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Embolization of iatrogenic renal arteriovenous fistula – a case report

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Abstract

Renal artery pseudoaneurysms and arteriovenous fistulae most often occur as an iatrogenic complication. The article discusses a case of a patient diagnosed with an arteriovenous fistula and a pseudoaneurysm. A 64-year-old woman was admitted to the hospital due to nonspecific pain in the lumbar region. Imaging showed a typical picture of clear cell renal carcinoma. The patient was qualified for surgical treatment. After tumor resection, the patient developed microhematuria. Arteriovenous fistula and renal pseudoaneurysm were diagnosed using Doppler and computed tomography scans. The patient was qualified for arteriography with simultaneous embolization of the lesion. A follow-up evaluation confirmed the exclusion of aneurysm and fistula. Treatment outcomes were monitored using Doppler ultrasound. Doppler ultrasonography is the first method of choice in detecting and monitoring renal artery irregularities. Safety, non-invasiveness and easy access to this tool make it play a key role in the diagnosis of renal artery fistulas and pseudoaneurysms.

Keywords

arteriovenous fistula,
kidney,
treatment,
pseudoaneurysm

Introduction

Advances in the field of medicine, particularly in the development of surgical techniques, offer an increasing number of treatment options for kidney diseases. The number of renal procedures is increasing each year. The most common interventions include, among other things, percutaneous nephrostomy, kidney biopsies, ureter splinting and wedge resection of renal tumors. The increasing number of performed procedures entails higher rates of iatrogenic complications⁽¹⁾. These most often occur in the form of renal artery pseudoaneurysm. Arteriovenous fistula is a less common complication. Other possible causes of their occurrence include abdominal injuries and congenital defects.

The presence of red blood cells in the urine is the most common symptom seen in renal vessel damage. Patients

may also report lumbar pain, dizziness and general fatigue. Hemodynamic disorders may develop in more severe injuries⁽²⁾.

For suspected postoperative complications, the management algorithm includes in the first place ultrasonographic imaging⁽³⁾. If the findings are inconclusive, computed tomography is recommended. Finally, patients are referred for angiography with the possibility of simultaneous embolization of the affected vessels.

The paper discusses a case of a patient diagnosed with right renal arteriovenous fistula and pseudoaneurysm based on ultrasound and computed tomography (CT), who received endovascular treatment in the Department of Interventional Radiology and Neuroradiology.

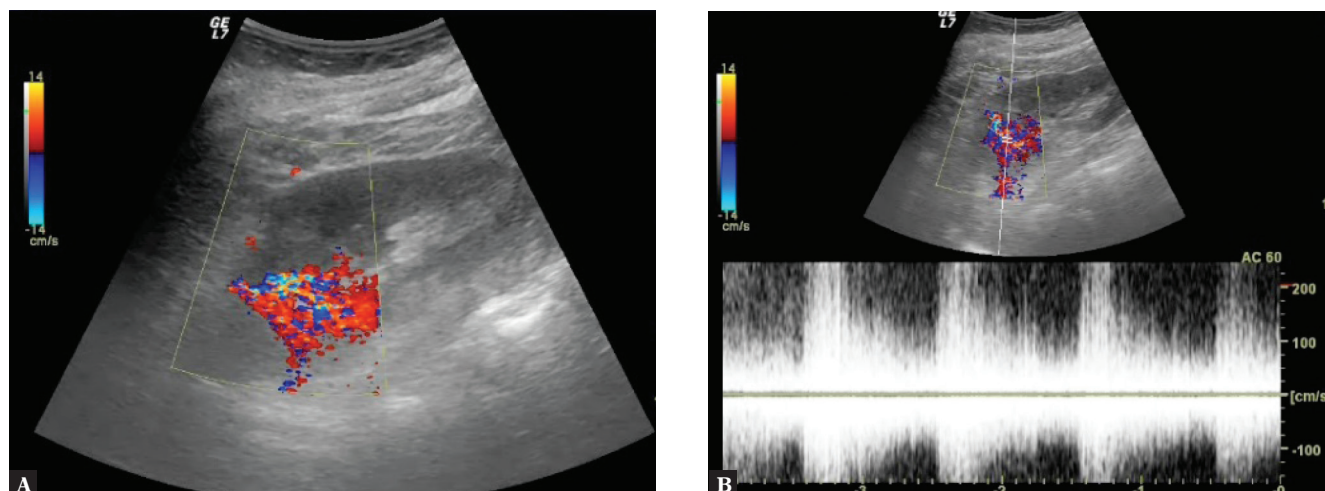


Fig. 1. A. Color-coded imaging of arteriovenous fistula. B. Spectral recording of increased blood flow typical of fistula

Case report

A 64-year-old woman underwent abdominal ultrasonography and CT due to nonspecific lumbar pain. The imaging revealed typical appearance of clear cell renal carcinoma, i.e. a round well-vascularized lesion with focal necrosis and calcifications^(4,5). The patient was qualified for wedge resection of a tumor located in the right kidney. After surgery, the patient reported persistent nonspecific lumbar pain, which was accompanied by periodic micro-hematuria.

A follow-up postoperative Doppler ultrasound revealed arteriovenous fistula at the surgical site (Fig. 1).

CT was performed to confirm the diagnosis and provide accurate imaging of the lesion, and confirmed the pres-

ence of arteriovenous fistula accompanied by a pseudoaneurysm and extrafistular venous dilation (Fig. 2).

The patient was qualified for arteriography with simultaneous embolization of the diagnosed lesion. The examination and the procedure were performed via right femoral artery puncture using the Seldinger technique. Right renal artery angiography confirmed the presence of $15 \times 20 \times 20$ mm pseudoaneurysm with arteriovenous fistula (Fig. 3 A). The next stage involved selective catheterization of the affected branch of the right renal artery using 4F Bernstein catheter. Two 3×30 mm free coils (MWCE, Cook Inc.) were inserted (Fig. 3 B).

A follow-up arteriography confirmed the successful exclusion of aneurysm and fistula from circulation (Fig. 3 B). Treatment outcomes were monitored using Doppler ultrasonography (Fig. 4).

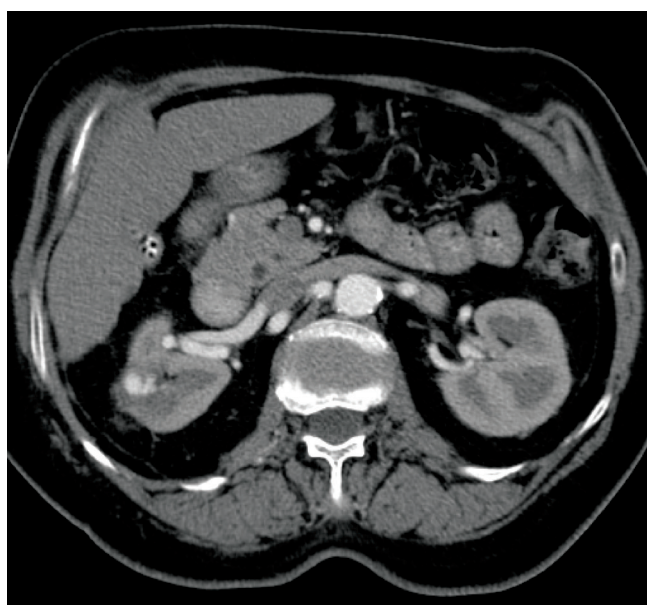


Fig. 2. CT of arteriovenous fistula and pseudoaneurysm

Discussion

An arteriovenous fistula is an abnormal connection between an artery and a vein that bypasses the capillary bed. The estimated incidence of renal arteriovenous fistula in clinical trials is 1/2,500, with right kidney predominance (3 : 1)⁽⁶⁾. Pseudoaneurysms arise from a disruption in the continuity of arterial wall closely overlaid by tissue, as a consequence of the so-called pulsatile hematoma. The extravasated blood enters the adjacent tissues, which limit further bleeding through compression⁽⁷⁾.

Renal biopsy is the most common cause of renal artery damage⁽⁶⁾. Although these lesions heal spontaneously in more than 80% of cases, life-threatening complications may develop in other cases. The occurrence of a pseudoaneurysm and arteriovenous fistula in the same kidney is an exceptional situation, which increases the risk of severe bleeding and heart failure⁽⁸⁾.

Conservative treatment for the first 7 days after surgery is recommended in patients diagnosed with renal vascular



Fig. 3. A. Digital subtraction angiography of arteriovenous fistula and pseudoaneurysm. B. A follow-up angiography confirming successful treatment

damage, with no or minor clinical symptoms and hemodynamic stability. There is a good chance of spontaneous vessel closure during that time. If no improvement is observed during a follow-up after a week, minimally invasive endovascular treatment is recommended. Open surgeries, which involve partial nephrectomy, are an additional burden for the patient and pose greater risk of further complications. Embolization is an efficacious, minimally invasive procedure, which involves a low risk of complications. Therefore, endovascular treatment is a method of choice in the management of renal pseudoaneurysm and arteriovenous fistulae⁽⁸⁾.

A quick and accurate diagnosis is the first step to therapeutic success. Doppler ultrasonography is a method of choice for the detection and monitoring of renal artery abnormalities. Safety, non-invasiveness and easy access

to this tool make it play a key role in the diagnosis of renal artery fistulae and pseudoaneurysms. Characteristic ultrasound findings for arteriovenous fistula include reduced vascular resistance, increased blood flow velocity, venous flow arterialization and a color mosaic overlying the fistula due to the vibration of the adjacent tissues⁽⁹⁾. The ultrasonographic appearance of pseudoaneurysm is characterized by arterial dilation and a “to-and-fro” flow pattern at the site of dilation⁽¹⁰⁾. If the diagnosis is not certain, CT angiography should be performed. Computed tomography should allow to make a final diagnosis and plan an appropriate therapeutic approach. Ultrasonography is an unquestionable method of choice for disease monitoring and treatment outcome assessment. This course of management will reduce hospital stay, which will be both economical and beneficial for the patient.

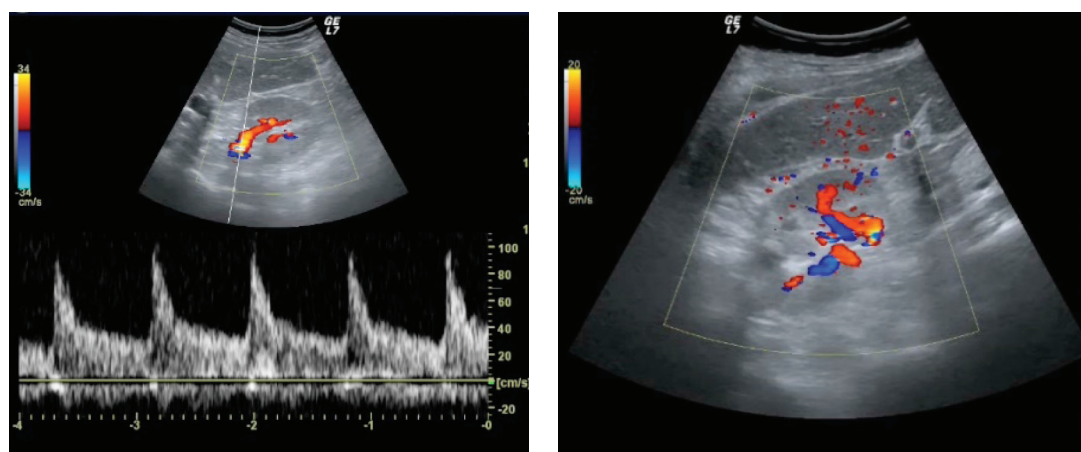


Fig. 4. Doppler ultrasonography confirming successful treatment

Conflict of interest

The authors do not report any financial or personal connections with other persons or organizations, which might negatively affect the content of this publication and/or claim authorship rights to this publication.

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