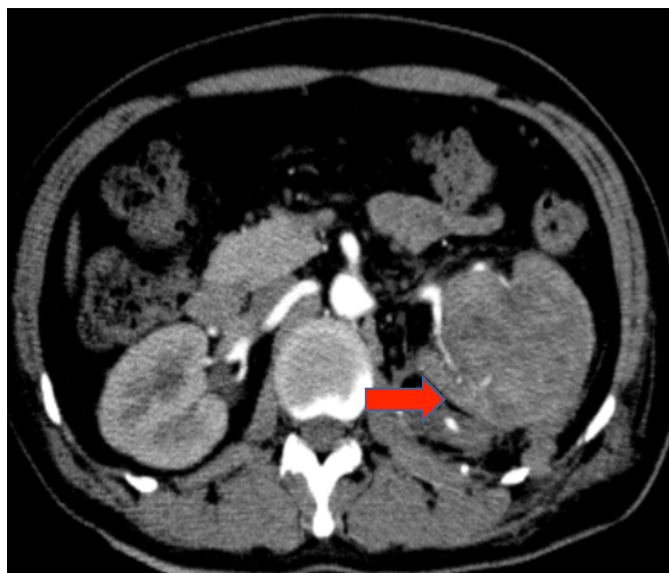


Figure 2: CT renal angiogram (axial section) showing reduced parenchymal enhancement of the left kidney compared to the normal right side and complex heterogeneous material filling the pelvicalyceal system.

The patient received an emergency blood transfusion to address anaemia along with prophylactic antibiotics. Unfortunately, an acute hypersensitivity reaction occurred which was managed by withholding blood transfusion, and administering IV fluid and steroids. Due to the unavailability of a dedicated interventional radiology department in our institution, the only option for endovascular embolisation was to refer him to another city in a specialised centre, which was very risky, keeping in view the overall clinical assessment. After a team meeting between nephrologists, urologists, and a general surgeon, nephrectomy was deemed the best option in this case. The patient underwent left total nephrectomy through median laparotomy due to impending renal infarction. The Patient was

discharged with a total stay of eight days after the complete resolution of symptoms as well as normalisation of vitals.

DISCUSSION

Renal artery pseudoaneurysm (RAP) is formed by injury to the intima-media complex and leads to an outpouching from the damaged arterial wall, with covering by adventitia only or by the surrounding haematoma. Most of these cases result from interventions such as renal biopsies, which are in routine practice for establishing various diagnoses.³ Despite its recommended role in the treatment of large renal pelvic calculi, PCNL can rarely be associated with this serious entity.^{1,4} In this case, PCNL was the cause of RAP formation.

Although RAP is a very rare complication, but is potentially life-threatening in cases presenting with further complexities, e.g. renal ischaemia, haemoperitoneum, etc. It usually develops at the level of interlobar branches, as more distal branches are surrounded by dense renal parenchyma, which can serve as a tamponade.⁴ Digital subtraction angiography (DSA) of the renal artery is considered the standard for both diagnosis and therapeutic options; however, post-contrast CT serves the diagnostic role efficiently. It is readily available and is also the modality of choice in follow-up cases.^{4,5}

Key management options include open surgery and interventional procedures, mainly endovascular embolisation, and among both, endovascular embolisation has emerged to be an ideal choice of management.^{6,7} However, it needs superior technical skills and a dedicated angiography suite. *Ex-vivo* reconstruction with auto-transplantation and *in-vivo* aneurysmal repair are examples of open surgery. Some retrospective studies have compared open surgery with endovascular approaches and concluded that the endovascular approach is more fruitful due to its less invasive approach, decreased post-procedural hospital stay, and less complications.⁷

The institute lacks a dedicated interventional radiology department. Additionally, due to the significant risk of hypovolemic shock, unstable vitals, severe anaemia, and signs of impending infarction on CT, a further delay in management could have led to more drastic consequences. Finally, the decision was to proceed with open surgery. Intraoperative findings revealed a ruptured pseudoaneurysm in the upper pole with infarction in the middle and lower poles of the left kidney. Additionally, clotted blood was filling the entire collecting system as well as the proximal left ureter.

CONCLUSION

The importance of early inclusion of such rarities in the list of differential diagnoses, where the patient presents with increasing pain or signs of anaemia, is emphasised by this case. As in this case, due to delayed presentation and late diagnosis, the treatment options were limited. Secondly, the importance of established endovascular services in all tertiary care hospitals is also highlighted by this case as the frequency of various interventional procedures, which can lead to similar vascular complications, has risen.

PATIENT'S CONSENT:

Informed consent was obtained from the patient.

COMPETING INTEREST:

The authors declared no conflict of interest.

AUTHORS' CONTRIBUTION:

MHM: Conceptualisation, design of the work, literature research, manuscript writing, and final critical revision.

KN: Conception of the work and drafting.

AS: Data collection from the patient and interpretation of the data.

All authors approved the final version of the manuscript to be published.

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