Validation of quantitative flow reserve and residual quantitative flow reserve to predict fractional flow reserve post stenting from the DOCTORS (Does Optical Coherence Tomography Optimize Results of Stenting) study population

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Background: Quantitative flow reserve (QFR) is a computation of fractional flow reserve (FFR) based on angiography without use of a pressure wire. The ability to predict post-PCI FFR using residual QFR after virtual stenting (pre-PCI), and using QFR (post-PCI) remains unknown. We sought to evaluate the correlation and diagnosis accuracy of residual QFR and post-PCI QFR to predict post-PCI FFR.

Methods: From the DOCTORS (Does Optical Coherence Tomography Optimize Results of Stenting) study population, we blindly analyzed the following from angiography, and compared them to post-PCI FFR: pre-PCI residual contrast QFR (cQFR) and fixed QFR (fQFR), and post-PCI cQFR and post-PCI fQFR.

Results: 93 post-PCI QFR measurements and 84 residual QFR measurements were compared to post-PCI FFR measurements in 93 patients. Compared to the post-PCI FFR mean value of 0.92 ± 0.05, mean values of residual cQFR, residual fQFR, post-PCI cQFR and post-PCI fQFR were, respectively: 0.94 ± 0.05, 0.93 ± 0.05, 0.93 ± 0.06 and 0.93 ± 0.05 (p values >0.05 for all pairs except for residual cQFR versus FFR (p=0.01)). Pearson correlation coefficients of residual cQFR, residual fQFR, post-PCI cQFR and post-PCI fQFR compared with post-PCI QFR were, respectively: 0.62, (95% CI: 0.46-0.73); 0.61, (95% CI: 0.45-0.73); 0.75, (95% CI: 0.64-0.83) and 0.73, (95% CI: 0.62-0.81). Area under the curves for these indices with a post-PCI FFR cutoff value of 0.90 were, respectively: 0.79, 0.78, 0.85 and 0.84.

Conclusions: cQFR and fQFR correlated well and had similar diagnostic performance. Pre-PCI QFR analysis with virtual PCI, and post-PCI QFR analysis, correlated well with post-PCI FFR, and had similar diagnostic accuracy. Further studies are needed to prospectively validate a QFR-guided PCI strategy.
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Hemodynamic and clinical impact of Anomalous connections of Coronary arteries using computed tomography-derived Fractional Flow Reserve (FFRCT) from the ANOCOR registry

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Background: With the emergence of coronary computed tomography angiography (CCTA), ANOmalous connections of CORonary arteries (ANOCOR) are more frequently diagnosed than previously reported. CT-derived Frac- tional Flow Reserve (FFRCT) is a non-invasive functional test providing anatomical and functional evaluation of the overall coronary tree. These unique features could help for the management of patients with ANOCOR.

We aimed to retrospectively evaluate the clinical impact of FFRCT analysis in the ANOCOR registry population with 3 year-follow-up.

Method: The ANOCOR registry included adult patients with ANOCOR detected during invasive coronary angiogram or CCTA performed between January 2010 and January 2013. Among 472 patients included, 105 patients had a cardiac CT during the inclusion period.

Results: We retrospectively performed FFR-CT and obtained successful analyses in 54 patients of 60 ± 13 years with a complete 3-year clinical follow-up. Thirty-six (67%) patients had conservative treatment and 18 (33%) patients had coronary revascularization after the CCTA. FFRCT analysis showed that ANOCOR course slightly reduces the mean FFRCT value of 1 at the ostium to 0.90 ± 0.10 downstream the abnormal course and had a distal vessel mean FFRCT value of 0.82 ± 0.11. No statistical difference of FFRCT values were observed between ANOCOR at risk and non at risk and between conservative and revascularization groups. At 3 years of follow-up, only one patient had unplanned revascularizations of ANOCOR vessel in the conservative strategy group.

Conclusion: We observed favorable FFRCT values of ANOCOR and non ANOCR vessels. Patients treated conservatively and revascularized had excellent clinical outcome at 3 years of follow up.

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Invasive assessment of the human palmar arterial arch collateral function during transradial catheterization


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Background: The present study aimed to quantitatively measure the pressure-derived function of the palmar arterial arch collateral circulation during transradial catheterization.

Methods: Palmar arterial arch collateral function was determined using radial artery pressure signals in the non-occluded vessel and during brief manual occlusions of the more proximal radial artery, and of the radial plus ulnar arteries. Collateral flow index (CFI), the ratio of mean occlusive divided by mean non-occlusive arterial blood pressure, both subtracted by central venous pressure, was determined for radial artery occlusion (CFIrad) and for radial plus ulnar artery occlusion (CFIrad+uln). Prior to invasive CFI measurements, palmar arterial arch function was tested non-invasively by the modified Allen test (MAT).

Results: Two hundred and fifty patients undergoing transradial access coronary angiography were included in the study. CFIrad was equal to 0.802±0.150 (95% confidence interval, CI, 0.783-0.820). CFIrad+uln was equal to 0.424±0.188 (CI 0.400-0.447). There was an inverse linear relation between CFIrad and MAT in seconds (s): MAT = 64 - 63 * CFIrad (r²=0.229, p< 0.0001). Two hundred and eleven patients had a normal and 39 patients an abnormal (>15s) MAT. The group with normal MAT had a CFIrad of 0.830±0.111, patients with abnormal MAT had a CFIrad of 0.648±0.224 (p< 0.0001).

Conclusions: Direct invasive hemodynamic assessment of the palmar arterial arch function reveals collateral supply to the briefly occluded in comparison to the patent radial artery of 0.802. During external occlusion of both radial and ulnar artery, collateral flow index amounts to an unexpectedly high value of 0.424.

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Left ventricular ejection fraction and N-terminal pro b-type natriuretic peptide predict cardiovascular out-
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comes, heart failure and cardiac death one year after acute coronary syndromes

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Background: Heart failure (HF) following acute coronary syndromes (ACS) is associated with increased hospitalization and mortality. However, it is uncertain whether currently available risk markers alone or in combination are able to precisely predict the development of HF or cardiac death after ACS. This study aims to evaluate left ventricular ejection fraction (LVEF) and NT-proBNP as predictors for cardiovascular outcome, HF and cardiac death after ACS.

Methods: The prospective multicenter SPUM registry enrolled 2'168 ACS patients. LVEF by ventriculography and NT-proBNP were measured at presentation in 1'027 patients (47.4%) and in 990 patients (45.7%) NT-proBNP also at 1-year follow-up. HF was defined according to the 2016 ESC guidelines and participants were followed up for 1 year.

Results: Impaired LVEF and high NT-proBNP predicted combined HF and cardiac death up to 1 year after correction for confounders including age, ACE-inhibitors, AT1-blockers, diuretics, statins, neutrophils, hsCRP and immunosuppressive therapy (< 0.001). 159 patients (15.5%) had HFpEF as defined by a LVEF < 40%, 240 patients (23.4%) had HFmrEF as defined by a LVEF 40-50% and 628 patients (61.1%) had HFpEF as defined by a LVEF >50%. Among the patients with HFrEF, 32 developed MACCE events and 11 patients in the HFmrEF (4.6%) and in 9 patients in the HFpEF group (1.4%), p < 0.001. Impaired LVEF and increased NT-proBNP at the time of ACS predict HF and cardiac death at 1-year follow-up. Patients with HFrEF present higher rates of MACCE and cardiac death, thus, this subgroup of ACS patients deserves special attention and appropriate therapeutic measures.

Impact of manual thrombectomy on microvascular obstruction among STEMI patients

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Introduction: Manual thrombectomy (MT) in ST segment elevation myocardial infarction (STEMI) is not associated with improved outcome and may even be harmful. Microvascular obstruction (MVO) assessed with cardiac magnetic resonance (CMR) imaging is among the strongest outcome predictors after STEMI. We aimed to investigate the impact of MT on MVO occurrence and extent.

Method: Between December 2010 and June 2017, 401 consecutive STEMI patients admitted for primary PCI, and still hospitalized in our tertiary care hospital at day 3 or later, (i.e. not transferred to another hospital) underwent a CMR during the index hospitalization (routine care at our institution during this period). Among them, 383 patients fulfilled the inclusion criteria and were classified into 2 categories (with or without MT) while 18 patients were excluded because of incomplete CMR data. The 2 co-primary endpoints were the occurrence and the extent of MVO, with these latter being analyzed either as a categorical variable (MVO vs. No-MVO) or as a semi-continuous variable (numbers of segments with MVO), respectively.

Results: In total, 188 (49.1%) patients experienced MVO. Both the incidence of MVO and the median number of segments with MVO were significantly higher in the MT group as compared to the no-MT group (59.5% vs 38.9%, respectively p < 0.001, Figure P75-1A) and (0 [0;2] vs 1.5 [0;4]; respectively, p < 0.001). When stratifying the analysis on coronary thrombus grade (Figures P75-1B and P75-1C), similar results were found only in patients with high thrombus burden (43.5% vs 60.7%, respectively, p =
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Impact of cancer on clinical outcomes of acute coronary syndrome

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Background: The impact of cancer on coronary artery disease (CAD) has not been well clarified yet. We designed the present study to explore the prognostic influence of cancer in patients presenting with acute coronary syndrome (ACS).

Methods: 2'132 patients with ACS, enrolled in the prospective, multicentre Swiss Program University Medicine ACS (SPUM-ACS) cohort were included. The primary endpoints of major cardiovascular and cerebrovascular events (MACCE) and death were independently adjudicated at 30 days and one year follow-up.

Results: Of the 2'132 ACS patients 7.74% (n=165) had cancer. At one year, MACCE rate was higher in cancer than in non-cancer patients (15.7 vs. 7.0%, p<0.001). Similarly, all-cause mortality at one year was higher in cancer patients (13.4%) than in those without it (3.7%, p<0.0001) as was cardiovascular mortality (9.0% vs. 3.0%, p<0.001) and revascularisation (12.7% vs. 5.5%, p<0.001). In contrast, at 30 day, except for net adverse clinical events (NACE), all other outcomes did not differ significantly between the two groups. NACE rate was significantly higher in cancer patients at 30 days (15.2% vs. 8.3%, p=0.0025) as well as at one year follow-up (27.8% vs. 14.6%, p<0.001). A sub-analysis based on the types of cancer showed that solid, but not liquid cancers were more likely to experience MACCE (p=0.001) as well as a higher cardiovascular (p=0.001) and all cause mortality (p=0.0001) at one year follow-up compared to the non-cancer group.

Conclusions: ACS patients with cancer specifically those diagnosed with solid tumors have a less favorable outcome at one year with a higher MACCE and mortality rate than non-cancer patients.

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Non-invasive assessment prior to invasive coronary angiography in routine clinical practice in Switzerland - is it according to the guidelines?

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Background: Non-invasive testing is recommended as a basis to decide about the indication for invasive coronary angiography (ICA) in patients with suspected stenotic coronary artery disease (CAD). However, a recent study based on insurance claims data reported that one third of patients undergoing ICA in Switzerland did not have non-invasive testing beforehand. We aimed to re-evaluate the practice of testing prior to ICA in Switzerland by manual review of patient histories.

Methods: Retrospective analysis of 816 patients (age 67±9 years, 70% males) undergoing elective ICA solely for the evaluation of stenotic CAD during the year 2015 in a single center in Eastern Switzerland. The proportion of patients undergoing a non-invasive test was assessed, and predictors of the lack of such a test were determined. The following tests were considered as non-invasive tests: exercise stress test, stress echocardiography, myocardial perfusion scintigraphy, cardiac stress magnetic resonance, positron emission tomography, or computed tomography coronary angiography.

Results: 764/816 (94%) patients had a non-invasive test prior to ICA. The majority of patients (728/816; 89%) had an exercise stress test, one fifth (160/816; 20%) underwent a test other than an exercise stress test (6% scintigraphy, 4% stress echocardiography, 6% stress magnetic resonance imaging, 4% computed tomography coronary angiography), and 122/816 (15%) patients had two tests. The use of antianginal drugs other than beta-blockers [odds ratio 1.92 (95% confidence interval 1.01-3.66); p=0.047] and a lower left ventricular ejection fraction [odds ratio 0.97 (95% confidence interval 0.94-0.99) per one % point increase (p=0.005)] were independent predictor of the lack of a non-invasive test. ICA revealed stenotic CAD in 72% of patients, and 54% of patients underwent revascularization. Patients with and without non-invasive tests did not differ with respect to ICA findings and management.

Conclusions: The present analysis suggests that patients are appropriately selected for ICA based on clinical judgement and non-invasive testing in Switzerland. There is no evidence for an overuse of ICA.

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Association of the body mass index with outcomes in elderly patients (≥80 years) undergoing percutaneous coronary intervention

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Background: The obesity paradox has been described in various patient populations including patients with coro-
nary artery disease. The association between obesity and outcomes in elderly patients undergoing percutaneous coronary intervention (PCI) has not been investigated, yet.

**Methods:** A total of 990 elderly (≥80 years) patients undergoing PCI at our institution between January 2009 and December 2017 and with available data on body mass index (BMI) were divided according to BMI tertiles (lowest BMI tertile: < 24.09 kg/m², middle BMI tertile: 24.09-27.17 kg/m², and highest BMI tertile: >27.17 kg/m²). The primary endpoint was all-cause mortality at a median follow-up of 233 [34-862] days.

**Results:** All-cause mortality was 11.2%, 7.6%, and 5.8% in the lowest, the middle, and the highest BMI tertiles (p=0.03). Belonging to the lowest BMI tertile was associated with an increased risk of all-cause mortality in univariate analysis (HR 1.97, 95% CI 1.27-3.05, p=0.002), and associations remained significant after multivariable adjustments (adjusted HR 1.67, 95% CI 1.0-2.67, p=0.03). While belonging to the lowest BMI tertile was independently associated with an increased all-cause mortality in patients with acute coronary syndromes (HR 1.96, 95% CI 1.20-3.18, p=0.007; adjusted HR 1.72, 95% CI 1.01-2.91, p=0.04), relations were not significant in patients with stable coronary artery disease (HR 1.66, 95% CI 0.54-5.11, p=0.38; adjusted HR 1.38, 95% CI 0.43-4.42, p=0.59).

**Conclusions:** In elderly (≥80 years) patients undergoing PCI, belonging to the lowest BMI tertile is associated with an increased mortality, particularly in acute coronary syndromes. Hence, the body mass index should be incorporated into the risk stratification of elderly patients with coronary artery disease.