Hypertension and Acute Kidney Injury following an Allograft Biopsy

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Clinical Images in Nephrology and Dialysis

Case Answer

A 49-year-old woman was admitted with 2 weeks of progressive dyspnea, edema, and hypertension. Medical history is significant for ESKD attributed to hypertensive nephrosclerosis. She underwent a deceased-donor kidney transplant 2 months before admission. The post-transplant serum creatinine concentration reached a nadir of 2.0 mg/dl. An allograft biopsy performed 2.5 weeks before admission revealed acute cellular rejection (Banff borderline). She was treated with steroids.

Physical examination on admission was notable for tachypnea at 24 breaths/min, BP of 180/95 mm Hg, pulse of 91/min, with oxygen saturation of 98% on 5 L of oxygen. Pertinent findings included bilateral 3+ pitting edema, crackles, and wheezing. Laboratory evaluation revealed serum sodium of 134 mmol/L, potassium of 4.6 mmol/L, bicarbonate of 16 mmol/L, BUN of 94 mg/dl, and serum creatinine of 5.28 mg/dl. Chest X-ray showed an enlarging pericardial effusion, interstitial edema, and bilateral pleural effusions. Renal allograft ultrasound showed a 1.2-cm pseudoaneurysm in the lower pole of the kidney with large subcapsular hematoma resulting in a mass effect on the kidney (Figure 1, A and B). A diagnosis of Page kidney was made. The patient underwent percutaneous embolization of the pseudoaneurysm followed by drainage of the subcapsular hematoma. She was dialyzed for volume overload after inadequate response to diuretics. A computed-tomography scan the next day showed persistence of subcapsular hematoma despite the percutaneous drain (Figure 1C). A repeat ultrasound showed absent flow in the pseudoaneurysm. She underwent surgical evacuation of the hematoma. Serum creatinine returned to baseline over the ensuing 2 weeks. No further dialysis was required. A repeat biopsy showed acute tubular injury but no evidence of rejection.

The incidence of major complications after an allograft biopsy is 2% (1). Serious complications that are life threatening or require intervention usually occur in <24 hours (2). The incidence of delayed subcapsular-hematoma formation secondary to pseudoaneurysm formation has not been defined. A pseudoaneurysm is a rare vascular complication that can occur after trauma, surgery, or a percutaneous kidney biopsy (3,4). It is a contained hematoma, usually asymptomatic and requiring clinical observation and follow-up imaging. Rarely, a pseudoaneurysm can rupture or extravasate beyond its boundaries, resulting in development of a subcapsular hematoma. Continued expansion of the hematoma can cause compression, microvascular ischemia, and elevated renin hypertension called the Page kidney phenomenon (5). Patients can present with refractory hypertension and signs and symptoms of volume overload. In addition, patients who have received a transplant can present with kidney dysfunction because they have a solitary kidney. If the extravasation of blood occurs slowly over time, the presentation can be subacute and the patient can present several weeks after biopsy, as seen in this case. Acute or newly uncontrolled hypertension, new onset edema, AKI (in patients with a single functioning kidney), and recent trauma are important clues.

Figure 1. Imaging evidence of kidney compression due to a subcapsular hematoma associated with a pseudoaneurysm. (A) C Doppler ultrasound showing pseudoaneurysm with classic “Yin Yang sign,” also called the “Pepsi sign,” indicating bidirectional flow due to swirling of blood within the pseudoaneurysm (yellow arrow). (B) G ultrasound with blue arrows demarcating subcapsular hematoma (below) and renal parenchyma (above). (C) C computed-tomography scan showing percutaneous drain (blue arrow) and subcapsular hematoma (red arrow) compressing the allograft.

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for suspecting Page kidney (5). Timely diagnosis with imaging and a low threshold for surgical intervention can potentially reduce and reverse kidney injury and the associated complications.

**Teaching Points**
- Pseudoaneurysms are a rare complication of renal allograft biopsies.
- Pseudoaneurysms can lead to subcapsular hematoma that can result in the Page kidney phenomenon.
- Percutaneous and/or surgical evacuation of a subcapsular hematoma in a transplanted kidney may preserve kidney function.

**Author Contributions**
Z. Zafar wrote the original draft; Z. Zafar and E. Marin reviewed and edited the manuscript.

**Disclosures**
Dr. Marin and Dr. Zafar have nothing to disclose.

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