

From TCT 2008: OCT Detects Vulnerable Plaque Better than Other Modalities

Key Points:

Technology could provide insights into CAD etiology, treatment.

By TCT Daily Staff

Optical coherence tomography provides better contrast and resolution of arterial pathology than intravascular ultrasound and virtual histology, demonstrating a greater potential for identifying vulnerable plaque, according to an abstract presented at TCT 2008 in Washington, DC.

In clinical practice, optical coherence tomography (OCT) has a resolution nearly 10 times higher than intravascular ultrasound (IVUS) and other modalities, said lead study investigator So-Yeon Choi, MD, of Ajou University School of Medicine, Suwon, South Korea. "OCT may provide a better understanding of the natural progression of coronary artery disease," Choi said. "It may answer longstanding questions about the relationship between vulnerable plaque and the risk of heart attack."

Results and analysis

In a study that included 48 patients (33 with acute coronary syndromes, 15 with stable angina), Choi and colleagues compared how well IVUS, virtual histology (VH-IVUS), and OCT detected vulnerable plaque, with two observers analyzing images independently using previously validated criteria. IVUS analysis showed that in the ACS group, the presence of a lipid core within the whole lesion ($P = .036$) and positive remodeling ($P = .049$) are more common. The VH-IVUS results indicated that the ACS group had a larger percent necrotic core area in the largest necrotic core cross-section than the stable angina group ($P = .001$). Meanwhile, fibrous cap thickness ($P = .016$), lipid-rich plaque ($P = .019$), and the presence of thrombus ($P = .001$) were significantly associated with clinical presentation in the OCT analysis, according to the investigators.

In addition, after adjusting for confounders, percent necrotic core on VH-IVUS, and thin-cap fibroatheroma and thrombus on OCT were independent predictors of clinical presentation.

"OCT might have a potential to detect vulnerable plaque by demonstrating thin fibrous cap, lipid-rich plaque, and thrombi because of its high-resolution imaging capability," Choi said. "OCT detected most of these major and minor characteristics of vulnerable plaque, including thin cap with large lipid core, endothelial denudation with superficial platelet aggregation, fissured plaque, significant stenosis (>90%) and superficial calcified nodule. The ability of OCT to detect in some criteria (ie, thrombus and fissured plaque) is four to five times better than that of other modalities."

Additional benefits

With its high-resolution images, OCT can also enable more accurate tissue characterization than other modalities, Choi said. In addition, OCT results provide a greater understanding of superficial vascular pathology. "For example, superficial pathology including plaque erosion or denudation could be detected even in patients with stable angina, a finding that we've never seen before," Choi said, adding that, "More research is necessary to determine the clinical implications of these findings."

Current OCT systems have some limitations – the need for a blood-clear zone and a low penetrating depth – but the technology is safe, Choi said, adding that it can be used safely in the

cath lab.

"New evolving OCT imaging is closer to becoming a powerful diagnostic tool that will provide new insights into the etiology and treatment of coronary artery disease," Choi said.

But for now, the goal remains to identify vulnerable plaque on the coronary vascular tree and hopefully prevent a future heart attack or sudden cardiac death, Choi said. "It is the most challenging task for a cardiologist to detect vulnerable plaque and prevent the future event," he said.

Disclosure:

- Dr. Choi reports no conflicts of interest with regard to this study.