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Optical coherence tomography (OCT) guided percutaneous coronary intervention: clinical impact of acute abnormal findings after drug-eluting stent implantation detected only by OCT

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BACKGROUND Although acute abnormal findings (AAF) after drug-eluting stent (DES) implantation such as stent malapposition, edge dissection, tissue protrusion and thrombus were frequently observed by optical coherence tomography (OCT), relevant clinical implications have not yet to be evaluated systematically. We sought to evaluate long-term clinical outcomes of patients with AAF detected only by OCT after DES implantation.

METHODS A total of 153 patients undergoing OCT analysis immediate after DES implantation were divided into 2 groups of the AAF group and the non-AAF group according to presence or absence of OCT-defined AAF. MACE [major adverse cardiovascular events; cardiovascular death, non-fatal myocardial infarction (MI), target vessel revascularization (TVR)] were compared between two groups. Quantification analysis of AAF was performed to define the correlation between severity of AAF and MACE.

RESULTS Among total 153 patients, additional procedure was performed in 36 cases (23.4%) due to malapposition. On the final OCT examination, 24 out of 36 additional procedure cases had shown one or more AAF. The final incidence of AAF was 68.6% (105/153) and the incidence of each composite are as followings: tissue protrusion 55.2%, malapposition 49.5%, thrombus 31.4% and edge dissection 18.1%. Baseline characteristics were statistically similar in two groups. Median follow-up duration was 24.7±8.2 months. The rate of MACE was not significantly different between the two groups (3.8% for AAF vs. 6.3% for non-AAF, P=0.338), as well as each components of MACE; cardiovascular death (0 vs. 2.1%, P=0.314) and TVR (3.8% vs. 4.2%, P=1.000). On analysis of quantitative results, all measurements were not associated with MACE. Malapposition maximum depth and length were more severe in malapposition cases before additional procedure (284.09±264.06 μm and 5.96±6.30 mm) compared to final AAF (421.30±178.34 μm and length 1.84±1.65 mm).

CONCLUSIONS AAF detectable only by OCT after DES implantation had no effect on clinical outcomes, irrespective of its severity.

CATEGORIES IMAGING: Intravascular

KEYWORDS Clinical outcomes, Optical coherence tomography

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Quantification and characterization of released plaque material during implantation of bioabsorbable vascular scaffolds into right coronary artery lesions - a multimodality intracoronary imaging study

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BACKGROUND Periprocedural microembolization (PM) during a percutaneous coronary intervention (PCI) induces myocardial injury, ranging from asymptomatic increases in cardiac biomarkers to life-threatening situations. Intracoronary imaging can identify distinct plaque characteristics, which may predict PM. We aimed to compare current intracoronary imaging modalities for their ability to quantify the amount and to characterize the nature of released plaque material during implantation of bioabsorbable vascular scaffolds (BVS) into right coronary artery (RCA) lesions.

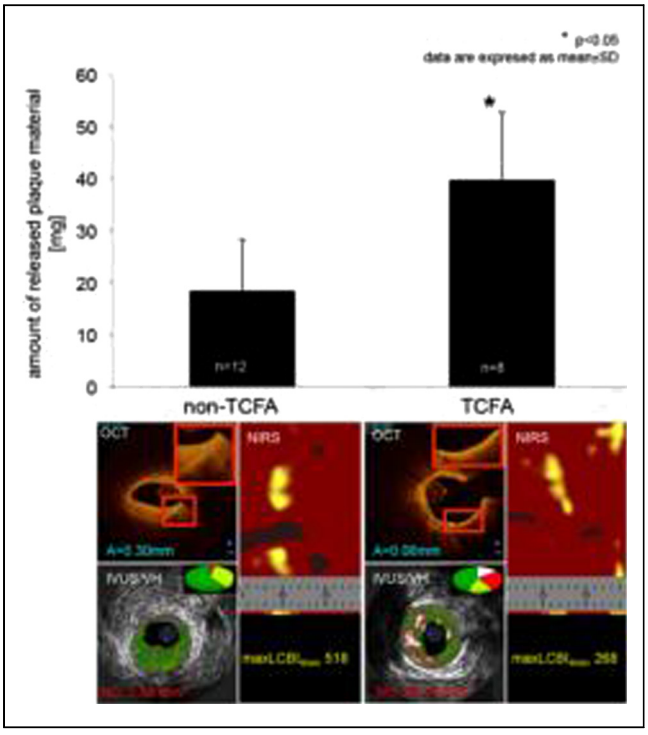
METHODS Twenty patients underwent BVS-implantation into the RCA under protection by distal occlusion. Prior, they underwent intracoronary imaging, using intravascular ultrasound with virtual histology (IVUS/VH), optical coherence tomography (OCT) and near-infrared spectroscopy (NIRS). Captured plaque material was weighed and its lipid content (LC) quantified by lipid extraction. Certain imaging parameters of all techniques (table) were correlated with the amount of released plaque material and with its LC. In addition, OCT-identified thin-cap fibroatheromata (TCFA) were compared to non-TCFA.

RESULTS IVUS/VH- and OCT-derived parameters correlated with the amount of released plaque material and its LC, while NIRS parameters did not display any correlation (table). The comparison of TCFA and non-TCFA revealed a greater NC volume in IVUS/VH (46.71±7.58 mm^3 vs. 18.82±8.26 mm^3, $p<0.05$) and a higher LAmax in OCT (285±69° vs. 177±61°, $p<0.05$), while there was no significant difference in maxLCBI4mm in NIRS (456±222 vs. 342±167, p=0.21). TCFA were associated with a more than 2-fold greater amount of released plaque material (figure) and its LC (4.28±1.04 mg vs. 2.03±0.93 mg, $p<0.05$) than non-TCFA.

Table. Correlations of imaging parameters and the amount of released plaque material and its lipid content

		Amount of released plaque material		Lipid content of released plaque material	
		Pearson' s coefficient	p-value	Pearson' s coefficient	p-value
IVUS/VH	NC volume (mm^3)	0.786	0.0001	0.790	0.0003
	NC percentage (%)	0.620	0.0035	0.381	0.0976
OCT	LA_{max} (°)	0.474	0.0347	0.727	0.0003
	LA_{mean} (°)	0.593	0.0587	0.586	0.0066
NIRS	$LCBI_{lesion}$	0.0100	0.967	0.163	0.492
	$maxLCBI_{4mm}$	0.293	0.210	0.278	0.236

NC: necrotic core; LA_{max}: maximal lipid arch; LA_{mean}: mean lipid arch; $LCBI_{lesion}$: lipid core burden index within the lesion; $maxLCBI_{4mm}$ maximal lipid core burden index within 4mm of the lesion



CONCLUSIONS Parameters of IVUS/VH and OCT can predict the amount of released plaque material and its LC. TCFA, which are also characterized by a high NC volume and a LAmax of at least 180°, are associated with a greater amount of released plaque material and its LC. Our data suggest the use of protection devices in PCI of TCFA to prevent plaque embolization.

CATEGORIES IMAGING: Intravascular

KEYWORDS IVUS, Near-infrared spectroscopy, OCT