Five-year major adverse cardiac and cerebrovascular events of patients with lipid core abutting lumen (LCAL) on integrated-backscatter intravascular ultrasound undergoing PCI with current DES

M. Ohta[1], Y. Ozaki[1], T. Toriya[1], R. Nagasaya[1], H. Takatsu[1], Y. Yoshiki[1], Y. Hashimoto[1], M. Ishikawa[2], H. Kawai[1], T. Muramatsu[1], H. Naruse[1], H. Takahashi[1], J. Ishii[1], H. Izawa[3]

[1]Fujita Health University, Toyoake, Japan; [2]Sakurabashi-Watanabe Hospital, Cardiology, Osaka, Japan; [3]Fujita Health University Second Hospital, Cardiology, Nagoya, Japan

Funding Acknowledgement: Type of funding source: None

Background: Percutaneous Coronary Intervention (PCI) using the new generation drug-eluting stent (DES) has been extremely reduced target lesion revascularization (TLR) in recent years. However, a high incidence of non-target lesion-related cardiovascular events in patients undergoing PCI is an important problem to be solved. According to the previous findings, patients with vulnerable plaques particularly have a high recurrence of cardiovascular events. Little studies, however, has been done to examine the relationship between plaque characteristics on intravascular imaging in a target lesion and non-target lesion-related cardiovascular events.

Purpose: The main objective of this study is to investigate the five-year major adverse cardiac and cerebrovascular events (MACCE) of patients with lipid core abutting lumen (LCAL) on integrated backscatter intravascular ultrasound (IB-IVUS) in a target lesion undergoing PCI with current DES.

Methods and results: Between February 2010 and September 2013, in total 780 patients with ischemic heart disease undergoing PCI, 166 target lesions in 166 consecutive patients with non-ST segment elevation acute coronary syndrome (NSTE-ACS) and stable angina pectoris (SAP) undergoing IVUS-guided PCI were studied.

Plaque characteristics in all target lesions were analyzed by three-dimensional IB-IVUS system using the mechanical IVUS catheter. Our previous study has found that LCAL which is defined as a lipid pool directly in contact with the lumen visualizes the thin fibrous cap of less than 75μm on optical coherence tomography (OCT). On the basis of this data, LCAL at minimal lumen area (MLA) site was identified.

In total, 39 patients had lesions with LCAL at MLA site (LCAL(+)), and 127 patients had those without LCAL (LCAL(–)).

The primary endpoint was defined as MACCE, including cardiovascular death, non-fatal myocardial infarction, non-fatal stroke and non-TLR for the new lesion during a median follow up of five years. The MACCE occurred significantly higher in the LCAL(+) than in the LCAL(–) (38.5% vs. 17.3%; $p<0.005$). And the Kaplan-Meier estimates have shown that the cumulative incidence of MACCE was significantly higher in the LCAL(+) than in the LCAL(–) (log rank test, p=0.041). Additionally, after adjustment for confounders, gender, prior PCI and LCAL was the independent predictors for the MACCE of patients undergoing PCI with current DES.

Furthermore, after adding LCAL to a baseline model with established factors consisting of age, gender, diabetes mellitus, prior PCI and percentage lipid volume on IB-IVUS, the net reclassification ($p<0.002$) and integrated discrimination improvement ($p<0.004$) significantly improved compared to baseline model alone.

Conclusions: In this study, it has become clear that LCAL on IB-IVUS is likely to be a surrogate marker of MACCE in patients undergoing PCI with current DES.