

## Ultrasound-guided Percutaneous Embolization of Post Renal Biopsy Gonadal Artery Pseudoaneurysm

### Abstract

Hemorrhage is the most frequently encountered post renal biopsy complication; reported in 12% to 14% of patients. Although the vast majority of these are due to renal artery injury, involvement of gonadal arteries is also rarely seen. These may be managed by the endovascular route, which has several limitations in this subset of patients. We report a case of a 69-year-old male with rapidly progressive glomerulonephritis, who underwent renal biopsy and developed a testicular artery pseudoaneurysm (PA). Successful embolization of this PA was performed under ultrasound guidance using a direct percutaneous approach. This is the first such case reported in the literature.

**Keywords:** *Biopsy, embolization, hemorrhage, kidney*

### Introduction

Renal biopsy is the mainstay for diagnosis of renal parenchymal disease. The use of real-time ultrasound (US) guidance has become the standard of care across nephrology centers worldwide, due to the results of several studies reporting a significant difference in the number of glomeruli obtained per sample, as well as the complication rate.<sup>[1,2]</sup> The vast majority of complications occurring secondary to biopsies; both blind and US guided; are hemorrhagic. Of these, minor complications are termed as those that do not require a blood transfusion, vascular embolization, or surgical intervention. The reported incidence of these varied between 12% and 14% in different series.<sup>[1,3]</sup> On the other hand, major complications such as large hematomas or those requiring vascular or surgical intervention are more variable. Some authors have reported an incidence of 0% to 1%,<sup>[1,4]</sup> whereas others reported incidence as high as 12%.<sup>[3]</sup>

In a prior study on endovascular embolization in patients with post renal biopsy hemorrhage,<sup>[5]</sup> 42 of 43 (97.7%) patients had renal artery injury. There are anecdotal reports of iatrogenic injury to other vessels implicated as a cause of post renal biopsy, nephrostomy, or nephrolithotomy hemorrhage. These

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include lumbar, left colic, and mesenteric arteries. Gonadal artery involvement has been heretofore described in a solitary case report, where dual injury to accessory renal and testicular vessel was seen.<sup>[6]</sup> We present a patient with post renal biopsy hemorrhage due to isolated testicular artery injury and its subsequent management through a percutaneous approach under US guidance.

### Case Report

A 69-year-old male presented to the Emergency Department with hematuria and renal dysfunction. The serum urea level at presentation was 82 mg/dL and creatinine was 2.8 mg/dL. This was also associated with the accumulation of third space fluid in the form of ascites, bilateral pleural effusion, and extensive subcutaneous edema. The coagulation parameters were within the normal limits. He was clinically diagnosed as rapidly progressive glomerulonephritis and initiated on pulse methylprednisolone. The patient underwent US-guided percutaneous renal biopsy using 16-gauge automatic spring-loaded biopsy needle. Because the left kidney could not be properly visualized, the right kidney was chosen for the biopsy. Three cores were taken from the lower pole of the right kidney. No perinephric fluid was seen on US immediately post biopsy.

Post biopsy, the patient complained of persistent hematuria. There was no loin

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pain, tachycardia, or hypotension. The pre-procedure hemoglobin level of the patient was 8.2 g/dL, which remained stable post-procedure. A computed tomography angiography (CTA) was done for the patient. This showed a lobulated contrast-filled outpouching suggestive of a pseudoaneurysm (PA) in relation to the upper ureter, which measured approximately 10 mm × 6 mm. The location of the PA was extra-renal and outside the pelvicalyceal system. The location was in the peri-nephric space close to the right psoas, and no arterial origin could be traced. A retroperitoneal hematoma was seen adjacent to the PA abutting the right psoas, measuring approximately 6.3 cm × 1.9 cm.

We reviewed an old, computed tomography (CT) of the patient, which was performed 1 year back. At the same level as the PA, there was a small caliber vessel arising from a branch of the renal artery, presumably the gonadal (testicular artery). Thus, we concluded that we were dealing with a testicular artery PA [Figure 1].

US was performed to confirm the findings of the CTA [Figure 2]. The right kidney was of normal size with raised cortical echogenicity. The pelvis and the upper ureter showed internal echogenic content secondary to blood clots. An anechoic lesion measuring 11 mm × 7 mm was seen caudal to the ureter, with a nipple leading into a perinephric hypoechoic collection of thickness 34 mm. On Color Doppler examination, a “yin-yang” pattern was seen in the anechoic lesion, confirming a pseudoaneurysm. Spectral Doppler showed a prominent component of reverse flow.

To avoid another iodinated contrast challenge in a patient with compromised renal function, we planned direct percutaneous therapeutic embolization of the PA under US guidance. We decided on a trans-renal approach to the PA through the right flank, with the patient in the left lateral

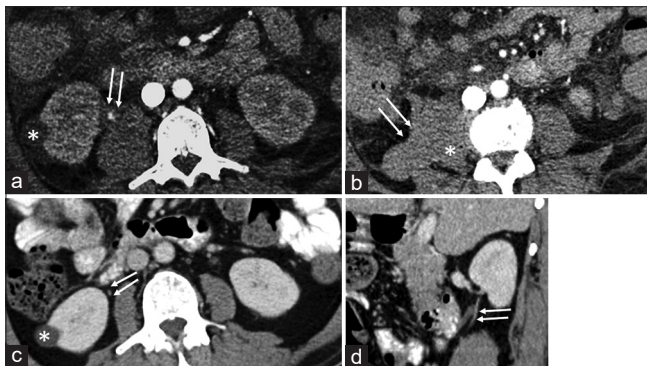
position. Access to the PA was secured using a 22-gauge lumbar puncture needle. *N*-butyl cyanoacrylate (NBCA) was used for embolization. A total of 1 mL of 50% NBCA was injected into the aneurysm sac under direct visualization on US. Following this, 5% dextrose solution was used to flush the needle tip. There was no residual anechoic component seen in the PA on post-procedure US. Color Doppler examination revealed absent color flow.

The patient was shifted to the ward post procedure, and his vitals remained stable. There was no complaint of loin pain or fever to suggest postembolization syndrome. Follow-up US was done 1 week later, which showed significant resolution of the hematoma.

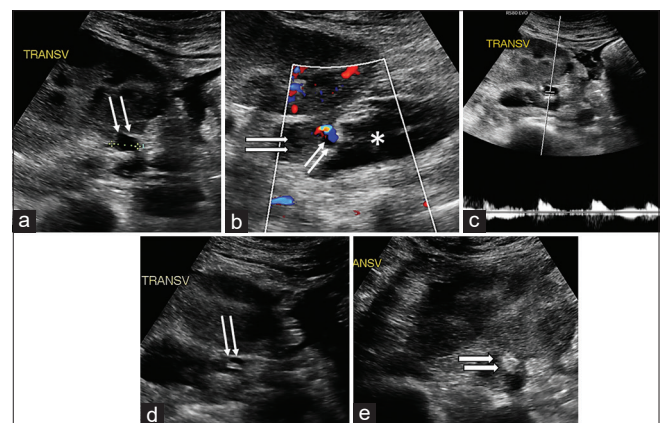
### Discussion

Gonadal artery injury is a unique vascular complication that may rarely be seen in patients post percutaneous renal intervention. The more common association of this condition is obstetric trauma in females,<sup>[7]</sup> where the lesions are pelvic in location and often associated with uterine artery injury. In males, on the other hand, they are intrascrotal in location and arise secondary to blunt trauma or infection.<sup>[8,9]</sup> The most common form of injury encountered in the literature are PAs, which are identified as anechoic lesions showing a “yin-yang” color flow on duplex Doppler examinations. On CTA or enhanced CT, they appear as focal contrast-filled outpouchings.

The management of such gonadal artery injury has mostly consisted of a percutaneous endovascular approach. This involves transcatheter embolization using coils, microparticles, and liquid embolic agents such as NBCA in isolation or in variable combinations.<sup>[7,10]</sup> The direct



**Figure 1:** (a) Computed tomography (CT) angiography image shows the small contrast-filled outpouching (arrow) in the perinephric space at the level of midpole of kidney with surrounding hypodense hematoma. The artery of origin could not be delineated. A right renal cyst (\*) is seen. (b) A large hematoma (arrow) is seen tracking inferiorly along the right psoas muscle (\*). (c) In an enhanced CT done 1 year back, a small caliber vessel (arrow) was seen in perinephric space at the same level, as denoted by the renal cyst (\*) (d) Sagittal reformatted image shows the origin of the vessel from the right renal artery; thus, it is the testicular artery (arrow)



**Figure 2:** (a) Transverse ultrasonography (US) image of the right flank shows a focal anechoic lesion (arrow) in relation to the lower pole of the right kidney. (b) Color Doppler reveals “to and fro” pattern of color flow in the lesion (arrow). The adjacent hypoechoic hematoma is seen (\*). The right ureter is also filled with echogenic material (solid arrow). (c) Spectral Doppler of the lesion reveals mixed forward and reverse flow. (d) A 22-gauge spinal needle was used to access the lesion. Needle tip is seen *in situ* (arrow). (e) On injection of 1 mL *N*-butyl cyanoacrylate, there was complete echogenic cast formation within the lesion (arrow). No residual anechoic component was seen

**Table 1: Summary of studies describing use of direct percutaneous approach for hemorrhagic complications post renal intervention**

Author	Year	Artery involved	Form of injury	Approach	Embolic agent	Success
Lal <i>et al.</i> <sup>[11]</sup>	2009	Renal artery	Post nephrolithotomy PA	US guidance US + Fluoroscopy guidance	Thrombin nBCA	No 100%
Sakr <i>et al.</i> <sup>[12]</sup>	2009	Renal artery	Post penetrating trauma, renal biopsy, nephrolithotomy PA	US guidance	Gelfoam	92.9%
Gupta <i>et al.</i> <sup>[13]</sup>	2008	Renal artery	Post pyelolithotomy PA	Transcatheter embolization US guidance	Thrombin	Failure to cannulate feeding vessel 100%
Siu <i>et al.</i> <sup>[14]</sup>	2006	Renal artery	Post renal transplant PA	US guidance	Thrombin	Central recanalization seen
Ramsay <i>et al.</i> <sup>[15]</sup>	2002	Lumbar artery	Pseudoaneurysm	US guidance	Thrombin	100%

PA, pseudoaneurysm; US, ultrasonography; NBCA, *N*-butyl cyanoacrylate

percutaneous approach has thus far not been used, although it has been successfully employed in another case of post renal biopsy hemorrhage, as described in Table 1.

A direct percutaneous approach may prove of considerable value in patients who present with complications secondary to percutaneous renal interventions such as biopsy, nephrostomy, and nephrolithotomy. Due to the underlying renal compromise, patients are often not amenable for the additional contrast challenge provided by catheter angiography and embolization.<sup>[16]</sup> US-guided compression is a popular treatment method for superficial PAs such as those arising from the femoral artery; however, the deep-seated location of the gonadal arteries in the abdomen and pelvis provides an inherent limitation to such a technique. Therefore, the injection of liquid embolic agents into the aneurysm neck and sac post cannulation under US guidance is the method of choice in such presentation. As noted above, a high rate of success has been reported by past authors using this technique.

In the index case, we found this approach particularly useful, due to the comorbid renal dysfunction necessitating dialysis through an indwelling femoral catheter. This precluded the use of femoral access for transcatheter embolization. In addition, any iodinated contrast injection would require careful consideration; since the patient had already been subjected to a diagnostic CTA with ~90 mL of low osmolar iodinated contrast. We achieved technical success in the procedure, like that reported previously.

Thus, although testicular artery injury as a complication of renal biopsy or nephrostomy is a rare occurrence compared with renal artery injury, clinicians must be aware of this possibility to suspect and diagnose the condition. It poses a unique management challenge due to its location as well as the comorbid patient conditions, and direct percutaneous US guidance provides a cheap, fast, and effective solution with a high success rate.

### Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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### Conflicts of interest

There are no conflicts of interest.

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