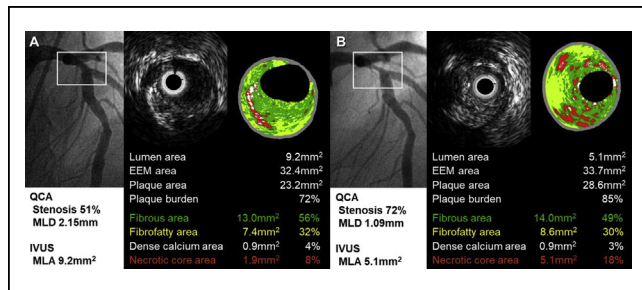


prospective cohort study to identify long-term clinical outcomes of patients with the untreated non-culprit intermediate lesion and evaluate its cardiovascular predictor by using virtual histology-intravascular ultrasound (VH-IVUS).

**METHODS** Subjects with non-culprit intermediate lesion underwent VH-IVUS were enrolled after percutaneous coronary intervention at the culprit lesion. Intermediate lesion was defined as 30% to 70% stenosis in coronary angiography and primary outcome was an occurrence of major adverse cardiovascular events (MACE) defined as all-cause death, target lesion revascularization (TLR), non-TLR (unplanned revascularization elsewhere in the target vessel or in other coronary arteries which looked normal or minimal stenosis), cerebrovascular events or non-fatal myocardial infarction (MI). The mean follow-up period was 4.2 years.

Figure represents angiographic and VH-IVUS images of patients whose intermediate lesion progressed rapidly and underwent revascularization after 9 months. (A: baseline, B: after 9 months)



**RESULTS** Total 25 MACE were identified in 86 patients with 89 intermediate lesions. Diameter stenosis (OR 1.07, p = 0.015), plaque burden (PB, OR 1.07, p = 0.040), fibrofatty area (FFA, OR 1.61, p = 0.016), PB ≥ 70% (OR 3.93, p = 0.018) and area stenosis ≥ 50% (OR 2.94, p = 0.042) showed significant relationships with an occurrence of MACE. In multivariable Cox-proportional hazard analysis, FFA in intermediate lesion was significantly associated with MACE.

Table 1. Incidence of MACE

Variables	Incidence	Proportion (n = 86)
All-cause death	3	3.5 %
Target lesion revascularization	13	15.1 %
Non-target lesion revascularization	6	7.0 %
Cerebrovascular event	1	1.2 %
Non-fatal myocardial infarction	4	4.7 %
Total	25	29.1 %

MACE, major adverse cardiovascular events

Table 2. Adjusted and multivariable analyses for predictors of MACE

Variables	Model 1			Model 2		
	HR	95 % CI	p	HR	95 % CI	p
Diameter stenosis	1.04	1.00 - 1.09	0.030	NS		
Plaque burden	1.05	1.00 - 1.12	0.070	NS		
Fibrofatty area	1.42	1.10 - 1.85	0.008	1.36	1.05 - 1.77	0.019
Plaque burden ≥ 70 %	2.34	1.02 - 5.37	0.046	NS		
Area stenosis ≥ 50 %	2.59	1.15 - 5.84	0.022	NS		

MACE, major adverse cardiovascular events; HR, hazards ratio; CI, confidence interval; NS, non-significant Model 1 - age, gender, hypertension, diabetes mellitus, smoking and dyslipidemia were adjusted. Model 2 - diameter stenosis, plaque burden, fibrofatty area, plaque burden ≥ 70 % and area stenosis ≥ 50 % were added in Model 1.

**CONCLUSION** Untreated intermediate lesions had a significantly higher chance for requiring revascularization compared with a normal or minimal lesion. And also, a large FFA in intermediate lesion was a significant predictor of cardiovascular events and which finding was mainly driven by coronary-related events, in particularly intermediate lesion progression.

**TCTAP A-084**

**Significance of Vasa Vasorum Identified by Optical Coherence Tomography on Plaque Erosion in Patients with Acute Coronary Syndrome**



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**BACKGROUND** Previous studies have shown that vasa vasorum (VV) is an accelerator of plaque progression and frequently observed in patients with plaque rupture (PR). However, the association between VV and plaque erosion (PE) is not well understood. Therefore, the aim of this study is to clarify the association between VV and morphological characteristics of coronary plaque in a patient with acute coronary syndrome (ACS).

**METHODS** This study is a retrospective single-center study. From January 2014 to August 2018, consecutive ACS patients who underwent OCT before ballooning were enrolled. Following cases were excluded; cardiac arrest, ostium lesion and poor quality of OCT image. OCT was performed after thrombus aspiration. According to OCT assessment, plaque characteristics were classified into PR, PE, calcified nodule (CN) and other. The presence of VV within the culprit lesions were also evaluated. VV was defined as non-signal tubuloluminal structures without a connection to the vessel lumen, recognized on more than three consecutive cross-sectional OCT images. It included in exterior to the media (within 1 mm).

**RESULTS** A total of 160 patients were enrolled in this study. We excluded 48 patients for the preceding reasons. Finally, 112 patients were evaluated by OCT (40 patients with PR, 56 patients with PE, 10 patients with CN, 6 patients with other). VV was identified in 43 patients (38.4%). VV was most frequently observed in patients with PR (65.0%), while, in patients with PE, VV was observed only in 23.2% (p < 0.01, respectively).

**CONCLUSION** Our study showed PE had a lower prevalence of VV than PR did in patients with ACS. In patients with PE, VV was not the main character in the pathogenesis of ACS.

**TCTAP A-085**

**Systolic Twist of the Heart in Patients with Dilated Cardiomyopathy vs. Patients Without Heart Failure**



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**BACKGROUND** Change in fibers orientation because of myocardial remodeling can result not only in longitudinal contraction decrease but also in myocardial radial and circular systolic twist change during heart cycle [Popescu B.A. et al, 2009]. This is one of several signs of congestive heart failure (CHF). Myocardial deformity disorder is more severe in patients with CHF of III-IV functional classes [Mondillo S. et al, 2011].

The definition of changes in the mechanics of the heart in the early stages of the CHF development can be a crucial point for the early diagnosis and treatment of this dangerous pathology.

**METHODS** The aim of this study was to develop methodology to evaluate the heart rotation during systole and diastole.

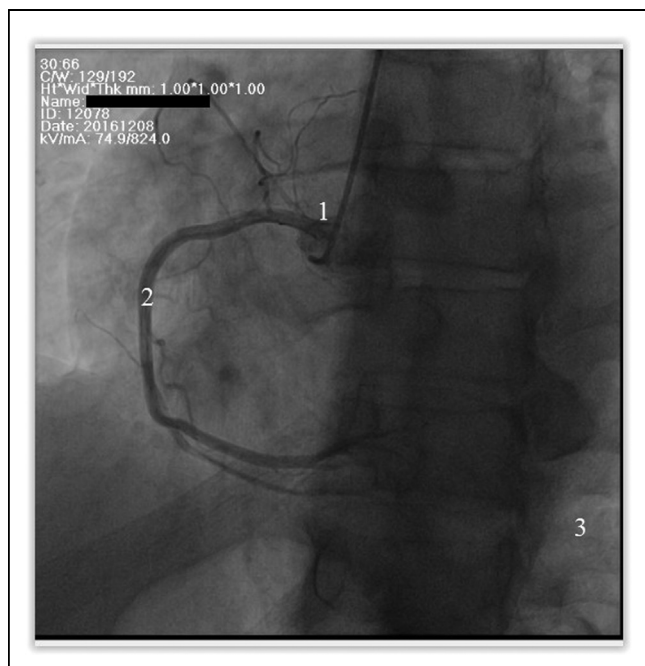
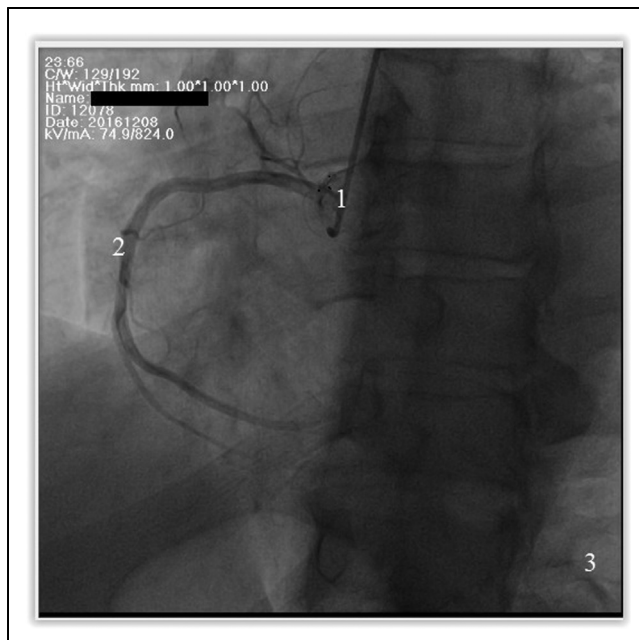
We have developed a methodology to calculate the angle of the heart rotation during X-ray diagnostic studies using landmarks on coronary angiography in two planes.

We used coordinates of three points in one plane of the right coronary artery in systole and diastole and similar points in another plane in systole and diastole. The first point and third one is relatively do not rotate and make axis for second one which is in the middle of the artery with some landmark (for example the side branch) and it rotates with the heart. Using trigonometry, we have made algorithm to convert from 2D coordinates of two planes to 3D rotation angle. With this algorithm we have made the computer program and calculate angles automatically using these 3 pairs of coordinates in systole, diastole in two different planes.

According to Speckle tracking [Pavlyukova E.N. et al, 2015; Takeuchi M. et al, 2006; Victor Mor-Avi et al, 2015], the average value of the twist angle of the left ventricle (LV) in a healthy population is  $7.7 \pm 3.5$  degrees. The rotation angle is  $7.7 \pm 3.5$  degrees corresponds to the normal findings of LV twist. The rotation angle is  $< 4.2$  degrees is an unfavorable prognosis for the development of CHF.

**RESULTS** 90 patients (age 31 to 76 years old) were examined using coronary angiography-based methodology to provide an evaluation of the heart mechanics performance. The subjects were divided into groups with dilated cardiomyopathy and patients with autonomic nervous system disorder without heart failure (control group).

The average value of LV twist angle [deg] in patients with dilated cardiomyopathy is  $6.1 \pm 3.3$  degrees, in patients with autonomic nervous system disorder it is  $9.6 \pm 3.5$  degrees. Statistically significant differences in twist angles [deg.] were revealed in patients with dilated cardiomyopathy and group without heart failure ( $p < 0.05$ ).



**CONCLUSION** According to the literature and our study, the twist angle of the left ventricle is significantly reduced in patients with dilated cardiomyopathy. In the setting of changes of the left ventricle shape (dilatation), there is a violation of the twisting angle, which leads to the progression of heart failure.

Changes in the left ventricle twist angle in case of dilated cardiomyopathy can potentially be used to monitor the disease progression and the effect of medical treatment that is the subject of research.

**TCTAP A-086**

**Incidence of Irregular Protrusion Was Not Different Between Xience Drug-eluting Stent and Resolute Drug-eluting Stent**



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**BACKGROUND** The irregular protrusion has been reported as an independent predictor of 1-year adverse cardiac events. However, the impact of stent type on the incidence of irregular protrusion remains to be elucidated.

**METHODS** A total of 308 consecutive patients with stable angina, who underwent optical coherence tomography-guided percutaneous coronary intervention with Xience drug-eluting stent or Resolute drug-eluting stent were identified. Among them, we included 76 propensity score-matched pairs adjusted by clinical characteristics and plaque morphology. The incidence of irregular protrusion was compared between the Xience group and the Resolute group.

**RESULTS** The incidence of irregular protrusion was comparable between the Xience group and the Resolute group (18.4% vs. 17.1%,  $P = 0.832$ ). The incidence of other vessel injuries including stent edge dissection, in-stent dissection, and smooth protrusion was also comparable between the two groups.

**CONCLUSION** The difference in the incidence of irregular protrusion between Xience stent and Resolute stent was not demonstrated in the preset study. Studies with other stent types in different cohort may further clarify the impact of stent type on the incidence of irregular protrusion.