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Evolution of vasomotor function and myocardial perfusion during three years follow-up after randomization between bioresorbable vascular scaffold and metal drug eluting stent: the VANISH trial

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Background: Although recent studies have shown that implantation of the bioresorbable everolimus-eluting vascular scaffold (BVS) is accompanied by an increased scaffold thrombosis risk, long term regression of the BVS reinstates normal vessel geometry allowing for regeneration of the newly formed endothelium with revival of vasomotor functions.
Purpose: The randomised clinical VANISH-trial was conducted to assess myocardial blood flow (MBF) and coronary flow reserve (CFR) during stress and cold pressor testing (CPT) with quantitative positron emission tomography (PET) perfusion imaging after implantation of a metal drug eluting stent (DES) vs. BVS during 3-year follow-up.
Methods: Sixty patients (age 18–65) with a documented single vessel type A or B1 lesion, and without significant myocardial enzyme release (CK<180 U/L), were randomized to implantation of a DES or BVS (Xience Prime or ABSORB) in a one-to-one fashion. Approximately one month (m), one year (y), and three years after intervention patients underwent H215O cardiac PET to assess MBF and CFR during stress and CPT.
Results: No culprit vessel events were registered between inclusion and 3-year follow-up. Fifty-nine (98%), 56 (93%), and 51 (85%) patients successfully completed 1m, 1y, and 3y follow-up PET imaging, respectively. Target vessel rest MBF, stress MBF, and CPT reserve at 1m, 1y, and 3y follow-up were comparable between DES and BVS arm (all p>0.05). A strong trend was observed for a lower CFR within BVS arm at 1m follow-up as compare to DES (DES vs. BVS: 3.57±0.85 vs. 3.09±0.94, p=0.05), whilst no difference was observed at 1y and 3y follow-up between DES and BVS groups (1y: 3.45±0.97 vs. 3.17±0.99, p=0.35 and 3y: 3.07±0.84 vs. 2.87±0.86, p=0.96, respectively). Stress MBF and CFR in the DES arm was significantly lower at 3y, as compared to 1m and 1y (stress MBF 3y vs. 1m and 1y: 3.02±0.67 vs. 3.38±0.83 and 3.33±0.77 ml min^{-1} g^{-1}, both p<0.05; CFR 3y vs. 1m and 1y: 3.07±0.84 vs. 3.57±0.85 and 3.45±0.97, both p<0.05). No differences in stress MBF, CPT reserve, and CFR were observed over time within the BVS arm (all p>0.05).
Conclusions: The hypothesized beneficial long-term effects of BVS resorption did not translate into improved MBF during stress or endothelium dependent vasodilation by cold pressor testing. Hyperemic MBF and CFR decreased significantly 3 years after implantation of metal DES, whilst no effect over time was observed for BVS.
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The predictive value of Pd/pa and resting diastolic pressure ratio (DPR) on 1-year adverse cardiovascular event following contemporary percutaneous coronary intervention

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Background: Fractional Flow Reserve (FFR) assessed post percutaneous coronary intervention (PCI) proved to be a strong independent predictor of future adverse cardiovascular events. Measuring FFR requires the use of hyperemic agents resulting in additional cost, procedure time and potential patient discomfort. Resting diastolic pressure ratio (dPR) has been introduced as an adenosine free reasonable alternative to FFR when used to guide PCI. Thus far no data are available on the predictive value of post PCI resting Pd/Pa and dPR on long-term major adverse cardiac events.
Aims: The aim of the current study was to assess the predictive value of post PCI resting Pd/Pa and dPR on one-year major adverse cardiac vascular events (cardiac death, myocardial infarction and target vessel revascularization).
Methods: The FFR SEARCH study is a prospective registry in which 1000 consecutive patients underwent post PCI FFR between March 2016 and May 2017. FFR measurements were performed with a rapid-exchange microcatheter inserted over the previously used coronary guidewire to approximately 20mm distal to the distal stent edge. DICOM pressure waveforms were recorded for offline calculation of dPR using dedicated software. All patients were followed-up at 1 month and will be followed up to 5 years for the occurrence of death, myocardial infarction and repeat revascularization.
Results: A total of 1000 patients were included with 1165 measured lesions. Mean age was 65±12 years and 73% of the population was male. Overall, mean post-PCI FFR was 0.91±0.07 and mean post-PCI Pd/Pa was 0.96±0.04. The analysis of the dPR and the 1-year follow-up data will be presented at the congress.
Conclusion: The present study will provide potentially important insights in the prognostic value of adenosine-free resting pressure gradients post PCI.
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Revascularization strategy in diffuse versus focal coronary artery stenosis with less than 0,80 fractional flow reserve and impact on outcomes

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Background: There are no specific guidelines for the therapeutic management of diffuse coronary artery stenosis versus focal stenosis patients. Conversely, revascularization is recommended for focal coronary artery stenosis with a fractional flow reserve (FFR) ≤0.8.
Objective: Our main objective was to compare the therapeutic management and the occurrence of cardiovascular events in patients referred for coronary artery disease (CAD) with FFR ≤0.80 with diffuse atherosclerotic coronary infiltration (pullback analysis) or focal coronary stenoses.
Method: In a monocentric retrospective study, 174 CAD patients underwent coronary angiography and had a FFR ≤0.8: 68 (39%) had diffuse coronary infiltration (DI group) and 106 patients (61%) had a focal stenosis (FS group). Percutaneous coronary artery intervention was performed at operator's discretion. The primary endpoint was the occurrence of a major cardiovascular event (MACE) defined as all-cause death, myocardial infarction, any coronary revascularization and ischemic stroke.
Results: Overall, the 2 groups were globally comparable on baseline characteristics. Patients in the FS group were older (p=0.002) and patients in the DI group had a more frequent history of previous PCI (p=0.04).
Patients in the FS group underwent significantly more PCIs compared to patients in the DI group (91% vs 34%; p<0.001). Optimal medical treatment alone was significantly more used in the DI group compared to the FS group (59% vs 6%; p<0.001). Final FFR was 0.88 in the FS group and remains 0.77 in the DI group. The median follow-up was of 4½ years. A MACE occurred in 38% of the patients in the FS group and 41% of patients in the DI group (0,340). On univariate analysis, there was a trend towards increased risk in the DI group compared to the FS group (HR=1,67 95% CI (0,98–2,85); p=0,06). On multivariate analysis, after adjustment on age, diabetes, left ventricular ejection fraction, renal function, multivessel status and the complete revascularisation status, this trend remained non significant (HR=1,68; 95% CI (0,82–3,46); p=0,16).
Within the DI patient group, there was no significant difference in MACE in patients treated with PCI versus OMT only.
Conclusion: In summary, diffuse coronary infiltration causing functional ischemia by FFR was not significantly associated with major cardiovascular events compared to FFR positive focal coronary stenosis.
Focal stenosis PCI does not appear to decrease long term MACE suggesting that atheroma burden is a stronger risk factor than ischaemia by itself.

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Vulnerable plaques are revealed by fractional flow reserve but not by instantaneous wave-free ratio

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Background: Fractional flow reserve (FFR) is, next to lesion severity, affected by plaque vulnerability as assessed by coronary computed tomography angiography (CCTA) and associated with imminent acute coronary syndromes. Instantaneous wave-free ratio (iFR) has recently emerged as an alternative for FFR to interrogate coronary lesions for ischaemia. It is, however, unknown whether vasodilator free assessment with iFR is associated with plaque stability similarly as FFR.
Purpose: The current substudy of the PACIFIC trial explores the impact of CCTA derived unfavorable plaque features on both hyperaemic and non-hyperaemic flow indices in order to detect vulnerable plaques.
Methods: Of 119 patients (62% men, age 58±8.6 years) with suspected coronary artery disease, 257 vessels were prospectively evaluated. Each patient underwent 256-slice CCTA to assess stenosis severity and plaque features (positive remodeling [PR], low attenuation plaque [LAP], spotty calcification [SC] and napkin ring sign [NRS]), as well as intracoronary pressure measurements (FFR, iFR, Pd/Pa and pressure ratio during adenosine within the wave-free period [iFRa]). CCTA derived plaque characteristics were related to these invasive pressure measurements.
Results: Atherosclerotic plaques were present in 170 (66%) coronary arteries. On a per-vessel basis, luminal stenosis severity was significantly associated with impaired FFR, iFR, Pd/Pa and iFRa. Multivariable analysis revealed that PR and LAP were independently related to an impaired FFR (p=0.006 and p=0.038, respectively) and iFRa (p=0.005 and p=0.027, respectively), next to stenosis severity (p<0.001 for all). Conversely, these adverse plaque characteristics were not independently related to the vasodilator free parameters iFR and Pd/Pa.