Hematuria and Flank Pain in a Patient with Sickle Cell Trait Who Is Taking NSAIDs

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Case Description
A 43-year-old woman with history of sickle cell trait presented with right flank pain, nausea, vomiting, and gross hematuria for 1 day. She had taken 3200 mg/d of ibuprofen for a toothache for 2–3 weeks preceding symptom onset. Physical exam was significant for right costovertebral angle tenderness. Laboratory results showed hemoglobin 11.2 g/dl and serum creatinine 1.1 mg/dl. Urinalysis demonstrated red color, 3+ blood, >100 red blood cells (RBCs) per high power field (no dysmorphic RBCs or RBC casts), 11–20 white blood cells per high power field, and negative nitrite and leukocyte esterase. Computed tomography urography (Figure 1) revealed a nonobstructing left upper pole renal calculus, hyperdense material in the urinary bladder, papillary excavation around the edge of the papilla with contrast from the collecting system extending into the excavation in the right kidney, mild hydroureteronephrosis (Figure 1A), and small collections of contrast material in the papillary regions peripheral to the calyces in the left kidney (Figure 1B). Cystoscopy and ureteroscopy did not reveal a cause of the hematuria, and a ureteral stent was placed. The patient was treated with intravenous (IV) fluids and urine alkalinization without improvement for 5 days. She was then given oral aminocaproic acid, with gradual resolution of her symptoms, and the ureteral stent was removed.

Our patient was diagnosed with bilateral renal papillary necrosis (RPN) on the basis of the clinical presentation and radiographic findings. Mild hydroureteronephrosis was considered to be secondary to an obstruction (sloughed papilla or blood clots). The renal medulla and papillae are susceptible to ischemic damage due to the hypertonic and relatively hypoxic environment of the renal medulla (1). Any condition associated with ischemia, e.g., sickle cell trait or disease, analgesic abuse, urinary tract obstruction, and vasculitis, can aggravate this medullary environment and lead to stasis, thrombosis, and infarction. RPN is seen in as many as 50% of patients with sickle cell trait. It may be complicated by fever, hypertension, and infection in more severe cases. RPN is often considered a diagnosis of exclusion. However, it may be

Figure 1. | Computed tomography urography shows signs of renal papillary necrosis. (A) Computed tomography urogram reveals papillary excavation around the edge of the papilla with contrast from the collecting system extending into the excavation in the right kidney (lobster-claw sign, long arrow) and hydroureteronephrosis (short arrow). (B) Computed tomography urogram demonstrates small collections of contrast material in the papillary regions peripheral to the calyces in the left kidney (ball-on-tee sign, short arrow).
detected by imaging, as was the case with our patient. Management is dependent on the severity of hematuria and includes IV hydration and alkalinization of the urine, and exchange blood transfusions when occurring with sickle cell disease (2). The use of desmopressin, aminocaproic acid, and embolization or balloon tamponade have been described in case reports but have not been formally studied (3–5).

**Teaching Points**

- RPN should be suspected in any patient presenting with hematuria and flank pain, especially those with risk factors for ischemic necrosis.
- RPN is generally a diagnosis of exclusion but can be made on the basis of imaging findings on computed tomography scans of the abdomen and pelvis.
- Treatment of RPN is usually with IV hydration and alkalinization of the urine, but desmopressin, aminocaproic acid, and embolization or balloon tamponade have been reported to be useful in case reports.

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**Author Contributions**

J.B. Buck, T.D. Homan, and K.N. Miyata were responsible for formal analysis; J.B. Buck and K.N. Miyata were responsible for validation and reviewed and edited the manuscript; T.D. Homan wrote the original draft and was responsible for project administration; T.D. Homan and K.N. Miyata conceptualized the study; K.N. Miyata provided supervision and was responsible for data curation and visualization; and all authors approved the final version for publication.

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