

## The developing mechanism of atherosclerotic lesion in coronary side branch on the ventricular free wall differs by the location of lesion

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**Background:** The effective treating method of coronary side branch lesions such as ostial stenosis or thin arteries has not been established. On the other hand, tortuous side branch rarely has stenotic lesions.

**Purpose:** We focused on coronary side branches on the ventricular free wall, and examined coronary risk factors and bending and stretching motion of branch which can contribute to the development of atherosclerotic lesion.

**Methods:** In elective and first-time coronary angiograms, we included side branches on the ventricular free wall (>2mm in diameter) and excluded previously treated ones. Study A; we divided arteries into proximal, middle, and distal segment, and examined the presence of tortuosity and stenotic lesions exceeding 50% diameter stenosis (DS) for each segment. A score of 1 was assigned to tortuous segment, and 0 to non-tortuous one. Study B; we included stenotic lesion (>50% DS) in side branch ostium and excluded those extended across main coronary arteries. Relation between lesions and patients' characteristics was examined.

**Results:** Study A; in 1,828 side branches from 472 patients, middle and distal segments had significantly higher tortuosity score than proximal (0.68, 0.78 vs. 0.34;  $p<0.0001$ ). On the contrary, proximal segments had more stenotic lesions except ostial stenosis (230 vs. 69, 5;  $p<0.0001$ ). Study B; in 1,740 side branches from 465 patients, 122 ostial stenotic lesions were found (7.0%). Multivariate logistic regression analysis revealed diabetes mellitus and age as independent contributors to development of ostial stenosis (Table).

**Conclusions:** Side branch stenosis developed less frequently in middle and distal segments, where stronger ventricular wall motion reinforces bending and stretching motion and tortuosity of arteries. This fact indicates that those characteristics may prevent developing atherosclerosis through increasing shear stress. On the other hand, diabetes mellitus strongly contributes to the development of ostial stenosis. Thus, the developing mechanism of atherosclerotic lesion in side branch on the ventricular free wall differs by the location of lesion.

Contributor of ostial stenosis (n=1,740)

	Odds ratio	95% CI	p value
Age	0.98	0.96–1.00	0.037
Sex (male)	0.91	0.59–1.38	0.65
Hypertension	1.03	0.69–1.53	0.88
Diabetes Mellitus	0.29	0.20–0.43	<0.0001
Hyperlipidemia	1.03	0.70–1.52	0.87
History of smoking	1.25	0.79–2.00	0.35