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Case report

Gross hematuria due to renal arteriovenous malformation successfully treated with embolization in an elderly patient

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ABSTRACT

Renal arteriovenous malformation is a rare anomaly of the urinary system. We report an elderly patient aged 60 years who presented with gross hematuria due to left renal arteriovenous malformation. This case highlights the importance of careful diagnostic work-up in the evaluation of gross hematuria and emergency treatment with transcatheter arteriographically directed embolization.

1. Introduction

The term renal arteriovenous malformation (AVM) is usually reserved for congenital abnormal communications between the intrarenal arterial and venous systems. They are rare lesions which may be acquired or congenital. Most AVMs (about 70%) are acquired and usually result from trauma, inflammation or percutaneous procedures involving the kidney, like kidney biopsy.[1] Hematuria is the major and most common symptom; other clinical manifestations, such as hypertension, left ventricular hypertrophy, cardiac failure, and abdominal pain are also usually associated with AVM.[2] There are only a few case studies in the literature describing the outcome of AVMs with percutaneous embolization. Today, this mode of treatment has some significance because it provides maximal preservation of functioning renal parenchyma, and the eradication of symptoms and hemodynamic effects. We report a case of a renal AVM in a 60-year-old female who presented with severe hematuria, which was successfully treated with transcatheter arteriographically directed embolization.

2. Case report

A 60-year-old woman from rural Maharashtra was admitted to the medicine department of our hospital with left flank pain and frank hematuria. There was no history of abdominal trauma, hypertension, or stones in the kidneys, ureters, or bladder. The patient denied any recent medical intervention in which a percutaneous procedure was performed. The patient also had no history of bleeding disorders and was not taking any medication. Her physical examination results were normal, and there was no abdominal bruit on auscultation. The patient's blood pressure was normal at 110/70 mmHg, and her heart rate was 110 beats/minute.

Her hemoglobin was 9.8 mg% and the total leukocyte count was 8400/mm.[3] Her blood sugar, kidney function, and liver function were within normal limits. Coagulation parameters were also normal. Urine examination revealed plenty of red blood cells, without evidence of leukocytes and albumin. Abdominal ultrasonography revealed a small left kidney (5.3 cm by 3.1 cm) with normal size right kidney without any parenchymal or collecting system abnormalities. There was no evidence of bladder stones. As the hematuria was persistent, angiography was performed using a right transfemoral approach. The right renal artery showed normal course and caliber with no evidence of AVM, fistula or aneurysm. Selective left renal artery angiography was performed using a right transfemoral approach which revealed a fistula in relation to the mid-pole of the left kidney (Fig. 1). Digital subtraction arteriography (DSA) demonstrated the feeding artery to the AVM. The size of the AVM at the nidus was 7 mm by 5 mm. Selective catheterization was performed using microcatheter and microguide wire using glue (*n*-butyl cynoacrylate) which was diluted with lipoidal (at a concentration of 70%) and injected through a microcatheter. No complications occurred during or after the

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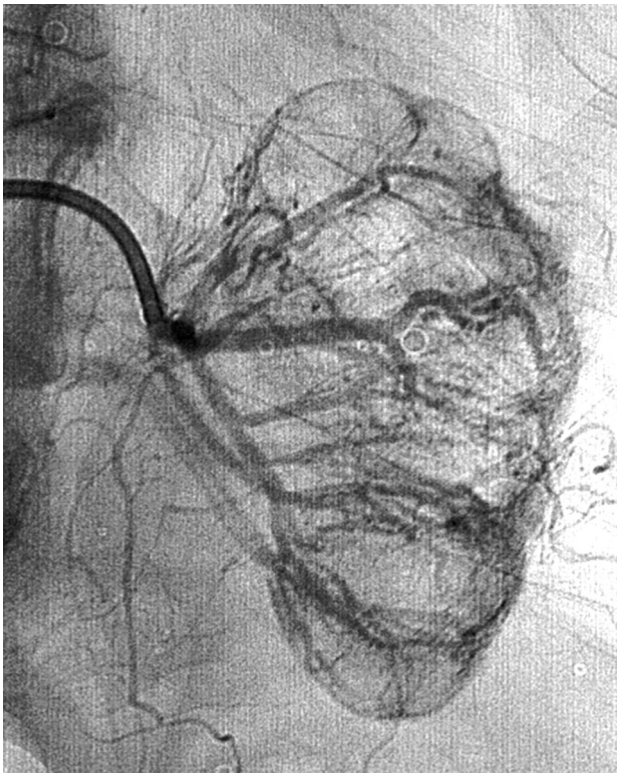

Fig. 1. Angiography showing arteriovenous malformation in relation to the mid-pole of the left kidney.

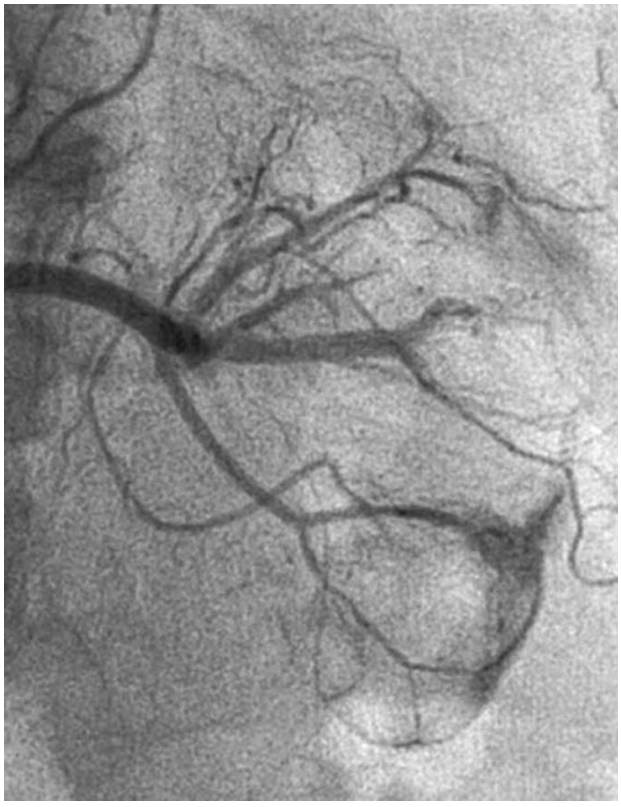

Fig. 2. Postprocedure angiography showing complete stoppage of arteriovenous malformation.

procedure. At the end of the procedure, complete excision of the AVM was detected using DSA (Fig. 2). Computerized tomography of the abdomen after embolization revealed a cast of glue in the mid-pole of the left renal artery (Fig. 3). The early postinterventional period was uneventful. Her hematuria stopped and she was doing well during the 8 weeks of follow up.

3. Discussion

AVMs are relatively uncommon lesions with considerable clinical impact, such as hematuria, hypertension, left ventricular hypertrophy, cardiac failure, and abdominal pain. An AVM can be congenital, acquired, or idiopathic. AVMs are due to a congenital condition in 20% to 30% of cases. They are usually located on the kidney's upper pole (45%), while remaining cases are evenly split between the mid-point or the lower pole of the kidney.[3] This case involved an AVM in relation to the mid-pole of the left kidney. The left kidney is more frequently involved, and women are affected twice as often as men between the ages of 30 and 40 years. In this case, the patient was a 60-year-old female.

Congenital AVM is characterized by multiple communications between the main or segmental renal arteries and veins and is characterized by a single vastly dilated artery directly feeding one or more veins. Arteriovenous fistulas with the radiological appearance of an acquired fistula but without an identifiable cause are classified as idiopathic or cavernous AVMs. Acquired fistulas are usually caused by iatrogenic injuries such as those occurring after renal needle biopsy, often in kidney transplant patients, and sometimes due to postoperative complications after nephrostomy or nephrectomy, particularly in cases of intraoperative injuries of the renal pedicle. Malignant tumors of the kidney and metastases can cause fistulas as a result of vein erosion. Other possible causes are penetrating or blunt abdominal trauma, fibromuscular dysplasia, and aneurysm of the renal artery.

Congenital renal arteriovenous fistulas are the most uncommon form, but their incidence may be underestimated because patients are usually asymptomatic. There are two types of congenital AVMs: (1) crisoid, a malformed lesion characterized by multiple varix-like

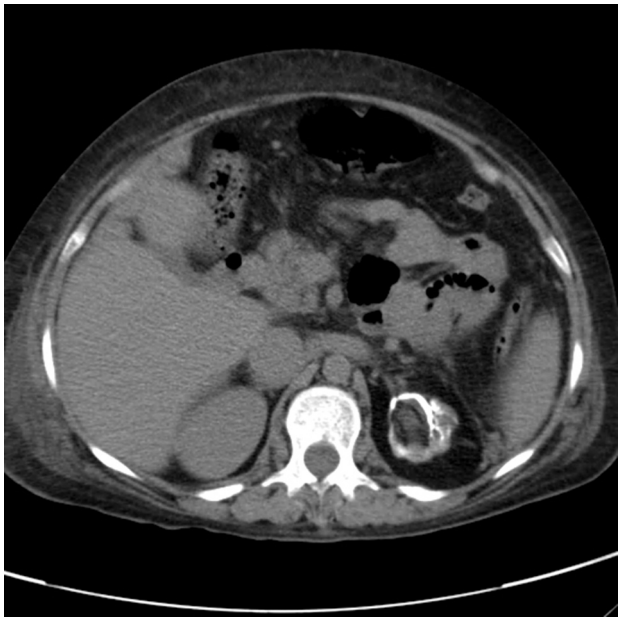

Fig. 3. Postprocedure computed tomography scan of the abdomen showing a cast of glue in the mid-pole of the left renal artery.

vascular communications and a major incidence of gross hematuria; and (2) aneurysmal, which typically occurs in elderly patients when a pre-existing arterial aneurysm erodes into an adjacent vein.[4] This kind of malformation has been treated to date with surgical therapy, such as nephrectomy, but endovascular approaches to treating AVMs are now increasingly performed.[3]

In this case, the AVM was treated by performing endovascular embolization to stop the bleeding and preserve renal parenchymal function because the affected kidney was already small in size. It is truly important to preserve renal function in patients who have just one functioning kidney or renal insufficiency. Recently, endovascular techniques have also been used to treat giant aneurysms with arteriovenous fistulas. For small renal AVMs, macroparticles or methyl cyanoacrylate glue should be used; for larger ones, however, coils or detachable balloons are preferable. The benefits of percutaneous treatment are avoidance of nephrectomy, reduction of peri-operative risk and postoperative morbidity, reduced surgical time and hospital stay, and decreased incidence of renal ischemia.[5] Complications may occur after embolotherapy, but they are very mild. Causes of this complication may include reflux of obliterating agents into proximal vessels, resulting in loss of normal renal parenchyma and pulmonary embolism from migration of the agent. A post-embolization syndrome may occur, characterized by pain in the embolized area, nausea, vomiting and fever lasting up to 5 days. However, selective embolization of renal AVMs allows the preservation of the renal parenchyma and also minimal post-embolization syndrome.[4]

To conclude, AVMs are uncommon but may give rise to massive and persistent hematuria, so computerized tomography scans, angiography, and DSA are the most important tools for making the diagnosis in an urgent setting. The therapeutic options must be selected in emergencies depending on the general condition of the patient and their symptoms. The only therapy considered in the past was total nephrectomy, but embolization by selective catheterization can be considered safe and effective. However, many studies need to be done to confirm the role of embolization.

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