RESIDENT'S CORNER

Life-threatening gross hematuria: case report of renal artery aneurysm

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Renal artery aneurysms can present with gross hematuria and are potentially life-threatening in cases of rupture. We report a case of a young male with no prior genitourinary history who presents to an emergency department with sudden onset gross hematuria, clot retention, and right-

Introduction

Gross hematuria accounts for 4%-20% of inpatient urology consults and hospitalizations.¹ The differential diagnosis is expansive, including, but not limited to, genitourinary tract infection or trauma, glomerulonephritis, nephrolithiasis, iatrogenic (e.g., traumatic urethral catheter placement), and primary urinary tract malignancies (i.e., renal or transitional cell carcinoma). More uncommon reasons for gross hematuria include renal vascular pathology and renal artery aneurysms (RAA).

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Address correspondence to Dr. Kelly R. Pekala, Department of Urology, 3471 Fifth Avenue, Suite 700, Pittsburgh, PA 15213 USA sided flank pain. On evaluation, he was found to have a renal artery aneurysm bleeding into his collecting system and underwent renal artery embolization and rapid resolution of his hematuria. Renal vascular pathology should be considered in the differential diagnosis and timely diagnosis of this condition is imperative as surgical interventions have proven to be life-saving.

Key Words: gross hematuria, renal artery aneurysm

A true aneurysm is a weakening in the arterial wall in which all layers of the arterial wall balloon out, whereas a pseudoaneurysms does not involve all layers of the arterial wall.² Historical incidence rates of RAA were reported at 1%-10%, however these were primarily diagnosed at autopsy.^{2,3} More recent literature has demonstrated an overall incidence range between 0.01%-1% within the general population, although some have reported incidence rates as high as 9.7%.^{2,3,5} Studies have also shown an increased incidence among patients with hypertension (2.5%) and those with refractory hypertension (39%).⁴

RAAs are typically silent without overt symptoms for many years until life-threatening rupture. Patients present with hypertension (15%-55%), abdominal and/or flank pain (50%), gross hematuria (30%), and abdominal bruit (10%).⁴ Patients are typically diagnosed around age 60, with a male predominance. RAAs occur more frequently in the right kidney than the left.² Patients presenting with a ruptured RAA are at significant risk of morbidity and have reported mortality rates of up to 80% in historical series but around 10% in modern day series with the use of computed tomography (CT) imaging allowing for rapid diagnosis and minimally invasive endovascular interventions. Indications for intervention include symptomatic aneurysms (i.e. pain, hematuria, or medically refractory hypertension), size > 2 cm, female gender of childbearing age, dissection, and rupture.⁵ Treatment options comprise of surgical reconstruction or endovascular interventions (i.e. transcatheter embolization and stent grafting).

Given the possible lethality of this condition, we present a case of a patient who presented with gross hematuria and was discharged home after a negative work up and resolutions of symptoms. He returned to the hospital with recurrence of gross hematuria and was diagnosed with a RAA that later ruptured causing life-threatening hemorrhage into the intrapelvic space.

Case report

A 31-year-old male with heroin addiction presents to the local emergency room from his rehabilitation facility with sudden onset gross hematuria and rightsided flank pain. He denies previous history of gross hematuria, kidney stones, or urinary tract infection. He denies any trauma or recent surgeries. He was afebrile, hemodynamically stable. CT abdomen/pelvis noncontrasted imaging demonstrated normal-appearing kidneys, hyperdense material within right collecting system and right ureter, large amount of hyperdense material within bladder consistent with neoplasm versus blood clot, Figure 1. He was clot irrigated at bedside and placed on continuous bladder irrigation (CBI). Hematuria resolved and he was successfully weaned from bladder irrigation, passed a void trial and was discharged to home 3 days later. Throughout this 3 day hospitalization, his hemoglobin, which started at 14.8 g/dL and trended down to 9.3 g/dL.

Two days later, he presented to the emergency room with return of gross hematuria and was found to be in clot retention. He was afebrile and hemodynamically stable. At this point, he was taken to the operating room for cystoscopy, clot evacuation, and diagnostic ureteroscopy with findings of organized clot and a long thin clot extruding from the right ureter without signs of active bleeding. Patient was continued on CBI and intravenous antibiotics for possible urinary tract infection. Diagnostic work up included a urine culture ultimately grew coagulase negative staphylococcus and a CT angiogram obtained postoperatively that



Figure 1. Non-contrast CT abdomen/pelvis demonstrates hyperdense material within collecting system of the right kidney and ureter indicating hemorrhage. There is a large mass effect within the bladder which may represent a urinary bladder neoplasm with or associated with large blood clot.

demonstrated a 5 mm x 7 mm right intrarenal aneurysm, Figure 2. Patient was subsequently transferred to a tertiary medical center for elective coiling of aneurysm.



Figure 2. CT angiogram on arterial phase demonstrates a 5 mm x 7 mm hyperdense contrast enhancing focus within the anterior lower pole right cortex immediately adjacent to a small caliber feeding artery that is consistent with aneurysm.



Figure 3. Diagnostic angiography reveals right lower pole branch aneurysm of the renal artery that was actively bleeding and embolized using 3 mm microcoils with complete thrombosis of the aneurysm but patent right renal artery.

On the morning of patient's planned procedure, he was found to have clotted off his continuous bladder irrigation with gross blood in his catheter. He was diaphoretic, tachycardic, hypotensive, and in extremis. He was emergently taken by Vascular Surgery to the operating room for angiogram and embolization of bleeding right lower pole renal aneurysm with Urology available for possible trauma nephrectomy, Figure 3. Labs revealed a hemoglobin of 5.4 g/dL at the time of emergent intervention. He received five units of packed red blood cells during his resuscitation. After embolization, his hemodynamics improved and his hematuria resolved. Over the next 4 days, he was weaned off of continuous bladder irrigation and passed a void trial with plans for follow up with a diagnostic ureteroscopy as an outpatient. CT angiogram of brain to complete aneurysm workup was negative for berry aneurysm. He had resolution of his symptoms and no further episodes of hematuria at his 3 month follow up visit.

Discussion

RAAs are the second most common visceral artery aneurysm (15%-22%) after splenic artery aneurysms (60%-80%).² RAAs have increasing rates of diagnosis due to the increased availability and utilization of CTA and angiography in the diagnostic workup for refractory hypertension.⁶ Predisposing factors for RAAs include arteriosclerosis, renal congenital malformations, fibromuscular dysplasia, renal angiomyolipoma, pregnancy, and trauma.⁴

Most RAAs are clinically silent until rupture. Rupture of the aneurysm leads to accumulation of blood in either the retroperitoneal, intraperitoneal, intrarenal, or intrapelvic space. Patients are likely to present with flank pain, hematuria, and shock. Clot retention has also been reported in several case reports as a common presentation.⁶ Ruptures that are unable to achieve tamponade are more likely to be lethal and have increased mortality rates.

Renal vascular pathology is a rare cause of hematuria, and is thus not considered in an initial work up. According to the 2016 American Urological Association guidelines, evaluation of patients with hematuria should include a careful history, physical exam, and laboratory examination to rule out benign causes such as infection, medical renal disease, trauma, nephrolithiasis, or recent urological procedure.⁷ Cystoscopy may be warranted if this work up is unrevealing. Angiography or CT angiogram based on index of suspicion would be the next step diagnostically to localize small vascular malformations if cystoscopy was negative.⁸

Retrospective reviews have shown marked success with RAA repair. A retrospective review found a 0% mortality rate among 121 patients who underwent RAA surgical repair, with eight patients (7%) requiring emergent nephrectomies.⁹ Other studies report primary success rates as high as 97% with 17% morbidity and 1% mortality rates with an open repair approach.¹⁰ Given that RAA has the potential to be lethal in the case of rupture yet the repair of RAA is very effective, practicing urologists should maintain a high index of suspicion when presented with a patient with severe gross hematuria without a genitourinary history or a clear etiology of hematuria. Appropriate diagnostic work up with angiography or CT angiogram and prompt surgical intervention can be life-saving.

Conclusion

We report a case of a young male who presents with gross hematuria secondary to a bleeding lower pole RAA. Although rare, RAAs have been associated with increased morbidity and mortality. It is imperative that RAAs and other renal vascular pathology are in the differential diagnosis when patients present with severe gross hematuria and more common causes have been excluded. Timely and accurate diagnosis allows for surgical repair or endovascular intervention and is associated with high primary success rates.

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