CHRONIC EFFECTS OF PERCUTANEOUS RENAL SYMPATHETIC DENERVATION ON RENAL HEMODYNAMICS AND PLASMA NOREPINEPHRINE LEVELS USING A NOVEL CATHETER FOR RADIOFREQUENCY ABLATION

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Background: The effect of renal sympathetic denervation (RSD) on chronic autoregulation of renal hemodynamics and plasma catecholamines has yet to be adequately explored. We investigated the effect of RSD (1 month post ablation), performed using a novel radiofrequency ablation catheter on renal hemodynamics [average peak velocity (APV), renal flow reserve (RFR) and resistive index (RI)] and on plasma norepinephrine levels.

Method: In 9 anaesthetized female juvenile farm swines (mean weight 34.5 kg) a 0.014 inch Doppler flow wire was introduced in the renal artery for the measurement of the APV under baseline and hyperemic condition that was induced by the bolus intrarenal administration of dopamine (50μg/kg). RFR was calculated as the ratio of hyperemic to basal peak velocity. RI was estimated as (peak systolic velocity - end-diastolic velocity)/peak systolic velocity. APV, RFR and RI were measured before and 1 month after RSD. The RSD was achieved via the lumen of the main renal artery with the novel catheter connected to a radiofrequency generator from St. Jude Medical according to pre-specified algorithm. Plasma norepinephrine was estimated before and 1 month after ablation.

Results: In all animals, APV 1 month after RSD compared to APV before RSD was significantly higher (30.21±13.14 vs 21.79±8.53cm/sec, p=0.035). Radiofrequency RSD resulted in reduced RFR (1.36±0.25 vs 2.96±1.33, p<0.0001), RI (0.48±0.15 vs 0.74±0.07, p=0.003) and plasma norepinephrine levels (11.08±6.19 vs 17.76± 11.9pg/ml, p=0.045), while no significant changes in the diameter of the renal artery was observed after dopamine administration (p=NS).

Conclusions: Catheter-based RSD augmented APV and decreased RFR, RI and norepinephrine levels persistently and significantly at 1 month post ablation in healthy swines. These results support the chronic effect of RSD by the radiofrequency ablation catheters on renal hemodynamic and catecholamines balance even in a healthy animal setting.