Three-Dimensional Guided Renal Denervation to Treat Drug-Resistant Arterial Hypertension in a Patient With Renal Insufficiency

To the Editor:

A 68-year–old diabetic women was transferred to our department for renal denervation to treat drug-resistant arterial hypertension. A known diabetic nephropathy deteriorated after an abdominal computed tomography scan in the external hospital with an increase of the serum creatinine (baseline, 1.3 mg/dL; 5 days after computed tomography, 2.1 mg/dL; at admission to our hospital, 1.4 mg/dL). To reduce or even eliminate the amount of necessary contrast medium during the denervation procedure we decided to perform a 3D guided ablation procedure.

For this purpose, the external abdominal computed tomography scan was used to reconstruct the 3D anatomy of the renal arteries. The impedance-based NavX system (St Jude), used routinely in arrhythmia ablation, was used to create a virtual anatomy of both renal arteries by touching the vessel walls. For image fusion, critical anatomic landmarks like, for example, an orifice of the renal arteries or areas of vessel bifurcation, were determined by comparing the position of the catheter in the native x-ray and the 3D image based on computed tomography anatomy. A decapolar steerable electrode catheter in the renal venous system served as the local reference catheter (Figure A and B, video).

To perform the ablation, a cooled tip 7F quadrupolar radiofrequency ablation (IBI/St Jude) catheter with a flow of 17 mL/min and a maximum of 10 watts was used in a power-controlled mode (IBI/St Jude RF generator). In the right renal artery 11 ablation points and in the left 13 ablation points were delivered in a spiral manner from the distal until the proximal portion of both renal arteries. To check the distal catheter position once for the fusion process, a single contrast medium injection was performed in each renal vein (7 mL for the left and 8 mL for the right), leading to a total contrast medium volume of 15 mL for the entire procedure. To reduce the risk of vasospasm, we performed the procedure in deep sedation (propofol infusion). No creatinine increase could be detected after the ablation procedure. A postprocedural Doppler sonography of both renal arteries revealed no evidence for a stenotic process. At 3 months after the procedure, a drop in the mean systolic blood pressure of 9 mm Hg and in the mean diastolic pressure of 4 mm Hg in a 24-hour measurement could be documented.

To our knowledge, this is the first report about a cooled tip renal denervation using a 3D nonfluoroscopic guiding system. This approach allows an ablation requiring only a minimal amount of contrast medium. Even a procedure without any contrast medium appears feasible with this technique. Therefore, this approach is of special interest in patients with drug-resistant arterial hypertension and concomitant renal insufficiency with the aim of reducing their exposure to contrast medium to a minimum.

Online Data Supplement

None.

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Figure. Anterolateral view (A) and posterior view (B) of the 3D image of the renal artery (red), the renal vein (blue), and kidney parenchyma (gray). The reference decapolar catheter is positioned in a side branch of the renal vein. The ablation catheter can be located in the proximal portion of the renal artery. The green dots indicate ablation spots.
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