CLINICAL VIGNETTE

Spontaneous Renal Hemorrhage Secondary to Pyelonephritis

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A 76-year-old female with history of nephrolithiasis and diabetes mellitus presented to an outside hospital with right flank pain. She reported 2 weeks of worsening symptoms without recent trauma or use of anticoagulants, anti-platelet agents, or NSAIDs. Urine analysis (UA) showed pyuria and urine culture grew *Escherichia coli*. She was treated with ceftriaxone and left against medical advice and presented to our institution for further management.

CT angiogram of the abdomen and pelvis revealed a 10 cm subcapsular hematoma without active bleeding or extravasation. There was peripheral enhancement of the hematoma with fat stranding. The differential included superimposed infection or inflammation from the hematoma itself. Several nonobstructive renal calculi were also noted, and no renal masses were identified. Complete blood count revealed mild leukocytosis of 10.06 $x10^3$/uL and hemoglobin of 10.1 g/dL with normal previous baseline. Creatinine was 0.88 mg/dL, unchanged from baseline. Repeat UA revealed persistent but improved pyuria (when compared to prior UA) and repeat culture on antibiotics showed no growth.

She was admitted and Urology was consulted. She was managed conservatively with close monitoring of blood counts and renal function, which remained stable. She completed a course of inpatient antibiotics and was discharged with repeat CT imaging scheduled in 3 months.

Discussion

Spontaneous renal hemorrhage (SRH) is defined as bleeding into the perirenal space without any preceding trauma or medical intervention.[1] Also known as Wunderlich syndrome, SRH is rare.[2] Most cases of SRH are caused by underlying neoplasms, followed by vasculitis and vascular abnormalities (such as arteriovenous malformations). The incidences of etiologies vary by study.[1,3] Infections are thought to account for less than ten percent of SRH cases.[4] This patient highlights diagnostic and therapeutic challenges associated with SRH.

The underlying pathophysiology of hemorrhage with acute infections is unclear. It is hypothesized that inflammation related to the infection leads to weakening and destruction of the renal parenchyma, which predisposes it to rupture. Weakening, combined with increased renal blood flow during infection, may lead to hemorrhage into the perinephric space.[2] Atherosclerosis of small blood vessels may be an underlying risk factor for this syndrome, and conditions that predispose to atherosclerosis, such as this patient's diabetes, are identified as general risk factors for SRH.[5] This patient's imaging supported the diagnosis, demonstrating a fluid collection consistent with hematoma around the kidney, as well as changes consistent with of pyelonephritis. Urine cultures documented the infection and the hypothesis that the additional imaging findings were secondary to infection and not solely due to the hematoma itself.

The presentation of SRH can be nonspecific and overlap significantly with pyelonephritis symptoms, complicating timely diagnosis. Flank pain is the most common symptom, followed by hematuria and signs of shock.[6] Additional symptoms include nausea, vomiting, and fever, which are not specific for SRH (4). More specific indicators for acute hemorrhage, such as drop in hemoglobin, support the diagnosis of SRH in the setting of acute infection, as with this patient.[5]

Diagnosis of SRH requires a high index of suspicion. CT imaging is the modality of choice for detecting perinephric hematomas and provide detailed information on the size, extent, and possible etiology of the hematoma.[2] CT angiogram is the preferred imaging modality to assess for and localize active bleeding, which may be managed with selective embolization.[4] However, multiphase CT with renal mass protocol is more sensitive at detecting underlying causes of SRH, such as renal masses.[2] Large hematomas may obscure the underlying cause of hemorrhage. In a case series of 78 patients by Mao et al (2017), only 3 of 9 cases of SRH caused by renal cell carcinoma and only 1 of 6 cases of SRH caused by angiomyolipomas were not detected at the time of presentation, though were later captured on follow-up imaging once the hematomas improved. Therefore, follow-up imaging should be considered after clinical improvement as was recommended in this case.

The optimal management of SRH is unclear. Given the high prevalence of renal tumors as the cause of SRH, nephrectomy was previously thought to be the preferred treatment. However, more recently, embolization and conservative management with clinical observation are gaining popularity.[4] In severe cases complicated by large hematomas or persistent hemorrhage, embolization or surgical intervention may be necessary. One case series, by Ahn et al (2017), reported that 27.9% of patients who received embolization and 43.3% of patients who were managed conservatively required further interventions, including nephrectomy. Conservative management with anti-

biotics may be most appropriate for SRH cases arising from infection, particularly if active hemorrhage is not identified.[5] However, this may be complicated by perinephric abscess requiring individualized decision for drainage.[7] Blood counts, renal function, and urine output should be monitored closely with conservative management. This patient responded well to conservative management with antibiotics and close observation without evidence of ongoing hemorrhage or uncontrolled infection.

This patient illustrates the importance of considering SRH in patients with pyelonephritis presenting with atypical or severe pain, especially with poor response to antibiotics. Early imaging and a multidisciplinary approach are helpful for optimal outcomes. As the incidence of SRH is rare, further studies are needed to improve understanding and management for this unusual complication of pyelonephritis.

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