

An arteriovenous fistula in the right kidney as a cause of right ventricular heart failure

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A 45-year-old female patient was hospitalized in January 2022 in another hospital and diagnosed with acute right ventricular heart failure, dyspnea, ascites, and bilateral hydrothorax. Echocardiography revealed, *inter alia*, preserved left ventricular ejection fraction (LVEF, 57%), dilatation of both atria, moderate mitral valve insufficiency, severe tricuspid regurgitation pressure gradient (TRPG) with a peak of 51 mm Hg and a long pulmonary artery acceleration time (PA-AcT) of 152 ms. In March 2022, she was admitted to the Department of Gynecology at our hospital with suspected right ovarian cancer, based on elevated serum cancer markers and an ovarian cyst found earlier on computed tomography (CT). The patient had a consultation with an angiologist to ascertain the presence of a systolic murmur detected in the umbilical region by a cardiologist. The angiologist used abdominal ultrasound and found, among others, an extension of the right renal vein and inferior cava vein as well as fluidic spaces in the projection of the pelvicalyceal system of the right kidney (Figure 1A), in which low-resistance blood flow was detected using Doppler imaging. This suggested the presence of a renal arteriovenous fistula of non-traumatic origin, as the patient reported no history of abdominal or back trauma before hospitalization in January 2022. This hypothesis was confirmed during reanalysis of contrast-enhanced CT images from January 2022 (Figure 1B, C), in which we found signs of a renal artery aneurysm ruptured into the

renal vein that had not been described. Our multidisciplinary team recognized the fistula as a cause of right ventricular heart failure with increased cardiac output, qualifying the patient for endovascular fistula closure. Angiography (Figure 1D) confirmed the presence of an arteriovenous fistula between the renal artery and the vein. However, implantation of a stent-graft (BeGraft Peripheral, Bentley, 6.0) was complicated by the rupture of the renal artery (Figure 1E), and embolization of the distal part of the renal artery was necessary (Figure 1F). During a follow-up visit on July 15, 2022, the patient was asymptomatic. Ultrasound imaging showed that the right kidney was diminished (65 mm, cortex 12 mm). Blood creatinine decreased from the level found before procedure in March (0.96 mg/dl) to the value found in July 2022 (0.82 mg/dl). Similarly, blood carbohydrate antigen 125 (CA-125) concentration and TRPG decreased (from 22 to 51 mm Hg and from 22.93 to 534.0 U/ml, respectively) between measurements on March and July 2022 (before the procedure and at 3 month follow-up).

The presented case shows that heart failure may be caused by an arteriovenous fistula, whose detection is possible during a detailed physical examination (abdominal murmur) and abdominal ultrasound. An arteriovenous fistula should be considered as a cause of high-output right ventricular failure, not only in patients undergoing hemodialysis [1] but also in those with an unclear cause of right ventricular failure [2], especially when

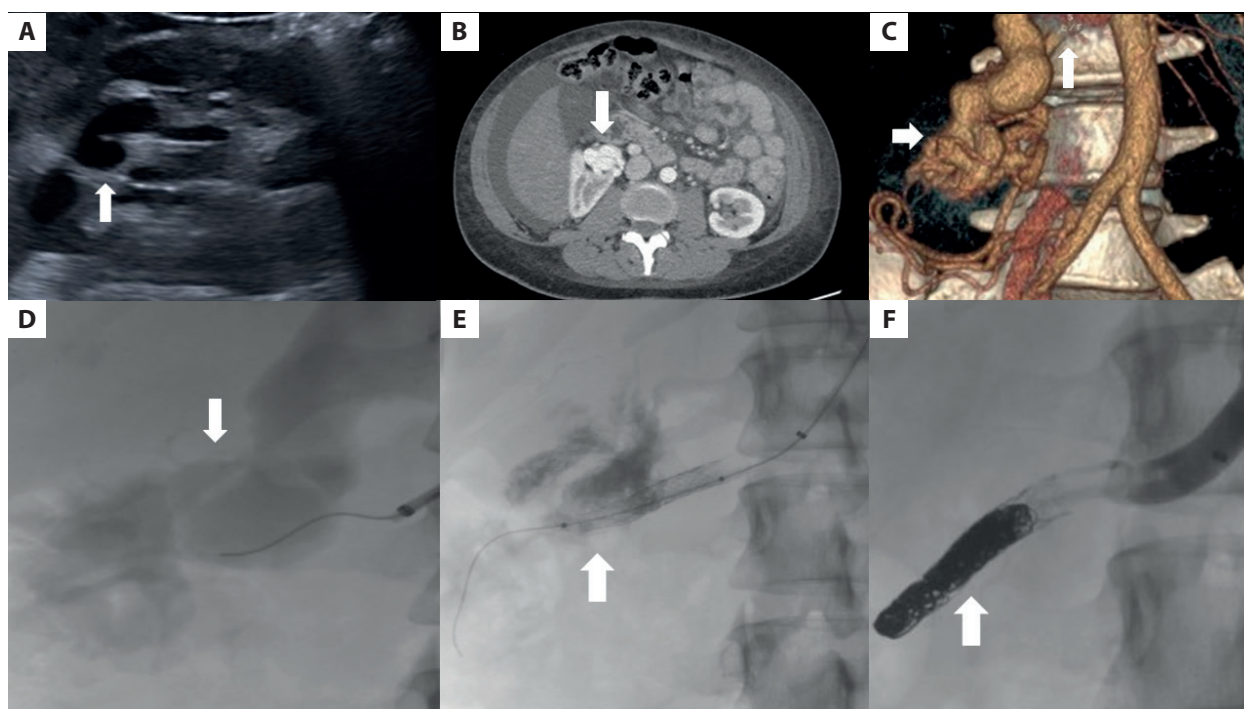


Figure 1. **A.** Ultrasonographic imaging of the right kidney with fluidic spaces in the projection of the pelvicalyceal system (white arrow). **B.** Arteriovenous fistula in the hilum of the right kidney (white arrow) on CT from January 2022 (white arrow). **C.** 3D reconstruction of arteriovenous fistula and the net of dilated veins in the hilum of the right kidney (horizontal white arrow) (the right renal artery is marked with a vertical white arrow). **D.** Angiography from March 2022 showing an arteriovenous fistula and fast shunt of contrast medium to the inferior cava vein (white arrow). **E.** Implanted stent-graft, closed arteriovenous fistula, and contrast medium leak (white arrow) showing renal artery rupture and hemorrhage. **F.** Right renal artery embolized with coils (white arrow)

echocardiography reveals high TRPG resulting from volume overload accompanied by prolonged PA-AcT due to a low transpulmonary pressure gradient. Endovascular closure of the arteriovenous fistula resolved the heart failure in this patient [3, 4]. Moreover, ovarian cancer serum markers, such as CA-125, can be elevated in the course of heart failure, which should be taken into account when considering a patient's qualification for surgery [5].

Article information

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