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Imaging Teaching Case

Renal Artery Aneurysm Mimicking Renal Calculus With Hydronephrosis

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A 51-year-old woman was found to have a left renal calculus with hydronephrosis. She underwent unsuccessful extracorporeal shock wave lithotripsy, leading to the recommendation that percutaneous lithotomy was necessary to remove the renal calculus. In view of the unusual shape of the calculus and absence of abnormalities in urine sediment, preoperative computed tomography and renal angiography were performed, which instead showed a calcified left renal artery aneurysm. Subsequent efforts to perform an aneurysmectomy also failed, eventually necessitating left nephrectomy. This case illustrates the pitfalls in the diagnosis of a renal artery aneurysm, which is a relatively common condition that may have unusual presentations. Hence, it is suggested that the possibility of a renal artery aneurysm be considered in the differential diagnosis when one detects a renal calculus with an unusual appearance. In addition, we propose that 3-dimensional reconstruction computed tomography be performed before considering surgical options for such renal calculi to rule out the possibility of a renal artery aneurysm.
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INDEX WORDS: Renal calculus; hydronephrosis; renal artery aneurysm; 3-dimensional reconstruction.

INTRODUCTION

A renal artery aneurysm is a segment of a renal artery that has dilated more than 2 times the diameter of a normal renal artery. It can have a variety of causes, including degeneration (arteriosclerosis and fibrodysplasia), inflammation (by formation of arteritis), trauma, or iatrogenic damage to the vascular wall.[1-3] The incidence of renal artery aneurysms is 0.01%-0.3%.[4,5] Renal artery aneurysms usually are silent, but occasionally can present with clinical symptoms following rupture of the aneurysm, including hypertension, abdominal pain, hematuria, and renal artery thrombosis represented by a renal pseudoaneurysm.[6,7] We report a patient with a left renal artery aneurysm whose presentation mimicked a renal calculus with hydronephrosis.

CASE REPORT

Clinical History and Initial Laboratory Data

A 51-year-old woman underwent abdominal ultrasonographic examination that showed a 25-mm spherical hyperechoic focus in the left renal pelvis with hydronephrosis, prompting a diagnosis of renal calculus. Based on this diagnosis, extracorporeal shock wave lithotripsy was performed at the local hospital. Follow-up 2 weeks later showed that the shape and size of the hyperechoic focus did not change on a repeated ultrasonographic examination.

Due to left lumbago and the persistent left hyperechoic focus in the renal area, the patient was referred to our hospital for further evaluation and treatment. The patient had a medical history of significant hypertension (blood pressure, 155/85 mm Hg), for which she took amlodipine besylate, 5 mg, daily and irbesartan, 150 mg, daily. Physical examination revealed neither a palpable tender mass nor an audible abdominal bruit. The patient's serum creatinine concentration was 0.86 mg/dL, and estimated glomerular filtration rate was 91.2 mL/min/1.73 m^2 using the 4-variable MDRD (Modification of Diet in Renal Disease) Study equation.[8] Other laboratory data, including plasma renin activity and urinalysis, were normal. Because of the unusual shape of the calculus and absence of abnormalities in urine sediment for a large stone in the collecting system, further evaluation was recommended before proceeding to percutaneous lithotomy.

Imaging Studies

To determine the true nature of the hyperechoic lesion, an ultrasound and intravenous pyelogram were obtained. Results showed a hyperechoic focus in the left renal pelvis with hydronephrosis, which suggested left hydronephrosis due to compression of the pyeloureteral junction by a 25-mm calcified mass (Fig 1 and Fig 2A and B). Computed tomography (CT) indicated an annular calcified space-occupying lesion in the left renal hilum (Fig 3), which was confirmed as a calcified renal artery aneurysm by angiography (Fig 4A and B). CT showed a mass with a calcified rim in the noncontrast scan (Fig 3A) and partial filling of the mass in the contrast-enhanced scan (Fig 3B), highlighting the vascular nature of the mass. The coronal image and 3-dimensional (3D) reconstruction clearly showed the aneurysm, situated at the first bifurcation of the left renal artery, and showed the involvement of the posterior segmental artery (Fig 3C and D).

Diagnosis

An intrarenal calcified renal artery aneurysm can mimic a renal calculus and hydronephrosis on conventional ultrasonography and intravenous pyelography. CT and subsequent angiography disclosed that a calcified aneurysm of the left renal artery caused the

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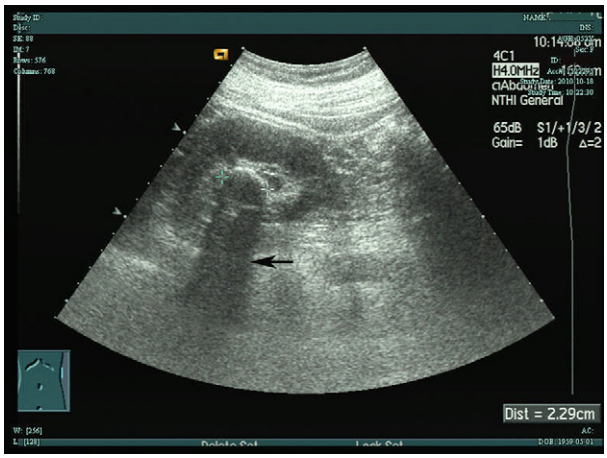

Figure 1. Duplex ultrasonographic examination shows a hyperechoic focus in the left renal pelvis with acoustic shadow (arrow).

imaging findings, thus creating a potentially dangerous clinical pitfall.

Clinical Follow-up

Surgical therapy was recommended as a result of the size of the aneurysm, hypertension, left lumbago, hydronephrosis, extracorporeal shock wave lithotripsy failure, and the patient's preference. An aneurysmectomy failed due to hemorrhage, which eventually led to a left nephrectomy. The mass consisted of a thickened renal artery wall and a red-brown parietal nodule that contained dark brown fluid. Pathologic examination showed elastic fibers within the atherosclerosis wall. The nodule was identified as a thrombus and calcification with revascularization, confirming the diagnosis of renal artery aneurysm. The patient's postoperative recovery was uneventful. After an 18-month follow-up, blood pressure and serum creatinine level were normal.

DISCUSSION

Renal artery aneurysms often are asymptomatic. Both physical examination and laboratory tests may be inconclusive. Renal artery aneurysms are associated strongly with hypertension, renal artery stenosis, and kidney failure.[9] Renal artery aneurysms are being seen with increasing frequency during the past decade, which could be attributed in part to angiography and other imaging modalities becoming more commonly used.

Ultrasonographic findings generally are nonspecific and may miss a diagnosis of renal artery aneurysm. In rare instances, the calcified vessel walls of the renal arterial branches coursing through the sinus may be mistaken for a renal calculus on ultrasound. In this case, no turbulent flow was detected within the calcified renal artery aneurysm, and renal artery aneurysm was not considered in the initial evaluation. A lesion in the renal artery can be suggested by a number of abnormal intravenous pyelography findings, including calcification at the renal hilum, a compression or defect in the excretion system, delayed excretion, or asymmetric nephrograms, which may be seen in as many as 60% of patients with renal artery aneurysms.[6] This interesting case highlights how an unusual calcified mass in the renal pelvic area needs to be evaluated cautiously, and the possibility of

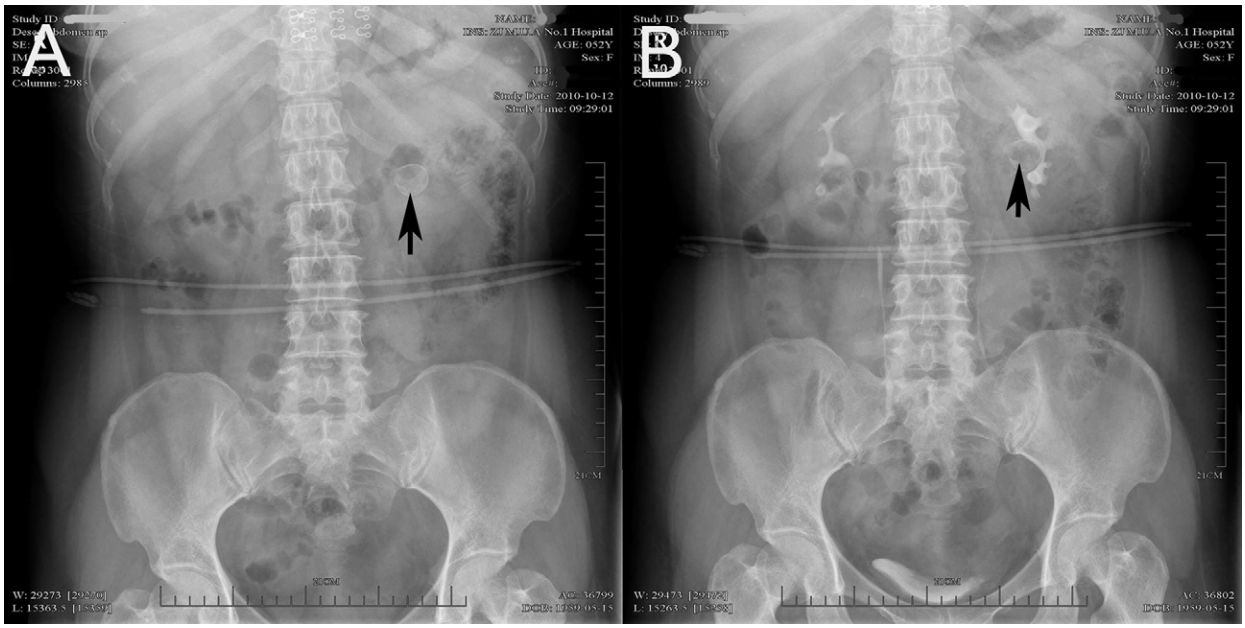

Figure 2. Images from intravenous pyelography. (A) A plain abdominal radiograph showed a left-sided renal calcification (arrow). (B) After injecting contrast medium, intravenous pyelography showed left hydronephrosis due to compression of the pyeloureteral junction by a 25-mm calcification (arrow).