

P5612

In vivo histological and clinical evaluation of layered culprit plaque by optical coherence tomography in stable angina patients

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Background: In patients with stable angina pectoris (SAP), exact mechanism of plaque progression overtime is still unclear due to lack of histological evaluation. Directional coronary atherectomy (DCA) allows for the differential cutting of atherosclerotic lesions and for the histological examination.

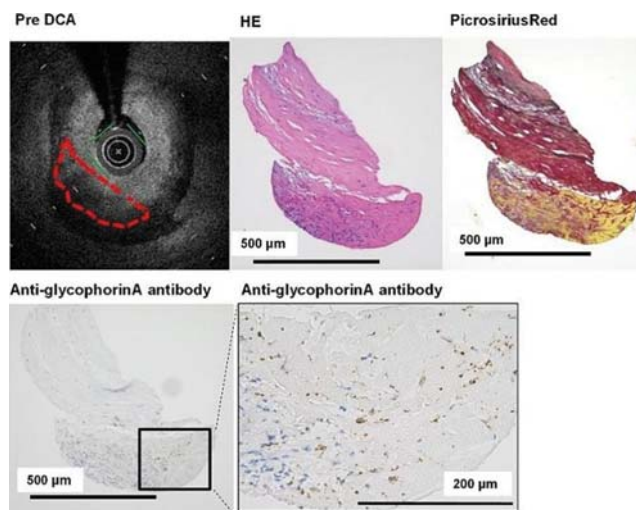
Purpose: The aims of this study were to compare the histological features obtained by DCA and layered pattern (LP) by OCT, and to establish the prevalence and clinical characteristics of LP in culprit lesion form SAP patients.

Methods: SAP patients who underwent OCT imaging guide PCI in our medical school hospital between June 2016 and June 2018 were included into this study. This was two-fold histological and clinical studies. In a histological study, we evaluated histological features of 42 specimens from 18 patients who underwent DCA and compare OCT findings. Lesions were classified into the following categories based on the OCT finding before DCA cutting; homogeneous or heterogeneous group. Furthermore, lesions in heterogeneous group were classified into 2 categories; LP or non-LP

group. In a clinical study, 205 target lesions from 205 patients were categorized as shown above at minimum lumen area (MLA) sites. Plaque characteristics were compared among these groups.

Results: In the histological study, 9 (21.4%) specimens were classified in homogeneous group and 33 (78.6%) in heterogeneous group. In 33 heterogeneous group, LP group were observed in 12 specimens (36.3%). Of 12 LP group, 10 LP group consisted of intramural thrombosis. In clinical study, 39 (19.0%) lesion were classified in homogeneous group and 166 (81.0%) in heterogeneous group. In 166 heterogeneous group, LP group were observed in 75 lesions (45.2%). Of heterogeneous group, LP group had significantly smaller MLA ($1.5 \pm 0.9 \text{ mm}^2$ vs $1.9 \pm 1.0 \text{ mm}^2$, $p < 0.05$) and higher rate of microchannels (57.3% vs 15.4%, $p < 0.05$) than non-LP group.

Conclusions: LP in culprit lesion with SAP was significantly associated with intramural thrombosis. MLA sites in LP was significantly smaller than in non-LP group. These data suggest that thrombus formation and subsequent their organization overtime might contribute to the plaque progression even in SAP patients.



A representative layered pattern case