

of total strokes (OR: 1.77, 95% CI: 1.33 to 2.34, $p < 0.01$), predominantly non-fatal or disabling strokes (OR: 2.69, 95% CI: 1.58 to 4.59, $p < 0.001$). There was no statistical difference for fatal or disabling strokes ($p = 0.16$), all-cause mortality ($p = 0.98$) or restenosis ($p = 0.66$).

Conclusions: Symptomatic carotid artery stenosis continues to be an important cerebrovascular pathology. CAS has similar outcomes to CEA, but the increased risk of strokes, although non-fatal or disabling, remains a pressing issue. RCTs with longer follow up are needed to better understand the full long-term benefits and disadvantages of CAS.

CORONARY PHYSIOLOGY AND IMAGING

P749

Influence of coronary artery calcification on pressure-bounded coronary flow reserve

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Background: Coronary flow reserve (CFR) provides information about epicardial stenoses and microvascular function. It is suggested that CFR is impaired in patients with severe coronary artery calcification (CAC). Deriving CFR from pressure measurements only is impossible, but pressure-bounded coronary flow reserve (pb-CFR) is a new complex analysis technique yielding a range of CFR values derived from intracoronary pressure data.

Aim: We investigated the influence of severity of CAC on pb-CFR.

Method: In 228 consecutive patients (291 vessels) CAC was assessed by CT and pb-CFR was measured by invasive FFR measurements. At vessel level, CAC scores ≥ 75 th percentile were considered as "severe CAC". We categorized pb-CFR values into groups defined by the pb-CFR limits. Using a cutoff value for pb-CFR limits of 2, we digitized them into low and preserved. If pb-CFR limits overlapped 2, we could not categorize the flow reserve definitely. Multivariate analyses were performed to investigate the potential association between the severity of CAC and pb-CFR.

Results: Mean age of the population was 65 ± 10 years, 66% was male. Median CAC score was 498 (range 0 to 6141). We categorized 142 (49%) of the measurements into the low pb-CFR group ($n = 38$) or preserved pb-CFR group ($n = 104$). Diabetes was observed more frequent in the low pb-CFR group ($p < 0.01$). Severe CAC was observed in 24% of the vessels with low pb-CFR versus in 25% of the vessels with preserved CFR ($p = 0.53$). The adjusted odds ratio for low pb-CFR in vessels with severe CAC was 0.93 (95% CI 0.39–2.22, $p = 0.87$).

Conclusion: There is no association between severity of CAC and microvascular response to adenosine as measured by pb-CFR.

P750

Impact of lipid plaque component reduction during percutaneous coronary intervention on cardiac troponin elevation after procedure: a near-infrared spectroscopy analysis

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Background: Percutaneous coronary intervention (PCI) is often complicated by post procedural myocardial infarction (pMI) as manifested by cardiac enzyme elevation. Recently, near-infrared spectroscopy intravascular ultrasound (NIRS-IVUS) has emerged as a novel imaging tool for the prediction of pMI by identifying lipid containing plaque (LCP). We aimed to assess the relationship between NIRS-IVUS derived LCP component reduction during PCI and cardiac troponin-T (cTnT) elevation after PCI.

Methods: Forty-five patients who underwent percutaneous coronary intervention with normal cTnT levels were enrolled in this study. These patients were analyzed utilizing NIRS-IVUS before and after PCI procedure. According to maximal lipid core burden index (LCBI) score for each of the 4-mm longitudinal segments in the culprit lesion (maxLCBI4mm), the patients were divided into two groups; LCP group: maxLCBI4mm ≥ 500 ($n = 15$) and non-LCP group: maxLCBI4mm < 500 ($n = 30$).

Results: The baseline cTnT data was comparable between two groups (0.008 ± 0.010 vs. 0.007 ± 0.006 , $p = 1.0$). By contrast, cTnT after PCI and delta-cTnT (defined as cTnT after PCI - cTnT at baseline) were significantly higher in the LCP group than in the non-LCP group after PCI (0.073 ± 0.069 vs. 0.035 ± 0.031 ; $p = 0.014$, 0.066 ± 0.070 vs. 0.028 ± 0.032 ; $p = 0.016$, respectively). Furthermore, delta-LCBI (defined as maxLCBI4mm at baseline - maxLCBI4mm after PCI) was significantly higher in the LCP group than in the non-LCP group (401.1 ± 185.2 vs. 164.6 ± 136.6 , $p < 0.001$).

Conclusion: In the present study, the lesion with widely distributed LCP assessed by NIRS-IVUS can predict post-PCI cardiac enzyme elevation. Therefore, NIRS-IVUS measurement may be useful tool in detecting which lesions are high risks for pMI after PCI.

P751

In vivo vulnerability grading system of plaques causing acute coronary syndromes: an intravascular imaging study

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Background: Autopsy studies shed light on the interplay between fatal acute coronary events and features of plaque vulnerability, including pultaceous core, thin fibrous cap, local inflammation, lumen narrowing.

Purpose: This is a pilot study designed for generating a new in vivo imaging grading system of plaque vulnerability.

Methods: We prospectively studied 87 coronary vessels in 63 consecutive patients: 48 with Acute Coronary Syndrome (ACS) and 15 with stable coronary artery disease using Intra-Vascular Ultrasound-Near Infrared Spectroscopy (IVUS-NIRS) and Optical Coherence Tomography (OCT). We identified 99 lesions: 21 were the ACS culprit lesions (18 ulcerations and 3 with intact fibrous cap), 78 were non-culprit lesions including plaques located in the in the same ACS culprit vessel (N12), plaques located in a non culprit vessel in patients with ACS (28) and target lesions of stable patients (N 38). A second analysis focused on lipid plaques, comparing the 18 ACS culprit ulcerated lesions and the 55 non-culprit lesions.

Results: The co-presence of the following three features of vulnerability [Minimal Luminal Area (MLA) $< 4 \text{mm}^2$, Fibrous Cap Thickness (FCT) $< 75 \mu\text{m}$ and superficial macrophages] was by far more frequent in ACS culprit lesions than in controls (OR 40.6 for all lesions and OR 45.7 for ulcerated culprit lesions only). The triple-feature OCT grading identified vulnerable plaques with a much higher accuracy than that obtained applying each single feature of vulnerability (Figure 1).

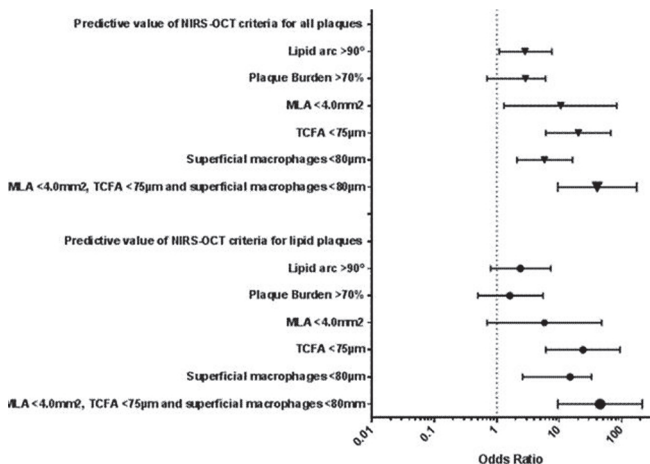


Figure 1

Conclusions: The co-presence of the 3 OCT features of vulnerability (MLA $< 4 \text{mm}^2$, FCT $< 75 \mu\text{m}$ and superficial macrophages) identifies culprit ACS lesions with a very high odd ratio. This finding could set the basis for a new OCT vulnerability grading system including superficial macrophages.

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P752

Clinical and angiographic outcomes of true versus false lumen stenting of coronary chronic total occlusions: insights from intravascular ultrasound

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Aims: The clinical implications of subintimal stenting of the recanalized CTO segment have not been characterized. We evaluated the in-hospital and the long-term clinical and angiographic outcomes of drug-eluting stents (DES) deployed in true versus false lumen of successfully recanalized CTO.

Methods and results: Two independent reviewers analyzed the intravascular ultrasound (IVUS) images of 173 successfully recanalized CTO lesions (157 patients), between August 2011 and October 2012. After successful guidewire crossing, lesions were classified according to IVUS evaluation into 2 groups; (1) true lumen stenting group and, (2) subintimal stenting group; and compared with