A Pregnant Woman With Gross Hematuria and Acute Kidney Injury

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Case Presentation

A 28-year-old woman in her third pregnancy presented at 13 weeks’ gestation with low-grade fever, progressive fatigue, asthenia, and gross hematuria of 1 week’s duration. Her medical history included coarctation of the aorta, corrected with stent implantation, and chronic sinusitis. Home medications included aspirin 100 mg daily, amlodipine 10 mg daily, and bisoprolol 5 mg daily. She had no history of kidney disease, and had a baseline serum creatinine of 0.67 mg/dL (estimated glomerular filtration rate of 104 mL/min/1.73 m²) 1 month prior. Family history was unremarkable.

Physical examination revealed hypertension (140/75 mm Hg), mucocutaneous pallor, and peripheral edema. Investigation revealed anemia and acute kidney injury (AKI) with a serum creatinine reaching 2.18 mg/dL. Relevant laboratory results are presented in Table 1; other tests, including those of liver function, were normal.

What is the differential diagnosis of AKI with macroscopic hematuria in a pregnant woman?

What additional diagnostic investigation should be performed?

What are the treatment options?

Discussion

What is the differential diagnosis of AKI with macroscopic hematuria in a pregnant woman?

For the differential diagnosis of AKI in pregnant women, we must consider disorders that occur in the general population as well as complications related to the pregnancy.

When macroscopic hematuria is associated with AKI, the main differential diagnosis is between urologic lesions with bilateral urinary tract obstruction and acute glomerular diseases, such as lupus nephritis, IgA nephropathy, and systemic vasculitis.

Pregnancy-related causes of AKI include pre-eclampsia, HELLP (hemolysis, elevated liver enzymes, low platelet count) syndrome, acute fatty liver of pregnancy, thrombotic thrombocytopenic purpura, and hemorrhagic uremic syndrome. These are less likely, since they typically occur later in the pregnancy and are usually accompanied by other signs and symptoms, like severe hypertension, hemolysis, or elevated liver enzymes.1,2 Acute renal vein thrombosis is also a possibility, although this is very rare in pregnancy.

What additional diagnostic investigation should be performed?

Table 1 outlines the patient’s initial laboratory studies. Urine examination assists in distinguishing between glomerular and nonglomerular hematuria. In this case, urinalysis revealed 10-30 erythrocytes per high-power field, 55% of which were dysmorphic (including 5% acanthocytes), proteinuria, and leukocyturia, consistent with glomerular disease.

Given these findings, serologic tests were obtained. Testing for antineutrophil cytoplasmic antibodies to proteinase 3 (PR3-ANCA) gave positive results (201 U/mL; reference range <20 U/mL). Additional investigation was unremarkable, including antiglomerular basement membrane autoantibodies, anti-myeloperoxidase ANCA, antinuclear antibodies, complement C3 and C4, serum and urine electrophoresis, and tests for HIV and hepatitis B and hepatitis C virus.

A Doppler ultrasound of revealed normal kidneys with patent renal arteries and veins.

While the diagnosis of PR3-ANCA–associated vasculitis was considered highly probable, we felt it important to confirm a diagnosis by kidney biopsy. Kidney biopsy can be performed safely by experienced operators in pregnant women with well-controlled blood pressure and normal coagulation until week 32 of gestation. Ultrasound-guided kidney biopsy was performed in the prone position, with a 16 gauge needle, 5 days after aspirin was discontinued.

Kidney biopsy showed acute tubular injury (Fig 1) and tubular hematuria (Fig 2). It also identified, among 14 glomeruli, 1 with cellular crescents (Fig 3) and 3...
with fibrinoid necrosis. Immunofluorescence studies were negative, confirming our diagnosis.

What are the treatment options?
De novo vasculitis during pregnancy is a rare condition that creates treatment dilemmas, as standard-of-care treatment is either unsafe (cyclophosphamide) or unproven (rituximab) in pregnant patients.3,4

Our patient was initially started on corticosteroids and intravenous immunoglobulin. Intravenous immunoglobulin, although not standard-of-care treatment for vasculitis, was chosen because of its lesser toxicity and proven safety in pregnancy while histological confirmation of the diagnosis was pending.5

Following histological confirmation, we started induction therapy with rituximab.6 Remission was achieved at 15 weeks’ gestation. Unfortunately, the pregnancy had to be terminated at 23 weeks’ gestation because of severe fetal intrauterine growth restriction and premature rupture of membranes. At 1 year follow-up, the patient is still in remission with normal kidney function on azathioprine maintenance therapy.3

Final Diagnosis
ANCA-associated vasculitis during early pregnancy.

References