

Case
Report

Retroperitoneal Aortobifemoral Bypass by a Combination of Horseshoe Kidney and Aortoiliac Occlusive Disease with Stent Thrombosis

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Bilateral aorto-profunda femoris bypass with Dacron bifurcation graft was performed by a patient with aortoiliac occlusive disease (AIOD) and horseshoe kidney (HSK) who had undergone stenting of the right common iliac artery and of the left superficial femoral artery with subsequent stent thrombosis as well as significant subrenal aortic stenosis. As endovascular treatment was not feasible and surgical treatment by means of transperitoneal incision would be associated with high risk of damage to the HSK, the operation was successfully accomplished through left pararectal retroperitoneal approach.

Keywords: horseshoe kidney, aortoiliac occlusive disease, surgical treatment, retroperitoneal approach

Introduction

Horseshoe kidney (HSK) is a rare renal anomaly but is one of the most common congenital fusion kidney abnormalities. It has an incidence of 0.25% and is more frequent in men than in women (2:1).^{1,2} HSK can be associated with three anatomic abnormalities: ectopia, malrotation, and vascular changes. In most of the cases (90%), the abnormality consists of two renal masses

fused at their lower poles by a parenchymal or fibrous isthmus (U-shaped).

There could be wide variations in the arterial supply of the HSK (in approximately 80% of the cases) and the renal arteries (RAs) can originate from the abdominal aorta, the common iliac artery or from the inferior mesenteric artery.^{3,4}

HSK is usually asymptomatic and is an incidental finding. The renal anomaly can be infrequently combined with abdominal aortic aneurysm (in 0.12% of the patients) and the coexistence of HSK and aortoiliac occlusive disease (AIOD) is even more rare.⁵ When encountered in combination with AIOD, HSK may pose serious technical challenges for the surgeon regarding the choice of the most appropriate access to the aorta, especially after preceding endovascular procedures in this segment.

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Case Report

The patient was a 57-year-old man who presented with symptoms of peripheral artery disease (PAD) with short distance claudication which started several years ago. He was treated at an invasive cardiology department where he received two stents—one in the right common

iliac artery (8 × 40 mm self-expanding stent) and another one in the left superficial femoral artery (6 × 200 mm self-expanding stent). The intervention led to temporary symptomatic improvement. However, in the course of last year, the man experienced significant worsening of the PAD symptoms.

The patient had history of coronary artery disease (CAD), arterial hypertension, and dyslipidemia and was receiving antihypertensive and lipid-lowering medications. He was in good general condition, the femoral pulses were absent on the right side, on the left side there were palpable femoral pulses and absent distal pulses. The ankle-brachial index (ABI) was reduced to 0.40 for the right leg and to 0.73 for the left leg. The renal function was normal (glomerular filtration rate [GFR] 74 mL/min/1.73 m²).

The computed tomography (CT) angiography showed 60% stenosis of the aortic lumen with thrombotic masses, as well as in-stent thrombosis of the right common iliac artery. The left superficial femoral artery stent was partially patent but it was protruding into the common femoral artery and was overlying the ostium of the deep femoral artery (**Fig. 1B** and **1C**). The distal blood flow for both legs was compromised.

On occasion, on the CT angiography a U-shaped HSK was noted (**Fig. 1A**). It was located in front of the aorta and was receiving blood supply from three RAs with normal blood flow. One of the arteries seemed to be accessory and was coming from the patent part of the aorta, just before the aortic stenosis and was supplying blood to the kidney isthmus.

As the patient was undoubtedly indicated for intervention, the various therapeutic possibilities were discussed (see Discussion) and a decision was made that endovascular aortic repair (EVAR) was not feasible and the best option would be to perform open surgery through left pararectal retroperitoneal approach. The HSK was delicately lifted to get access to the free of thrombotic masses aortic segment. Partial aortic clamping under the level of the RAs was applied. To bypass the vascular occlusion, aorto-profunda femoris bypass with Dacron bifurcation graft (Intergard Synergy 18/9 mm) was performed (**Fig. 2A** and **2B**). The proximal anastomosis was placed below the level of RAs, including the accessory RA, and above the aortic stenosis. The proximal anastomosis was end-to-side and the distal end-to-end to the deep femoral arteries on both sides. It was not possible to anastomose the distal part of the graft to the common femoral arteries because they were obliterated bilaterally and the deep femoral arteries were the only outflow. Because of the

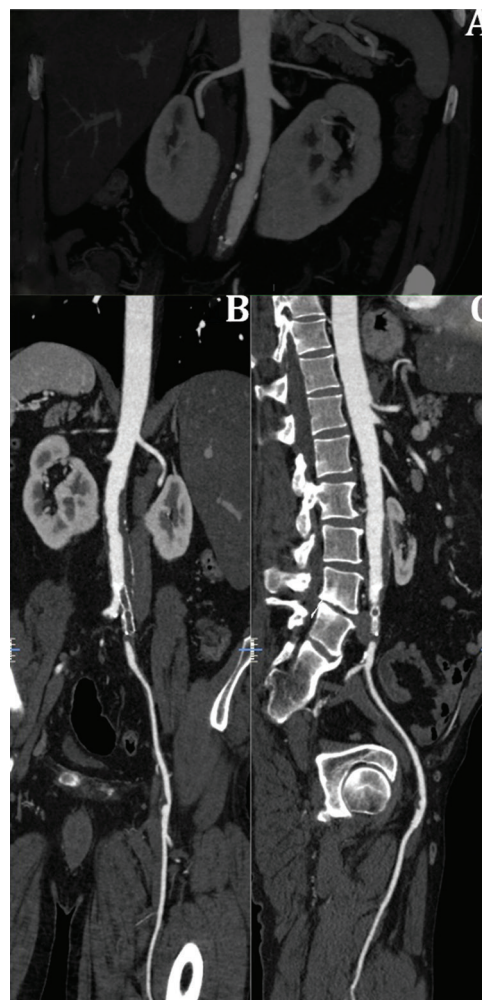


Fig. 1 (A) Preoperative CT scan demonstrating the aortic stenosis at the level of the horseshoe kidney below the RAs. (B) Preoperative longitudinal CT scan showing the fully thrombosed stent in the right common iliac artery and the left common femoral artery which is covered by the stent. (C) Preoperative sagittal CT scan with the kidney overlying the aortic stenosis. CT: computed tomography; RAs: renal arteries

left retroperitoneal access, the body of the prosthesis was located on the left side of the aorta and the course of its right branch was extra-anatomic along the pelvic floor. The left common femoral artery was ligated above the stent so that extirpation of the stent was not necessary.

There were no complications after the surgical procedure, the femoral pulses were palpable bilaterally as the aorto-profunda femoris bypass was well functioning, the right ABI was 0.71 and the left was 0.74. Postoperative rehabilitation was started on the second day after the intervention. A CT angiography performed on the third



Fig. 2 (A) Intraoperative photo demonstrating the left pararectal retroperitoneal access below the level of the horseshoe kidney. The Dacron bifurcation vascular graft is positioned but the distal anastomoses are not completed yet; the distal exploration of the common and of the deep femoral arteries is visible. (B) Completed distal end-to-end anastomoses with closed femoral access on the right side. The end-to-end anastomosis to the deep femoral artery is visible on the left side.

postoperative showed patent vascular conduit without any defects in contrast filling, saved renal parenchyma, and intact RA (**Fig. 3**). The renal function remained normal.

On the two follow-up visits on the first month and on the third month after the operation, the patient was significantly improved, was able to walk up to 200 m without claudication and the vascular reconstruction was functioning properly. The renal function remained normal and the man did not have any miction disorders. He did not have any abdominal distension.

Discussion

The HSK by the presented patient was missed at the time of the first intervention with bilateral stent implantation because it cannot be visualized on angiography without CT. It was an incidental finding on the CT angiography which is a sensitive method for detection of HSK and associated anomalies of its vascular supply and collective systems. Of note, HSK can be visualized even on plain CT.

Usually, EVAR is preferred by AIOD.⁶⁾ However, by our patient it was not applicable because the access was

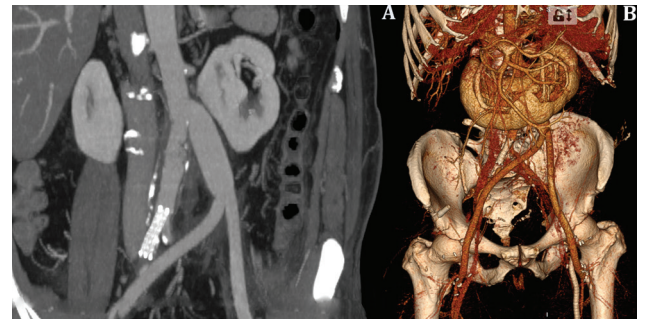


Fig. 3 (A) Postoperative CT scan (longitudinal section) showing the patent vascular graft; the thrombosed stent in the right common iliac artery is also visible. The proximal anastomosis is end-to-side and its position is below the level of the RAs and above the aortic stenosis. Because of the left retroperitoneal access the body of the prosthesis is located on the left side of the aorta and the course of its right branch is extra-anatomic along the pelvic floor. (B) Postoperative CT volume-rendered reconstruction demonstrating the HSK overlying the body of the aorto-profunda femoris bypass graft. The distal anastomosis is end-to-end to the deep femoral arteries on both sides. CT: computed tomography; HSK: horseshoe kidney; RAs: renal arteries

complicated by the presence of stent thrombosis of the right common iliac artery and by the incorrect position of the stent in left common femoral artery. Furthermore, there was high-grade aortic stenosis, with only a short segment of the aorta free of thrombosis, and an accessory RA with a diameter of 3 mm was originating from it. Arteries with size ≥ 3 mm usually need to be reimplemented.⁷⁾

Open repair in the setting of HSK is associated with several technical problems and the leading one is the choice of surgical approach for revascularization in the aorto-iliac segment.⁸⁾ Transperitoneal access requires division of the kidney isthmus which is not without risks—there is high probability for injury to the renal parenchyma and excretory system. To avoid such complications, in our case we decided to utilize left pararectal retroperitoneal approach which ensured us atraumatic access to the patent subrenal segment of the aorta, preserving the ostium of the accessory RA. Furthermore, there are data from clinical trials that retroperitoneal approach is associated with lower blood loss and faster recovery of the patient with shorter hospital stay and intensive care unit (ICU) stay compared with transperitoneal access.⁹⁾

Conclusion

CT angiography is the gold standard for imaging of the aortoiliac segment as it allows visualizing of associated

renal anomalies. When dealing with patients presenting with AIOD and HSK, the decision for the most suitable surgical approach can be made after careful assessment of the anatomy of the kidney malformation, the probability for injury when using standard transperitoneal access and last but not least, considering the experience of the surgical team with retroperitoneal reconstructions in the aortoiliac segment.

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Disclosure Statement

We have no conflicts of interest to declare.

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