Intrarenal pseudoaneurysm presenting with microscopic hematuria and right flank pain

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We report a case of a 19-year-old female who presented with right flank pain and microscopic hematuria. Three years earlier, she sustained a stab wound to the right flank and was managed conservatively. After being diagnosed with an enhancing renal mass using computed tomography (CT) scan, duplex ultrasound and angiography were performed revealing an intrarenal pseudoaneurysm. Endovascular coils were successfully employed to selectively embolize the pseudoaneurysm.

Key Words: pseudoaneurysm, renal trauma, renal artery

Introduction

Intrarenal pseudoaneurysms (IRP) are most frequently related to prior traumatic or iatrogenic penetrating injuries. The true incidence of IRP after penetrating injury is unknown, as some cases remain clinically silent. Delay in diagnosis of an IRP may be potentially life threatening, and thus warrants a high index of suspicion for immediate diagnosis.

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Case report

A 19-year-old African American female presented to the emergency room after sudden onset of severe right flank pain. Three years prior to this presentation, the patient had been stabbed in the right flank with a 4-inch kitchen knife. She had been admitted to the hospital for successful conservative management and was subsequently lost to follow-up. At current presentation, she was afebrile, normotensive, and hemodynamically stable. Physical exam revealed only mild right abdominal tenderness. Urine analysis was significant for 12 red blood cells per high-powered field. Other laboratory values, including serum creatinine 0.9 mg/dl (0.8-1.5) and hematocrit 41.0% (41-53), were within normal limits. CT scan examination of

Figure 1. Contrast enhanced CT scan. White arrow demonstrates 3 cm "solid"enhancing right intrarenal mass.

the abdomen and pelvis revealed a 3.0 cm "solid" enhancing right renal mass. Figure 1. Given the prior renal traumatic history, color flow duplex ultrasonography was performed, revealing the presence of a pseudoaneurysm within the right kidney. Figure 2. She underwent renal arteriography and selective embolization of the IRP. Figures 3a and 3b. The patient was discharged home in stable condition 1 day status post embolization. Unfortunately, follow-up is not available as she did not return for reassessment.

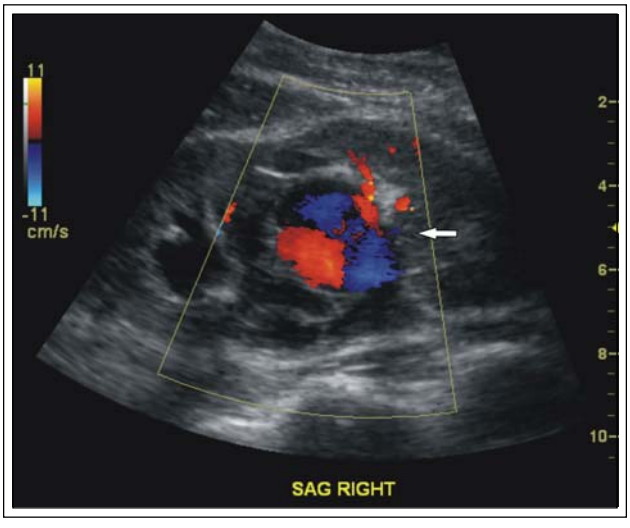

Figure 2. Right renal duplex ultrasonography. White arrow demonstrates characteristic appearance of swirling blood.

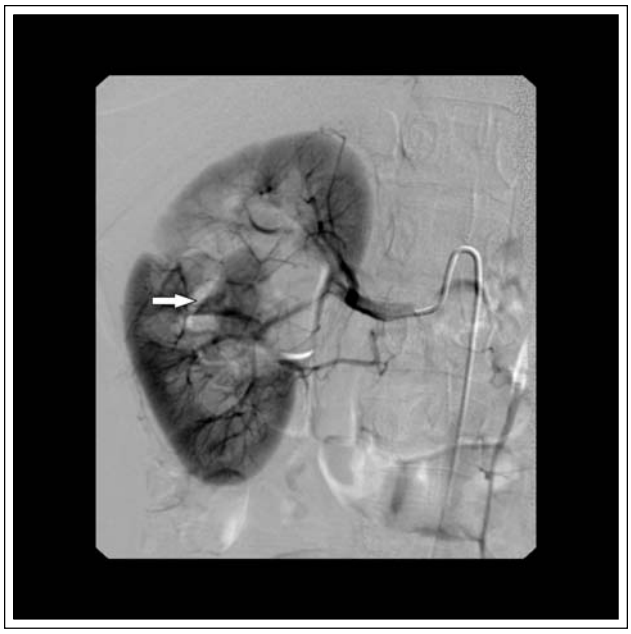

Figure 3a. Right renal arteriography prior to embolization. White arrow demonstrates extravasation of contrast into the pseudoaneurysm from a mid-pole third branch of the renal artery.

Figure 3b. Right renal angiography post embolization. Four coils were used to embolize the feeding artery of the pseudoaneurysm. Note that approximately 30% of the nephrogram is missing, consistent with successful embolization.

Discussion

IRP are defined as the flow of high-pressure arterial blood into adjacent renal parenchymal tissue. These false aneurysms result from incomplete ruptures of the intrarenal, segmental, or renal artery branches that are contained by the adventitia within the renal parenchyma, eventually leading to encapsulation and pseudoaneurysm formation.

Published literature regarding IRP formation is scant, with current literature based on single case reports or anecdotal evidence. IRP may be caused by a penetrating (stab or gunshot wound) or less commonly a blunt traumatic event (deceleration injury after a major fall or motor vehicle crash); however, most reports describe iatrogenic injuries as the causative factor.[1-4,] Authors have stated that up to 60% of renal vascular injuries are caused by iatrogenic trauma.[5-6] Some iatrogenic etiologies include: percutaneous nephrolithotomy (PCNL), nephrostomy tube placement, and percutaneous renal biopsy; however, renal transplantation, ureteroscopy, and nephron sparing surgery have been implicated as well.

Although PCNL is a well-established treatment of large and complex renal stones, it is not without its potential complications, including severe bleeding. Venous and parenchymal bleeding are often managed conservatively, whereas arterial bleeding usually warrants endovascular intervention. Several publications have reported a 1% rate of severe bleeding requiring embolization after PCNL.[7-10] The meantime to onset of hemorrhage in these patients was 8 days. The most common etiologies were pseudoaneurysm formation followed by arterial venous malformation. Most were successfully treated with selective embolization; one patient required partial nephrectomy for persistent bleeding.

Associated with high success rates and low morbidity, percutaneous nephrostomy tube placement and percutaneous renal biopsy have rarely been attributed to IRP formation.[11-12] Most reported cases of IRP following these procedures were treated successfully with selective embolization. Pseudoaneurysm formation after kidney transplantation is estimated to occur in 1% of cases. Typically due to anastomotic defects, most reported cases occur early after transplantation. However, some cases have a late presentation and may occur up to 6 years post renal transplantation. The majority of cases required open surgical repair or allograft removal.[13-15]

IRP formation after ureteroscopy has rarely been reported. Electrohydraulic lithotripsy during flexible ureteroscopy has been reported in two cases.[16-17] Both patients presented with gross hematuria approximately 3 weeks after the initial stone intervention, and both were diagnosed and treated with angiography and embolization. Two additional cases describe IRP formation after ureteroscopy with endoscopic fulguration for upper tract urothelial carcinoma and ureteroscopy with retrograde endopyelotomy.[18-19]

IRP formation after open (0.5%) and laparoscopic partial nephrectomy (1.7%) has been reported.[20-22] The majority of cases presented with flank pain, hematuria, and/or dizziness 2 weeks post-operatively and were managed successfully with embolization. One case was detected incidentally on a 3-month follow-up CT scan and reportedly resolved spontaneously.[23]

Patients with IRP may present with abdominal tenderness, gross hematuria, and or shock. Our patient presented with typical acute onset flank pain, but without gross hematuria. CT scanning in the emergency department led to the diagnosis of an enhancing renal mass. Given her prior traumatic history, further work up of the CT scan findings were carried out given the high index of suspicion for a potentially life-threatening condition.

This case underscores the importance of obtaining a complete patient history and physical exam in order to achieve the correct diagnosis. Ultrasonography is strongly recommended when renal parenchymal and vascular injuries are suspected. For the hemodynamically stable patient, angiography remains the gold standard for diagnosing IRP. Angiography in the form of transcatheter embolization plays an important role as a both a diagnostic tool and a therapeutic intervention. Furthermore, emobolization is the procedure of choice given its nephron sparing/minimally invasive nature.[10] In the unstable patient, surgical exploration and nephrectomy may be warranted. □

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