

Native Coronary Artery Vulnerable Plaque Distribution Assessed by Virtual Histology - Potential Implications for Interventional Strategy

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Background – Pathology data indicate that distribution of vulnerable plaques, characterized by thin cup fibroatheroma (TCFA) overlying a large necrotic core (NC), is varied along the coronary tree, preferentially located in proximal segments. Similar data was also shown in clinical setting using intravascular radiofrequency virtual histology analysis (IVUS-VH). Accordingly, we hypothesized that vulnerable atherosclerotic plaques may be located away from the minimal luminal area sites.

Methods - Fifty patients (stable angina 42%, unstable angina 58%) with de-novo coronary lesions defined as angiographic stenosis of >50% underwent IVUS-VH assessment. Off-line IVUS-VH advanced analysis was performed on 69 segments (2735 slices).

Results – The mean segment length was 19.8 ± 13.7 mm, luminal volume 267.5 ± 179.5 mm³, vessel (EEM) volume 113.4 ± 67.8 mm³ and plaque volume 55.3 ± 9.2 mm³. Maximal NC area was located in MLA site in only 12 (17%) and away from the MLA site in 57 (83%) of the lesions. Slices containing maxNC area were found as far as 26 mm proximal and 22 mm distal to the MLA site (average 4.6 ± 5.3 mm). In those 57 segments, maxNC sites were more frequently characterized by morphological and compositional measures of vulnerable plaque compared to MLA sites (Table)

IVUS Measures	MLA @	MaxNC @	P-value
	non-Max NC (n=57)	non-MLA (n=57)	
Luminal area (mm ²)	3.65 ± 1.25	5.10 ± 2.2	<0.001
Area stenosis (%)	59.5 ± 10.7	32.69 ± 24.6	<0.001
Plaque burden (%)	76.02 ± 10.5	64.57 ± 11.22	<0.001
Remodeling index	0.89 ± 0.15	1.039 ± 0.17	<0.001
Fibrotic (%)	54.8 ± 13.85	47.7 ± 13.43	<0.001
Fibrofatty (%)	14.3 ± 11.28	9.4 ± 8.6	<0.001
Dense calcium (%)	11.9 ± 10.3	15.3 ± 10.8	<0.001
Necrotic core (%)	19.1 ± 11.48	27.7 ± 11.3	<0.001
TCFA (n, %)	14, 24.5	23, 40	0.11

Conclusions – In patients with intermediate lesions, vulnerable plaques are often located away from the MLA sites. This observation may have impact, in certain circumstances, on the interventional strategy.