

## Intrarenal Pseudoaneurysm After Percutaneous Nephrolithotomy: A Rare and Important Complication of Minimally Invasive Surgery

Siavash Falahatkar, Hossein Hemmati, Gholamreza Mokhtari, Ahmad Assadollahzadeh, Aliakbar Allahkhah

Urology Research Center, Guilan University of Medical Sciences, Rasht, Guilan, Iran

Submitted January 16, 2011 - Accepted for Publication March 6, 2011

### ABSTRACT

A renal artery pseudoaneurysm (RAP) is created by high-pressure blood passing from a lacerated artery into the renal parenchyma. It has been reported to occur after trauma, renal biopsy, percutaneous nephrostomy, percutaneous nephrolithotomy (PCNL), and open or laparoscopic partial nephrectomy. The incidence of this rare, potentially life-threatening complication is likely to increase with the increasing popularity of endoscopic renal procedures. We present a case of a 60-year-old male who received PCNL for a calculus in the lower calyx of the left kidney. Twenty days after the PCNL, the patient was readmitted due to severe gross hematuria and clot retention. Angiography revealed a pseudoaneurysm arising from the interlobar artery of the lower pole. RAP is often difficult to diagnose and requires a high index of suspicion. We successfully performed coil angiographic embolization, which is considered the most appropriate treatment. Other treatment options are discussed.

**KEYWORDS:** Intrarenal; Pseudoaneurysm; Percutaneous nephrolithotomy; Complication; Minimally invasive surgery

**CORRESPONDENCE:** Dr. Hossein Hemmati, Urology Research Center, Guilan University of Medical Sciences, Sardare Jangal Street, Rasht, Guilan 41448, Islamic Republic of Iran (drhossein\_hemmati@yahoo.com).

**CITATION:** *UroToday Int J.* 2011 Apr;4(2):art 36. doi:10.3834/uj.1944-5784.2011.04.18

### Abbreviations and Acronyms

PCNL, percutaneous nephrolithotomy  
RAP, renal artery pseudoaneurysm

### INTRODUCTION

A renal artery pseudoaneurysm (RAP) is created by high-pressure blood passing from a lacerated artery into the renal parenchyma [1]. RAP has been reported to occur after trauma, renal biopsy, percutaneous nephrostomy, percutaneous nephrolithotomy (PCNL), and open or laparoscopic partial nephrectomy (LPN) [2]. Percutaneous renal procedures could lead to renovascular injuries such as a hematoma, arteriovenous fistula, or pseudoaneurysm. El-Nahas et al [3] reported that patients with renal stones amenable to PCNL were the most at risk for severe bleeding if they had an upper caliceal puncture or multiple punctures, a solitary kidney, staghorn stone, or an inexperienced surgeon.

The reported incidence of a RAP following PCNL is 0.6% to 1% [4]. It is usually assessed by renal angiography. Pseudoaneurysms

following PCNL are typically small and have a low pressure. Clinicians should always bear in mind that a patient with a history of minimally invasive intervention may have a RAP, which might be misdiagnosed as a mass, malignancy, or similar disease; a radiologic work-up should be scheduled [5].

To the best of our knowledge, RAP after PCNL has been reported in only a few cases [1,6-8]. However, with the popularity of PCNL and other renal endoscopic procedures, the incidence of this rare complication is likely to increase. We present a case of an intrarenal pseudoaneurysm after PCNL and review the literature about this rare but life-threatening complication.

### CASE REPORT

A 50-year-old male with hypertension presented with a persistent left flank pain. Ultrasonography and intravenous

Figure 1. Angiogram showing the pseudoaneurism in the lower caliceal artery of the left kidney.

doi: 10.3834/uj.1944-5784.2011.04.18f1



Figure 2. Angiogram showing the location of the coil in the lower caliceal artery of the left kidney.

doi: 10.3834/uj.1944-5784.2011.04.18f2



urography (IVU) showed a 2.5 cm calculus in the lower calyx of the left kidney. Extracorporeal shock wave lithotripsy failed to fragment the left renal stone; therefore, the patient underwent PCNL in the supine position. The procedure was uneventful and the patient was discharged on the second postoperative day.

Twenty days after the PCNL, the patient was readmitted due to severe gross hematuria and clot retention. Bleeding and coagulation parameters were within the reference ranges preoperatively. The patient was resuscitated with intravenous fluids and blood transfusion. He had 3 additional episodes of severe hematuria with clots, despite conservative management. The urine was clear between the hematuria episodes. Ultrasound and computed tomography scans showed clots in the urinary tract without significant collection in the retroperitoneal space.

Because the episodes of gross hematuria recurred several times during the conservative management, changed the hemodynamic parameters, and decreased the hemoglobin level to below 10 mg/dL, the patient underwent angiography. This procedure revealed a pseudoaneurysm arising from the interlobar artery of the lower pole (Figure 1). We decided to perform coil angiographic embolization. After a right femoral approach under fluoroscopic control, selective catheterization into the inferior pole segmental artery was achieved. The coil was placed under fluoroscopic control to prevent reflux into the renal segmental artery (Figure 2). Angiography did not

show further opacification of the pseudoaneurysm at the end of the procedure (Figure 3; Figure 4). Three days after coil angiographic embolization, the patient was discharged from

Figure 3. Angiogram showing the obstacle artery after angioembolization.

doi: 10.3834/uj.1944-5784.2011.04.18f3

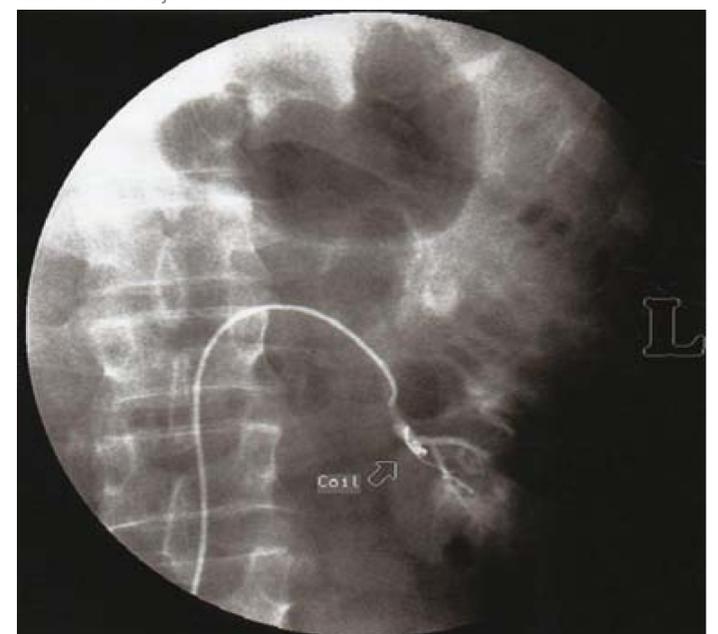


Figure 4. X-ray showing the coil in the kidney-ureter-bladder area after angioembolization.

doi: 10.3834/uj.1944-5784.2011.04.18f4



the hospital without hematuria.

## DISCUSSION

Renal artery pseudoaneurysms are an important complication of minimally invasive surgery and their occurrence is expected to increase as these procedures become more common [2]. Michel et al [8] reported that urologists must consider a number of factors when planning or performing PCNL to avoid the complications associated with endourologic percutaneous procedures and to ensure optimum outcomes for patients. Therefore, training and experience of the urologist are critical, as is careful patient selection, accurate positioning, and use of the best available instruments.

Asymptomatic RAP after percutaneous procedures may be diagnosed incidentally or remain undiagnosed and resolve spontaneously [5]. Transfusion after percutaneous stone surgery is necessary in 1% to 23% of the cases [9]. Sometimes, RAP can present with gross hematuria and clot retention.

Srivastava et al [1] studied 1854 patients that received PCNL. They reported that of 23 vascular lesions, 22 cases involved the renal vasculature and 1 lesion involved the lumbar artery, which was incidentally diagnosed on renal angiogram. These patients had severe hematuria [1]. Richstone et al [7] reported that major hemorrhage requiring intervention after percutaneous renal surgery is uncommon.

The most common angiographic finding associated with hemorrhage is arterial pseudoaneurysm. In 95% of cases, angiography reveals a demonstrable and treatable etiology. This strongly supports the first-line use of angiography for intractable bleeding in this setting. RAP may need angiographic evaluation and embolization in 0.3% to 1.4% of the cases [1,6].

Selective angiographic embolization is the treatment of choice for most patients with RAP [2]. However, the treatment differs according to patient presentation, ranging from conservative management to angioinfarction [5]. Endourologists should be aware of the clinical course and risk factors for RAP to make an appropriate diagnosis and treatment plan. Although embolization has a great success rate, it may still fail and loss of kidney function could be the end result. Successive attempts with embolization should stop bleeding, but kidney failure may be inevitable. In such cases, misdiagnosis and overtreatment should also be avoided [5]. Coil embolization supplemented with Gelfoam pledgets (Pfizer; New York, NY, USA) is a safe and effective method of controlling the bleeding, provided that any spinal nerve branches are identified and avoided [10]. For the present patient, hemorrhage due to RAP occurred after a successful and uneventful PCNL. The patient was diagnosed and treated appropriately. The localization of RAP was at the level of the interlobar artery and 1 session of selective angioembolization was done successfully.

## CONCLUSIONS

RAP is a rare but potentially life-threatening condition that is often difficult to diagnose and requires a high index of suspicion. Often it can be managed with percutaneous selective angioembolization to minimize morbidity and maximize renal conservation. As the indications for PCNL and partial nephrectomy continue to expand, endourologists must be aware of all potential threatening complications such as RAP so that the patient receives appropriate treatment.

## REFERENCES

1. Srivastava A, Singh KJ, Suri A, et al. Vascular complications after percutaneous nephrolithotomy: are there any predictive factors? *Urology*. 2005;66(1):38-40.

2. Singh D, Gill IS. Renal artery pseudoaneurysm following laparoscopic partial nephrectomy. *J Urol*. 2005;174(6):2256-2259.
3. El-Nahas AR, Shokeir AA, El-Assmy AM, et al. Post-percutaneous nephrolithotomy extensive hemorrhage: a study of risk factors. *J Urol*. 2007;177(2):576-579.
4. Jain R, Kumar S, Phadke RV, Baijal SS, Gujral RB. Intra-arterial embolization of lumbar artery pseudoaneurysm following percutaneous nephrolithotomy. *Australas Radiol*. 2001;45(3):383-386.
5. Inci K, Cil B, Yazici S, et al. Renal artery pseudoaneurysm: complication of minimally invasive kidney surgery. *J Endourol*. 2010;24(1):149-154.
6. Sacha K, Szewczyk W, Bar K. Massive haemorrhage presenting as a complication after percutaneous nephrolithotomy (PCNL). *Int Urol Nephrol*. 1996;28(3):315-318.
7. Richstone L, Reggio E, Ost MC, et al. First Prize (tie): Hemorrhage following percutaneous renal surgery: characterization of angiographic findings. *J Endourol*. 2008;22(6):1129-1135.
8. Michel MS, Trojan L, Rassweiler JJ. Complications in percutaneous nephrolithotomy. *Eur Urol*. 2007;51(4):899-906; discussion 906.
9. Falahatkar S, Allahkhah A. Recent developments in percutaneous nephrolithotomy: benefits of the complete supine position. *UroToday Int J*. 2010 Apr;3(2). doi:10.3834/uij.1944-5784.2010.04.03.
10. Tummala V, Nanavati KI, Yrizarry JM, Scagnelli T. Lumbar artery pseudoaneurysm following percutaneous nephrolithotripsy: Treatment by transcatheter embolization. *Indian Urol*. 2008;24(3):408-410.