Editorial Comment

A glimpse of the future: optical coherence tomography in the real world

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In vivo visualization of the coronary arteries is the most elegant way to confirm or refute any iatrogenic or pathological lesions and their association with any short- and long-term positive or negative results. At this present time, intravascular ultrasound (IVUS) is the standard technique in imaging coronary plaque and plaque volume measurements. However, in this March 2007 issue of the *Journal of Geriatric Cardiology*, Lu et al. showed us the real world results of optical coherence tomography (OCT) with 1) more than 30% of vulnerable plaques ruptured in elderly patients with unstable angina (UA), 2) intraluminal thrombus in less than 27% patients on treatment, and 3) high tissue prolapse rate after stent implantation (73%).

The pictures of the arterial wall by OCT were nearly perfect with the identification of plaque characteristic: thickness, histology, soft or hard contents and calcification. The arterial wall dissection, intra-luminal thrombus, tissue prolapse, stent apposition, and irregular stent struts were clearly evidenced without doubt. These high resolutions of OCT provide clear and detailed morphological information in contrast to the IVUS images with fuzzy vessel wall, struts, and shadow of tissue prolapse. Thrombus cannot be identified nor confirmed nor excluded by IVUS while it is clearly shown by OCT.

The presence of tissue prolapse is evidenced as it is without dramatization by OCT. Its presence is postulated to be related with: 1) slow reflow or non reflow during emergency interventions, 2) acute, subacute or chronic in-stent thrombus, and 3) long-term in-stent restenosis. However, no study ever proved the cause-effect relationship between tissue prolapse and late angiographic in-stent restenosis.

So OCT is clearly the winner in the battle of coronary artery imaging. However, there are still limitations of OCT. The OCT imaging system is limited by the diameter, location and time of the occlusion balloon, and the location of the artery such as the left main stem coronary and the ostium of the left anterior descending artery, left circumflex and right coronary arteries.

A few years ago I asked a friend of mine who is internationally known in the field of vascular imaging about the future of OCT. His answer is that OCT is great; however it has to be refined and affordable for more popular use. The indications of OCT need to be spelled out. Then OCT will replace IVUS as the method of choice for coronary imaging in research, clinical trials and then in the real world.

In this issue of the *Journal of Geriatric Cardiology*, Lu et al. told us that 1) it is safe and feasible using high resolution and contrast intravascular OCT to diagnose vulnerable or high risk coronary plaque and monitor stent deployment in the elderly patients, 2) coronary plaques in the elderly patients could be divided into acute ruptured plaque, vulnerable plaque, lipid-rich plaque, and stable plaque, 3) minor or critical plaque rupture is one of the mechanisms of UA in the elderly patients, 4) present stent implantation is complicated with multiple tissue prolapses which are significantly associated with irregular strut distributions, and 5) the action and significance of tissue prolapse on acute vessel slow flow or no flow, in-stent thrombus and chronic in-stent restenosis need to be further investigated. The future of OCT is bright and challenging.