Eosinophilia and Skin Rash in a Patient with Uncontrolled Hypertension and AKI

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Case Description
A 77-year-old woman with a 50-pack year smoking history, chronic obstructive pulmonary disease, hypertension, recent transient ischemic attack (TIA), and an aortic aneurysm that required intervention presented with progressively worsening kidney function. Two months prior, the patient underwent an emergent repair of a ruptured descending thoracic aortic aneurysm. Post-operative course was complicated by difficult to control hypertension requiring five antihypertensive agents. Serum creatinine rose from 1.5 to 3.5 mg/dl. The patient reported fatigue but denied fever, rash, joint pain, or swelling. Exam was remarkable other than livedo reticularis on the plantar aspect of her feet (Figure 1). Laboratory work-up revealed new onset eosinophilia and anemia. Complement levels were normal and ANCA serologies were negative. Urinalysis showed 1+ protein but was otherwise bland. Kidney ultrasound with doppler revealed an atrophic right kidney and well perfused, normal appearing left kidney. Computed tomography angiogram of the abdomen/pelvis (Figure 2) demonstrated an endograft extending from left subclavian to the celiac artery and an atrophic right kidney. Kidney biopsy revealed a focal interstitial infiltrate consisting of lymphocytes, plasma cells, and eosinophils, and evidence of cholesterol emboli (Figure 3). The patient was started on high intensity statin and 1 mg/kg prednisone tapered over 8 weeks with improvement in serum creatinine to 1.8 mg/dl.

Discussion
Atheroembolic kidney disease, part of the multi-system syndrome of cholesterol crystal embolization, is a result of atheromatous aortic plaque rupture releasing cholesterol crystals into arcuate and interlobular artery branches and rarely glomeruli and afferent arterioles. Cholesterol crystals embolize into small arteries of up to 200 μm in diameter causing a type of microcrystalline angiitis triggering an inflammatory reaction leading to intimal hyperplasia and perivascular fibrosis, and eventually obliteration of the vascular lumen (1). Atheroembolic kidney disease is, however, a rare finding with a reported incidence of 0.3%–2.4% in autopsy studies, which may be an underestimate (2).

Male sex, age >60, cigarette smoking, diabetes, and hypertension are common risk factors. The classic triad of a precipitating factor (invasive vascular procedure), AKI and skin findings is highly suggestive of this diagnosis, although it can also occur spontaneously.

Figure 1. | Livedo reticularis is observed on the plantar aspect of the feet.

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in someone with a high aortic atherosclerotic disease burden (1–4).

Patients may present with uncontrolled hypertension and skin lesions such as livedo reticularis and blue toe syndrome. Skin lesions are the most common extra-renal manifestations with an incidence of 35%–90% followed by gastrointestinal and central nervous system manifestations including transient ischemic attacks, retinal emboli (Hollenhorst plaque), and spinal emboli (2). Laboratory findings, although nonspecific, may include elevated inflammatory markers, eosinophilia, and hypocomplementemia. Kidney biopsy establishes the diagnosis where a cholesterol crystal cleft with associated inflammatory reaction is a diagnostic feature. The cholesterol crystals dissolve during formalin fixation leaving needle shaped, biconvex clefts (1–3).

Kidney injury can take an acute (<1 week), subacute (1–6 weeks, most common), or a smoldering chronic progressive course (5). Kidney and overall prognoses are variable but historically poor with a dialysis dependence rate of 28%–60% with 20%–30% partial recovery and a 1-year mortality rate of 64%–81% in older studies (2,5). Management is limited to supportive care including BP control, withdrawal of anticoagulation, and optimizing nutrition (2,5). Statins seem to offer improved kidney and overall survival benefit through plaque stabilization (2). LDL apheresis has shown benefit in case reports and small case series (2).

Corticosteroids to treat inflammation are controversial (2).

Teaching Points

- Cholesterol crystalline embolism disease is a multisystem disorder, which causes significant morbidity and mortality.
- Atheroembolic kidney disease is an underestimated cause of CKD and ESKD.

Disclosures

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Informed consent was obtained from the patient.

Author Contributions

A. Aklilu conceptualized the study and wrote the original draft.

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**Figure 2.** CT-angiogram of the abdomen and pelvis revealed a proximally occluded right renal artery with an atrophic kidney. A complex atherosclerotic plaque of the abdominal aorta can also be seen which was present diffusely throughout the thoracic and abdominal aorta.

**Figure 3.** An artery with a cholesterol cleft (arrow) with fibrous strand, surrounding inflammatory reaction and intimal hyperplasia. Numerous eosinophils were also noted in the interstitium along with lymphocytes and plasma cells involving 10% of the interstitium with associated edema.