In February, 2012, a 33-year-old man was admitted to our hospital because of exertional dyspnea, chest distress, and fatigue of 1 month duration. On admission, his blood pressure was 124/80 mm Hg and heart rate was 120 beats per minute. A chest examination detected no rales. Heart auscultation demonstrated accentuated first and second heart sounds, and grade 3/6 pansystolic ejection murmur in the mitral and tricuspid area. A grade 3/6 continuous machinery bruit over the left renal area was heard. His temperature ranged from 36.1°C to 38.3°C. He told us that he had undergone nephrectomy for contusion and laceration of left kidney 20 years ago. N-terminal pro-B-type natriuretic peptide was 792 pg/mL. Tests for renal and thyroid function were normal. Hemocultures and drug sensitivity assays in different days both indicated streptococcus mitis (resistant to penicillin but sensitive to vancomycin) infection. Ultrasonic cardio gram indicated that left ventricular diastolic dimension and ejection fraction were 60 mm and 58%, respectively (Table). Cardiac index was 7.23 L/min per m². Abdominal enhancement CT scanning indicated a bird’s beak-like malformation near the inferior caval vein (Figure 1). Three-dimensional reconstruction revealed a large mass (9.5×6.4 cm) in the left nephridial pit (Figure 2) and a dilatation of left renal artery (14.5 mm) and vein (90 mm; Figure 3). Accordingly, a diagnosis of renal arteriovenous fistula (AVF) was made. After admission, vancomycin, angiotensin-converting enzyme inhibitor, β-blocker, and diuretics were given. Several days later, his temperature became normal. Then, a transcatheter embolization therapy was arranged. Unfortunately, the renal AVF was too huge to be emobolized even by the top size of transcatheter coil in our hospital. Finally, the doctors blocked the blood stream by balloon inflation and made the dilated vessel diminished in volume. Subsequently, surgeons closed the renal AVF with a laparotomy. During follow-up, the patient recovered very well. Aorta CT scanning confirmed that AVF was closed successfully (Figure 4). Eleven months later, left ventricular diastolic dimension, ejection fraction, and cardiac index were 50 mm, 71%, and 4.53 L/min per m², respectively.

Up to now, only few cases of high-output heart failure caused by renal AVF have been reported.1–3 Our study has several strengths. First, to the best of our knowledge, renal AVF of this case is the largest ever reported. We think that the cause of this AVF might be mass ligation of the renal pedicle in nephrectomy. Second, to reduce the risk of hemorrhage, we combined both transcatheter embolization and surgical ligation for the first time. It seems to be practical and effective. Moreover, AVF itself may be a focus of infection in this case. To some extent, it is a curable disease. Once renal AVFs are closed, patients are expected to make a full recovery. Consequently, we hope that clinicians would consider renal AVF as a possible cause of high-output heart failure.

Disclosures
None.

References
Table. Changes of UCG Parameters in an 11-Month Follow-Up

<table>
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<th>Visit</th>
<th>RVOT, mm</th>
<th>LAD, mm</th>
<th>LVDD, mm</th>
<th>EF, %</th>
<th>SV, mL</th>
<th>LVW, g</th>
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</table>

EF indicates ejection fraction; LAD, left atrial dimension; LVDD, left ventricular diastolic dimension; LVW, left ventricular weight; RVOT, right ventricular outflow tract; SV, stroke volume; and UCG, ultrasonic cardiogram.

Figure 1. Abdominal enhancement CT before the operation: a bird’s beak-like malformation between renal arteriovenous fistula and inferior caval vein.

Figure 2. Three-dimensional reconstruction (anterior aspect): a large arteriovenous fistula (9.5×6.4 cm) in the left nephridial pit.

Figure 3. Three-dimensional reconstruction (posterior aspect): dilated (14.5 mm) and tortuous left renal artery and dilatation of left renal vein (90 mm).

Figure 4. Aorta CT scanning after the operation: the arteriovenous fistula was closed.
An Unusual Cause of High-Output Heart Failure: Renal Arteriovenous Fistula After Nephrectomy
Jian Chen, Mao Liu, Jianting Ke, Binfang Shang, Zhiling Zhu and Wei Wu

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