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Case Report

Acute presentation of renal pseudoaneurysms in a patient with systemic lupus erythematosus after percutaneous renal biopsy ☆

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ABSTRACT

The development of renal pseudoaneurysms following percutaneous kidney biopsy is a rare but potentially dangerous complication due to the risk of rupture with subsequent hemorrhage. We describe a female patient in her 20s with long-standing lupus nephritis who presented to the hospital for elective CT-guided left renal biopsy that was complicated by pseudoaneurysms in the bilateral kidneys. Post-biopsy, she developed a perinephric hematoma that extended to the upper pelvis with resultant superior displacement and diminished blood flow to the left kidney. Successful endovascular coil embolization was performed after left renal artery angiography confirmed contrast extravasation in one of the branches that supplied the inferior pole of the left kidney. Despite the embolization, her hemoglobin continued to decline, and a subsequent CT-scan demonstrated a persistent loculated hyperdense fluid collection in the beforementioned area. Repeat angiography revealed multiple left renal pseudoaneurysms and a single pseudoaneurysm in the upper pole of the right kidney, neither of which were previously visualized. The acute development of pseudoaneurysms due to accidental or non-accidental trauma is a well-established entity. Here we present a patient that acutely developed numerous arterial pseudoaneurysms after renal biopsy and has never been reported in the literature. Special caution should be undertaken in the case of high-risk patients predisposed to these pseudoaneurysms.

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Introduction

The image-guided percutaneous biopsy is widely considered the procedure of choice in the management of renal intraparenchymal disease because of its high specificity and excellent safety profile. Procedural refinement, coupled with advancement in imaging techniques, have only improved its safety profile since it was first described in the literature in 1951(2). The most recent reports estimate that life-threatening complications occur in only 0.1% of cases [1,2]. Despite its safety, the percutaneous kidney biopsy may still present with complications, the overwhelming majority of which involve bleeding [3]. Minor bleeding complications do not require intervention and include self-limited anemia (10%-50%) and gross hematuria (3%-18%) [3]. On the other hand, major bleeding complications, such as hemorrhage-induced hypotension (1%-2%) and coil embolization (0.1%-0.4%), are less frequent and require intervention for hemostasis [3]. The formation of renal pseudoaneurysms following percutaneous kidney biopsy is a rare, but potentially life threatening complication due to the risk of rupture [4]. Here, we present the case of a patient with lupus nephritis who suddenly developed several renal artery pseudoaneurysms following percutaneous kidney biopsy.

Case report

A female patient in her 20s with history of systemic lupus erythematosus (SLE) presented to the hospital for a CT-guided left renal biopsy after outpatient blood work revealed unexplained worsening renal function. She had a history of biopsy-proven stage III lupus nephritis, as well as stage IV CKD that required hemodialysis with a baseline creatinine of 1.3-1.4 mg/dL. Her most recent C3 and C4 levels were reduced at 61 mg/dL and 16 mg/dL, respectively. In the months preceding her presentation, the patient was started on voclosporin due to marked proteinuria of 10 g/d, which improved to 2 g/d with medication. However, during this time, her creatinine trended upwards to a peak concentration of 4.4 mg/dL, which prompted medication cessation. Upon discontinuation of the voclosporin, her creatinine did not return to baseline, but remained elevated at 2.6 mg/dL. Due to this unexplained worsening of renal function, the decision was made to perform an elective CT-guided left renal biopsy (Fig. 1). The results revealed global glomerulosclerosis and interstitial fibrosis in all obtained samples, which effectively advanced her diagnosis to stage VI lupus nephritis.

Following the biopsy, the patient developed persistent hypotension, and a CT-scan with contrast was performed. It showed a complex fluid collection in the posterior left pararenal space that measured 14 × 7.7 × 12 cm (Fig. 2A). The collection extended to the upper pelvis with resultant superior displacement and diminished blood flow to the left kidney.

To further assess the bleeding, the patient underwent angiography of the left renal artery, which revealed brisk extravasation in one of the branches that supplied the inferior pole of the left kidney (Fig. 3). Endovascular coil embolization with a 2 mm x 4 cm ruby coil led to immediate cessation of the observed extravasation, and repeat runs with the microcatheter, and the Simmons catheter confirmed successful embolization.

Following her embolization, the patient remained hemodynamically stable, but there was concern for worsening bleeding due to hemoglobin loss. Her hemoglobin dropped to as low as 5.3 g/dL from 8.9 g/dL on admission. She was transfused and her hemoglobin rose to 7.5 g/dL, but then continued to decrease to as low as 6.1 g/dL. This prompted a repeat CT-scan that revealed an edematous and enlarged left kidney, as well as a loculated hyperdense collection that measured 12 × 5 × 21 cm, slightly decreased from the previous 12 × 7.6 × 22 cm. A repeat angiography revealed multiple left renal pseudoa-

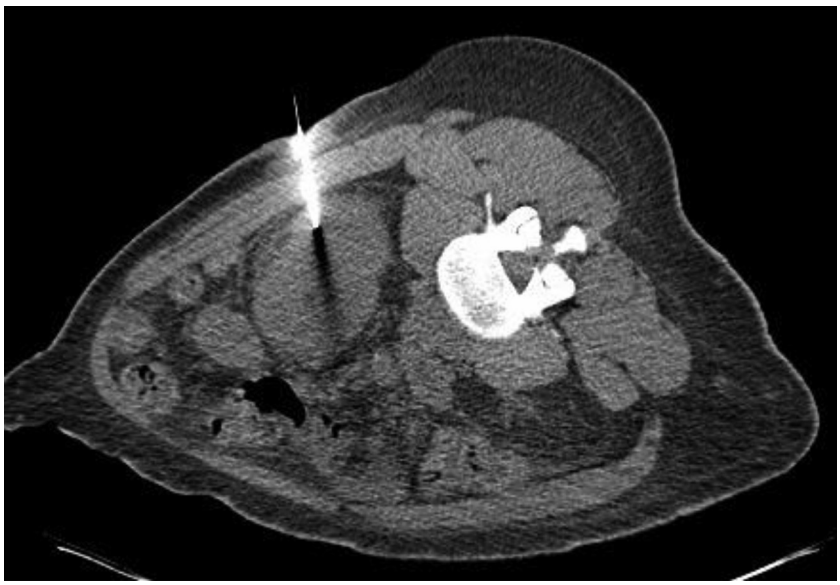

Fig. 1 – Computed tomography, axial view, demonstrates percutaneous biopsy needle within the left kidney.

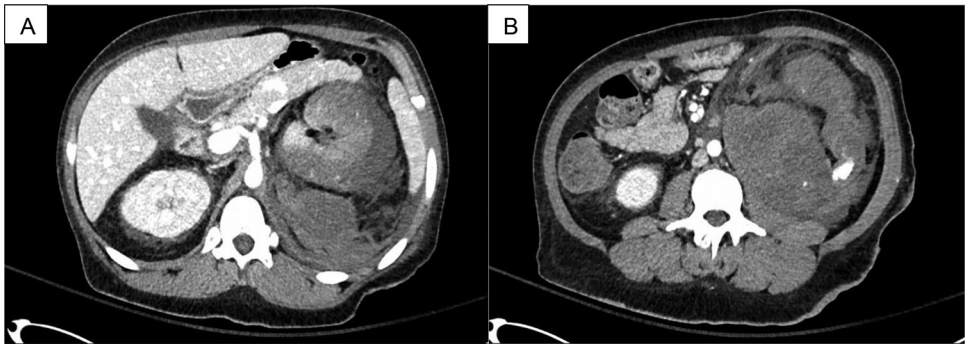

Fig. 2 – Computed tomography demonstrates (A) left subcapsular renal hematoma and (B) large retroperitoneal hematoma.

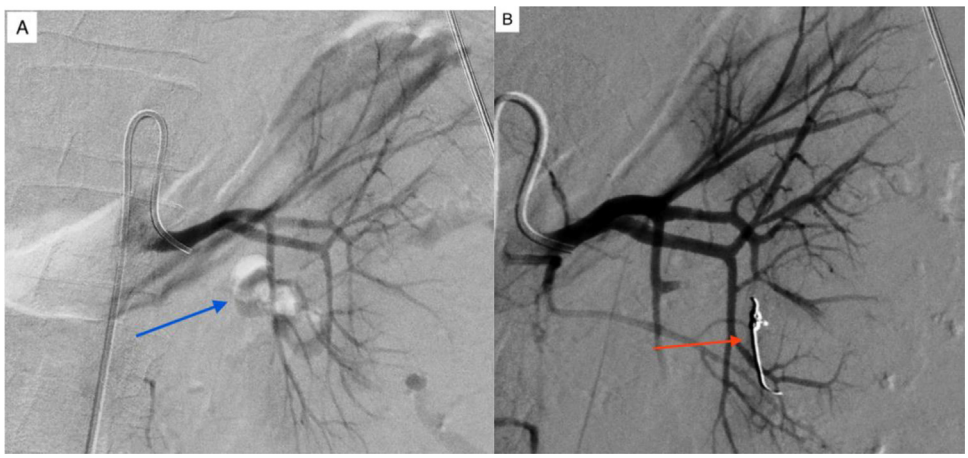

Fig. 3 – Digital subtraction angiography demonstrating (A) contrast blush consistent with hemorrhage (blue arrow) and (B) resolution of contrast blush after coil embolization (red arrow). No pseudoaneurysms visualized.

neurysms, as well as a single pseudoaneurysm in the upper pole of the right kidney, neither of which were previously visualized (Fig. 4).

Discussion

Numerous systemic disease entities are known to cause pseudoaneurysms (SLE, fibromuscular dysplasia, Behcet disease, Polyarteritis nodosa…) [5]. Pseudoaneurysms visualized on angiography in patients with SLE are rarely reported in the literature. Lupus associated vasculitis is a complication of SLE that is commonly associated with small sized vessels and rarely medium sized vessels. Lupus vasculitis most commonly involves the skin, kidneys, gastrointestinal tract, and nervous system among other organ systems with prognosis depending on severity of symptoms [5,6].

The pathogenesis of lupus associated vasculitis remains poorly understood but is believed to be a complex interaction among autoantibodies, immune complexes, cytokines, and the vascular endothelium [5]. Pseudoaneurysm is defined as false aneurysms that are bound by the tunica adventitia, the outermost layer of the arterial wall compared to true aneurysms that are bounded by all 3 layers adventitia, media, and intima [7]. Lupus associated vasculitis is a secondary vasculitis that is theorized to manifest acutely if triggered by an inflammatory process that results in immune complexes within the blood being deposited in blood vessel walls causing destruction of the intima and media [5]. No case reports in the literature were found to demonstrate this acute iatrogenic presentation.

The most common and feared complication from lupus vasculitis is hemorrhage. Multiple reports in the literature demonstrate spontaneous retroperitoneal or intraperitoneal bleeding attributed to lupus vasculitis affecting numerous solid organ arteries [6]. Pseudoaneurysms have a higher risk of rupture compared to true aneurysms and therefore treatment must be prompt [8].

We believe that the patient had undiagnosed lupus vasculitis. The percutaneous biopsy procedure performed on our patient then initiated an inflammatory cascade most pronounced within the left kidney. This then led to arterial wall destruction due to immune complex deposition and therefore leading to numerous pseudoaneurysms within the left kidney that were not present on the initial digital subtraction angiography. The presence of pseudoaneurysm within the right kidney is likely due to the systemic inflammatory process and

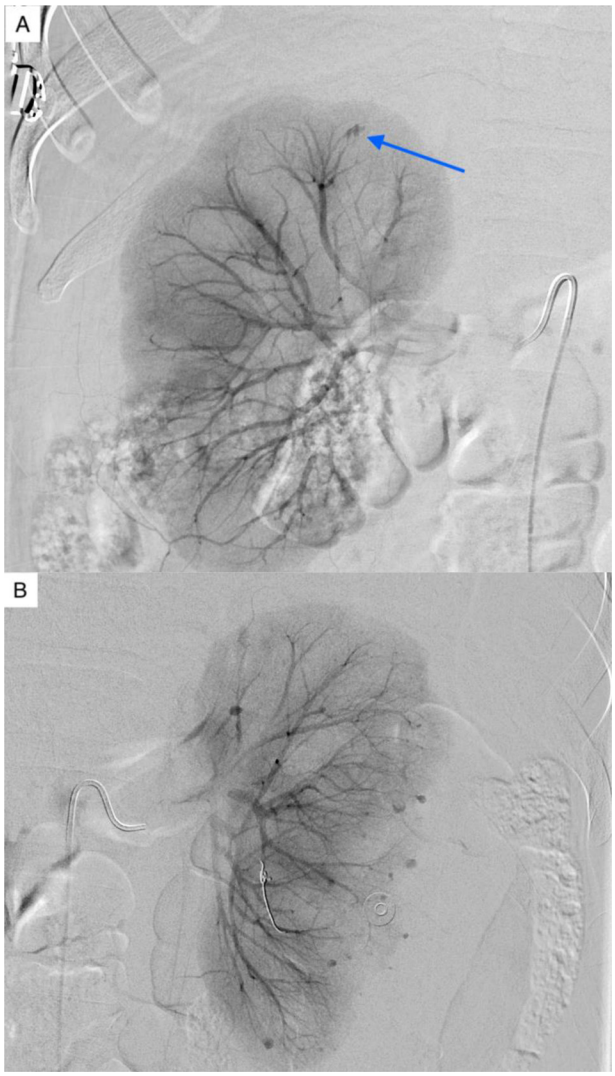

Fig. 4 – Digital subtraction angiography demonstrates pseudoaneurysm in the superior pole of the right kidney (blue arrow) and numerous pseudo aneurysms scattered throughout the left kidney.

other pseudoaneurysms would have been found if digital subtraction angiography was performed evaluating the arteries of the remainder solid organs.

Our patient was then started on high dose steroids. Hemoglobin stabilized and creatinine improved. Patient was eventually discharged.

Conclusion

Our case report demonstrates the first documented iatrogenic acute lupus vasculitis in a patient with systemic lupus erythematosus with angiographic evidence. Greater care must be taken in patients with systemic and advanced disease to prevent inciting an inflammatory process that might lead to more dire consequences.

Patient consent

Consent for publication was obtained for every individual person's data included in the study.

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