

Role of Intracoronary OCT in Diagnosis and Treatment of Acute Coronary Syndrome

Haibo Jia^{1,*} and Bo Yu¹

Abstract: Coronary angiography is the traditional standard imaging modality for visual evaluation of coronary anatomy and guidance of percutaneous coronary interventions (PCI). However, the 2-dimensional lumenogram cannot depict the arterial vessel per se and plaque characteristics, or directly assess the stenting result. Intracoronary imaging by means of intravascular ultrasound (IVUS) and optical coherence tomography (OCT) provides valuable incremental information that can be used clinically to optimize stent implantation and thereby minimize stent-related problems. Beyond guidance of stent selection and optimisation, imaging provides critical insights into the pathophysiology of acute coronary syndrome (ACS), greater clarity when confronted with angiographically ambiguous lesions and highlights the dynamic nature and significance of atherosclerotic coronary plaque. For several decades, most physicians have believed that ACS is caused by coronary thrombosis resulting from rupture of vulnerable plaque characterized by a thin fibrous cap overlying a large necrotic core and massive inflammatory cell infiltration. However, nearly one-third of ACS cases are caused by plaque erosion characterized by intact fibrous cap, less or absent necrotic core, less inflammation, and large lumen. Because of the limitations of current imaging modalities, including angiography and intravascular ultrasound, the importance of plaque erosion as a cause of acute coronary events is less well known. OCT as an emerging modality with extremely high resolution is the only intravascular imaging modality available for identification of plaque erosion in vivo, which provides new insight into the mechanism of ACS. More importantly, the introduction of OCT to clinical practice enables us to differentiate the patients with ACS caused by plaque erosion from those caused by plaque rupture, thereby providing precise and personalized therapy based on the different underlying mechanisms. This presentation will systematically review the morphological characteristics of plaque erosion identified by OCT and its implications for the management of ACS.

Keywords: Optical coherence tomography, coronary, plaque rupture.

¹ Department of Cardiology, the 2nd Affiliated Hospital of Harbin Medical University, The Key Laboratory of Myocardial Ischemia, Chinese Ministry of Education, Harbin, China.

* Corresponding Author: Haibo Jia. Email: jhb101180@163.com.

**Haibo Jia, MD, Ph.D., FACC, FCIT**

Vice Director, Professor of Medicine

Department of Cardiology 2nd Affiliated Hospital of Harbin Medical University; The Key Laboratory of Myocardial Ischemia, Chinese Ministry of Education

Harbin 150086, China

Email: jhb101180@163.com

Mobile: 15945685291 | Tel.: +86-45186605359 | Fax: +86-45186605180

Professor Haibo Jia's research interest is focused on intravascular imaging (OCT, IVUS, and NIRS) assessment of coronary atherosclerotic plaques morphology, specifically on pathophysiological mechanism of ACS. His achievements had a great impact on the field of coronary artery imaging research. First, the identification of plaque erosion as a substantial atherothrombotic mechanism of ACS, transformed the way of analyzing intracoronary optical coherence tomography (OCT) clinical data. Second, in collaboration with Prof. IK Jang at Mass General Hospital, he made a breakthrough in the field of intravascular imaging developing a new algorithm to allow a more objective assessment of plaque erosion. He performed a well-known first-in-man study at Harbin Medical University- China (EHJ 2017, EROSION) applying this technology to patients undergoing percutaneous coronary intervention (PCI), providing a NEW method capable of acquiring information about possible non-stenting strategy. From 2012 to 2015, he was trained as a research fellow in MGH, Harvard Medical School, supervised by Prof. Ik Jang who is the master of intravascular imaging in the world. He has co-authored over 50 peer review scientific papers in this field including JACC, European Heart Journal, and Lancet. He is co-author of imaging chapters in 5 books. He has been invited as speakers and faculty members at many national and international meetings including TCT, ESC, ACC, C3, CIT, and GW-ICC.