Effect of distal renal denervation on kidney function in patients with resistant hypertension, associated with type 2 diabetes mellitus

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Background: Diabetic patients with resistant hypertension (RHT) are characterized by accelerated annual decline in estimated glomerular filtration rate (eGFR) (from 10 to 14 mL/min/1.73m2). The distal renal denervation (RD) can preserve renal function within first year follow-up in these patients. However, whether this effect will persist at a later period is unknown, especially taking into account the potential risks of kidney damage due to deep introduction of the catheter and contrast into the segmental branches of the artery, as well as exposure to radiofrequency energy near to the kidney. In addition, RHT and diabetes mellitus (DM) contribute to impaired renal autoregulation which can lead to a decrease in GFR in response to a decrease in BP, but the long-term safety of a powerful BP reduction for renal function in these patients remains unexplored.

The purpose of this study was to assess the renal safety and efficacy of a distal RD compared to conventional intervention in diabetic patients with RHT during 3 years of follow-up.

Methods: Twenty seven patients with true RHT and type 2 DM were included in single-arm prospective interventional study (number NCT02667912 on ClinicalTrial.gov) (mean age 61.6±7.3years, mean office (systolic/diastolic) BP 171.8±21.9/87.7±17.7mmHg, mean eGFR 72.1±19.9mL/min/1.73m2, 7 patients with CKD (stage 3), 11 patients with albuminuria (> 30mg/day), 8 men), among them 13- underwent distal RD and 14 - conventional RD. Offices BP, ABPM, renal Doppler ultrasound, renal function (eGFR (CKD-EPI) and 24-hour urinary albumin excretion (UAE)) were assessed at baseline and annually for 3 years follow up. There were no any difference in sex, old, eGFR, UAE, BP level, and frequency both of CKD and albuminuria between distal RD group and conventional RD group. The patients were asked to refrain from changing their medication regimen for the duration of the study. Nineteen patients completed 36 months follow-up (8 treated by distal RD and 11- by conventional mode).

Results: The change in eGFR for distal RD during 3 years follow-up was not significant (-5.3±0.4 mL/min/1.73m2, P=0.63) and was comparable with that for conventional RD (-6.7±4.2 , P=0.3), (P=0.7 for the between-group difference), despite of a more powerful decrease in 24h- systolic BP and 24h-puls BP in the distal RD group than in the conventional RD group (-25.3±15.3 vs. -4.4±22mmHg, P=0.04, and -14.3±15.1 vs. 0.1±7.7mmHg, respectively). The degree of annual decline in GFR for the distal RD was the same as for the conventional RD (p=0.9), and was -2.7±2.4 mL/min/1.73m2/year, and -2.7±4.0 mL/min/1.73m2/year, respectively. There were no significant changes in mean values of renal blood flow, albuminuria, and the numbers of patients with albuminuria and CKD in both groups after 3 years of follow-up.

Conclusions: Distal RD in diabetic patients with RHT has a good renal safety profile and can slow the progression of CKD within 3 years of follow-up.