# *Renal pseudoaneurysm following percutaneous nephrolithotomy*

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*Percutaneous renal surgery can be utilized as treatment for a variety of urologic conditions. Percutaneous nephrolithotomy remains the treatment of choice for many large and complex renal calculi. Despite having a low overall complication rate, postoperative bleeding can occur. We report a case of significant hemorrhage from a renal pseduoaneurysm in a patient requiring anticoagulation following percutaneous nephrolithotomy. The bleeding was controlled by percutaneous coil embolization. Current management recommendations of postoperative hemorrhage following percutaneous renal surgery are reviewed.*

**Key Words:** nephrostomy, percutaneous, aneurysm, false, postoperative complications

## Introduction

Significant hemorrhage following percutaneous nephrolithotomy is an uncommon occurrence.[1] Initial measures to control bleeding include clamping of the nephrostomy catheter or the use of a balloon tamponade nephrostomy catheter.[2] In 0.8% of the time following percutaneous nephrolithotomy, hemorrhage will be severe enough to warrant angioembolization.[1] Arteriovenous fistulas and pseudoaneurysm are the most common causes of hemorrhage after percutaneous renal surgery, but laceration of renal vessels can occur as well.

It is critical for any surgeon performing percutaneous renal surgery to understand the management of postoperative hemorrhage. We present a case of a bleeding pseudoaneurysm in a patient who was anticoagulated following a percutaneous nephrolithotomy and review current management recommendations.

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## Case report

A 55-year-old man with history of a mechanical aortic valve underwent an uncomplicated right percutaneous nephrolithotomy for a 2 cm x 4 cm calculus. The patient's warfarin therapy was held prior to the procedure and his coagulation profiles were normal preoperatively. On post-operative day (POD) #1, he was noted to have gross hematuria from his Foley catheter and scant gross hematuria from his nephrostomy tube. His hematocrit was 30.1 units. A CT scan was subsequently performed to assess for additional stone burden which showed a small amount of perinephric blood, Figure 1.

On POD #2, his hematocrit dropped to 26.6 units but the urine in his Foley catheter cleared, his nephrostomy had minimal output, and his vital signs were normal. On POD #3, the patient's nephrostomy tube was removed and the patient was started on enoxaparin because of his mechanical aortic valve.

On POD #4 the patient's hematocrit dropped to 19.0 units and a repeat CT was obtained revealing expansion of the right perirenal hematoma to an estimated volume of 500 mL, Figure 2. With cessation of the patient's anticoagulation and transfusion of 4 units of packed red blood cells, the patient's hematocrit remained stable at 31 units for the next 4 days. Anticoagulation was restarted in the form of intravenous heparin.

Later that day, the patient began to have gross hematuria and developed clot retention. Rigid cystoscopy was performed for clot evacuation but a source of hematuria was not noted. Post-cystoscopy, the patient continues to have significant gross hematuria requiring continuous bladder irrigation. Despite the negative findings at cystoscopy, it was presumed that the source of hematuria was the right kidney. The interventional radiology service was consulted to perform a renal angiography with possible intervention. The angiography revealed a large right mid-pole pseudoaneurysm, Figure 3.

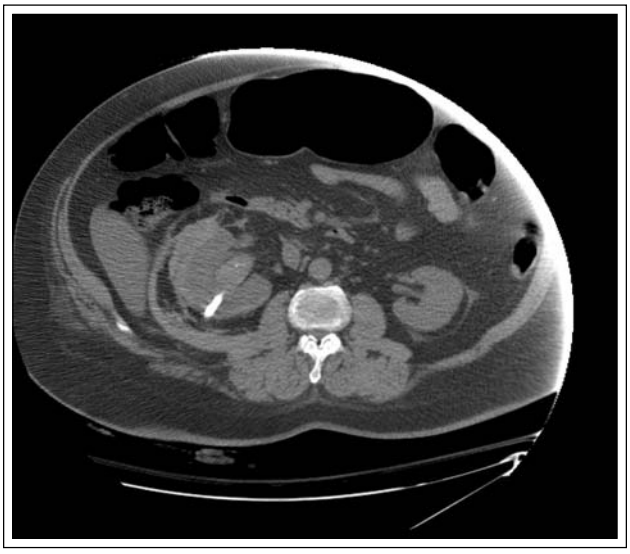

**Figure 1.** Postoperative CT revealing small amount of right perinephric blood.

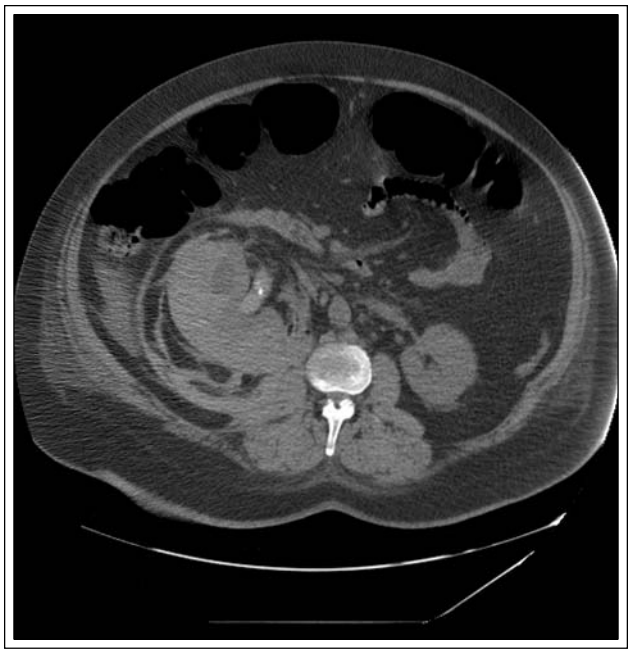

**Figure 2.** CT Revealing expansion of right perirenal hematoma.

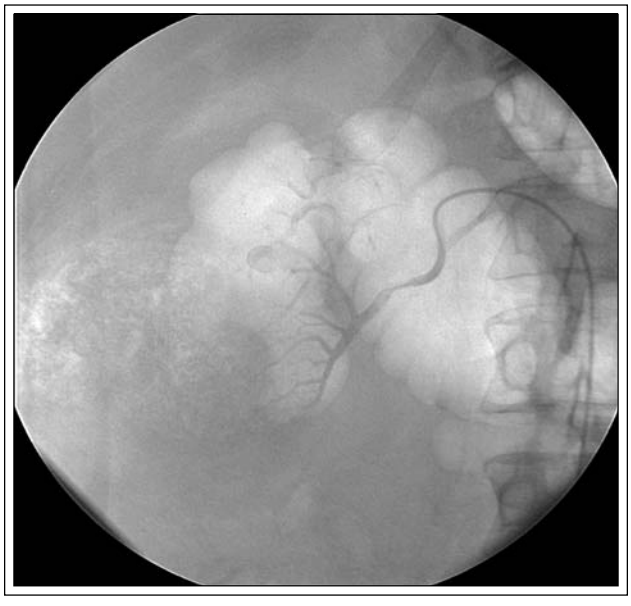

**Figure 3.** Mid-pole pseudoaneurysm.

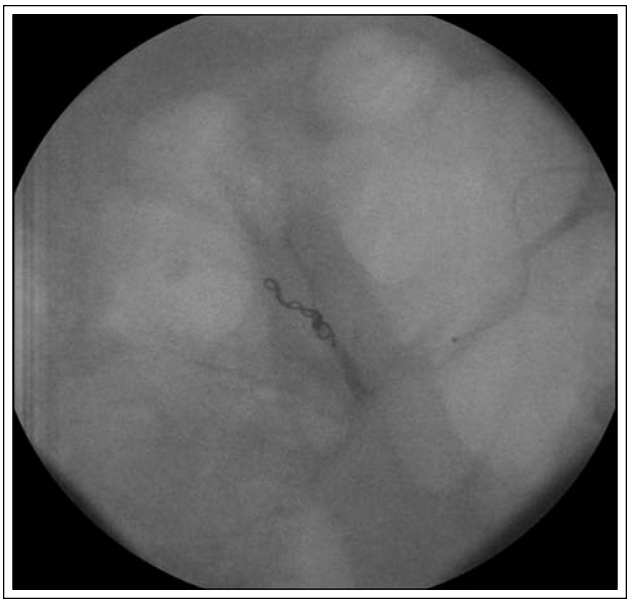

**Figure 4.** Microcoils placed in arterial branch supplying pseudoaneurysm.

A Tracker microcatheter (Boston Scientific, Natick, MA) was advanced out peripherally into a peripheral branch feeding the pseudoaneurysm and three Tornado microcoils (Cook, Bloomington, IN) were deposited into this small branch, Figure 4. A follow up arteriogram demonstrated no further filling of the pseudoaneurysm with preserved filling of the other branches, Figure 5. After the percutaneous coil embolization the patient's urine completely cleared, his hematocrit remained stable, and he was discharged home without further complication.

**Figure 5.** Post-embolization, filling of pseduoaneurysm is no longer present.

## Discussion

Knowledge of the management of postoperative hemorrhage is essential for any surgeon performing percutaneous renal surgery. Kessaris et al reported a series of 2200 percutaneous renal procedures over 9 years in which 0.8% required angiography and embolization for significant bleeding.[2] Arteriovenous fistula and pseudoaneuryms were the most common findings on angiography. Although most severe bleeding complications of percutaneous renal surgery are arterial in nature, Gupta et al reported a case series of four patients with massive hemorrhage developing from renal vein injury.[3] Thilagerajah et al reported an unusual complication of a subcostal artery laceration following an upper pole percutaneous nephrolithotomy.[4] Rupture of the renal sheath for forcible stone extraction has also been reported to cause significant hemorrhage.[5] Although most significant hemorrhage following percutaneous renal surgery presents in the first 7 days, there have been reports of delayed hemorrhage due to arteriovenous fistulas or pseudoaneurysms as late as 13 weeks following percutaneous nephrolithotomy.[6]

The timing of when to perform angioembolization is a dilemma that occurs with any patient experiencing hemorrhage following percutaneous renal surgery. According to the large case series by Kessaris et al,[2] 24% of patients who experienced significant hemorrhage following percutaneous renal procedures presented within the first 24 hours following the procedure. Forty one percent presented between 24 hours and 7 days postoperatively. Thirty five percent presented with significant hemorrhage at greater than 7 days postoperatively. The authors found no correlation to the type of lesion found angiographically and the time of presentation. There were also no risk factors for hemorrhage that could be identified. The authors recommended that percutaneous coil embolization be pursued in three situations based on the timing of presentation: in the immediate post-operative period when clamping of the nephrostomy tube and a tamponade balloon catheter fail to control the hemorrhage, in the early post-operative period when the patient requires 3-4 units of blood replacement after replacement of the initial blood loss, and in the situation where sudden hemorrhage occurs greater than 7 days postoperatively.

Our patient had the uncommon complication of significant hemorrhage from a pseudoaneurysm following percutaneous nephrolithotomy. The need for anticoagulation because of the patient's mechanical aortic valve may have contributed to risk of hemorrhage. Coil angioembolization resulted in control of the hemorrhage. □

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