TCT-16

Renal Artery Nerve Distribution and Density in the Porcine Model: Biological Implications for the Development of Radiofrequency Ablation Therapies

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Background: Catheter based renal artery denervation has demonstrated to be effective in decreasing blood pressure among patients with refractory hypertension. The anatomical distribution of renal artery nerves may influence the safety and efficacy profile of this procedure. We aimed to describe the anatomical distribution and density of renal artery nerves in the porcine model.

Methods: A total of 8 porcine renal arteries were included in the analysis. A tissue block containing the renal arteries and peri-renal tissue was extracted. Each artery was divided into 3 individual segments (proximal, mid and distal) and stained for histological analysis. Histological sections were assessed for total number, size (0-50 μm, 50-100μm, 100-200 μm, 200-500 μm) and depth (1 to 6 mm from renal artery) of the nerves according to the location. Immunohistochemistry, targeting tyrosine hydroxylase (effferent nerve fibers [ENF]) and calcitonin gene related peptide (CGRP, afferent nerve fibers [ANF]) was performed in a mid-section.

Results: Nerve counts were greatest proximally (57.2% of the total nerves) and decreased gradually distally (23.5% in mid-sections and 19.3% in distal sections). The distribution in nerve size was similar across all three sections (10-50 μm, 50-100 μm, 100-200 μm, 200-500 μm) and depth (1 to 6 mm from renal artery) of the nerves according to the location. Immunohistochemistry, targeting tyrosine hydroxylase (efferent nerve fibers [ENF]) and calcitonin gene related peptide (CGRP, afferent nerve fibers [ANF]) was performed in a mid-section.

Conclusions: In the porcine model, renal artery nerves are more frequently seen in the proximal segment of the artery. Nerve size distribution appears to be homogeneous throughout the artery length. Nerve bundles progress closer to the arterial wall in the distal segments of the artery. This anatomical distribution may have implications for the future development of renal denervation therapies.

TCT-17

Serial Changes of Everolimus-Elluting Stent Malapposition: An Optical Coherence Tomography Subanalysis from the RESET Trial

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Background: The long term outcome of stent malapposition after stent implantation remains unclear. The aim of this study was to evaluate serial changes of stent malapposition after everolimus-elluting stent implantation by using optical coherence tomography (OCT).

Methods: Randomized Evaluation of Sirolimus-eluting versus Everolimus-elluting stent Trial (RESET) was a prospective dual-arm randomized trial of everolimus-elluting stents and sirolimus-elluting stents in 3200 patients with coronary artery disease. From the RESET trial, 70 patients with everolimus-elluting stents who underwent serial OCT examination (post-stenting and 12-month follow-up) were investigated.

Results: At post-stenting, acute stent malapposition was observed in 23 (32%) everolimus-elluting stents, and 115 malapposed stent struts were detected. Mean stent malapposed distance (distance from stent strut to lumen surface) was 210 ± 240 μm at post-stenting. At 12-month follow-up, 15 (65%) stent malapposition was resolved, however 8 (35%) stent malapposition was persistent. A total of 41 persistent malapposed stent struts were detected, and mean stent malapposed distance was 110 ± 190 μm at 12-month follow-up. The ROC curves showed that stent malapposed distance > 290μm at post-stenting was the best cut-off to predict persistent stent malapposition at 12-month follow-up in everolimus-elluting stents.

Conclusions: The stent with malapposed distance > 290μm at post-stenting has a high risk for persistent stent malapposition at 12-month follow-up in everolimus-elluting stents. OCT can predict persistent stent malapposition and provide useful information to optimize percutaneous coronary intervention.

TCT-18

Long-term Outcome Of Discordance Between Fractional Flow Reserve And Coronary Flow Velocity Reserve After Deferral Of Percutaneous Coronary Intervention.

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Background: Discordance between Fractional Flow Reserve (FFR) and Coronary Flow Reserve (CFVR) reflects divergent extremes of focal epicardial and small vessel disease. Discordance is ignored in daily clinical practice, although it occurs in 30% of intermediate lesions, and data on its relevance for long-term clinical outcome is lacking.

Methods: We studied intermediate coronary lesions that were evaluated by FFR and CFVR between April 1997 and September 2006. Treatment was deferred when non-invasive testing was negative or non-diagnostic. Ten year follow up was performed to document the occurrence of major adverse cardiac events (MACE): cardiac death, non-fatal myocardial infarction, or target vessel revascularization.

Results: FFR and CFVR were evaluated in 191 deferred coronary lesions. Discordance was present with FFR≥0.75 and CFVR <2.0 in 24 lesions (13%), and FFR<0.75 and CFVR ≥2.0 in 29 lesions (15%). MACE related to 80 lesions (42%). Ten-year Kaplan Meier (KM) estimates of MACE were higher for discordant lesions compared to concordant negative lesions: 27% in concordant lesions, versus 52% when FFR≥0.75 and CFVR<2.0 (P<0.01 versus discordant negative for both). Importantly, KM-estimates of 10-year MACE did not differ between both groups of discordance (Figure).

Conclusions: Deferral of lesions with discordant results between FFR and CFVR is associated with an increase in long-term MACE compared to concordant negative results.