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Sightseeing: in search of the best vascular view

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Intravascular imaging guidance represents an unrequited romance for most interventional cardiologists. Indeed, the full potential of the "perfect view" of plaque and vessel contours often remains unexpressed in clinical practice.

Optical coherence tomography (OCT) images are very attractive for interventional cardiologists and experts in atherosclerosis. The clinical and research insight of an OCT high-resolution image should not be limited to a simple ideal case, characterised by a mild narrowing located in a proximal coronary segment.

The proper identification and characterisation of atherosclerotic plaque morphology probably represents the most important attribute of FD-OCT images. Indeed, the possibility to assess lesions before any treatment (i.e., predilatation) constitutes an important advantage for the better understanding of the vulnerability of the evaluated plaque (i.e., fibrous cap thickness and macrophage infiltration) and the underlying pathophysiologic mechanism (e.g., plaque erosion or ulceration). This is also true for the evaluation of a restenotic severe lesion or stent thrombosis (e.g., acute underexpansion or late malapposition assessment). In all of these cases, balloon predilatation inevitably leads to plaque disruption with consequent loss of the above-mentioned information. Furthermore, a true understanding of luminal dimensions at lesion and reference sites is key to selecting balloon-stent diameters and lengths[1].

Development of a valid acquisition technique for obtaining OCT images has been a long and difficult battle. Ten years ago, our group proclaimed with enthusiasm the innovative non-occlusive technical solution that enabled the use of time domain OCT without an occlusive balloon[2]. At that time, the infrared light was incorporated in a thin image wire and imaging of a severely stenotic artery was not seen as a problem. A few years later, such an acquisition modality, characterised by simple injection of contrast media through the guiding catheter, served to launch the second-generation frequency domain OCT, characterised by a very high acquisition speed. A drawback of these currently used over-the-wire probes is that they have a larger size, which impairs assessment of severe lesions whenever the catheter totally occludes the lumen. This represents a new problem, which remains difficult to overcome.

Tian and colleagues[3] experimented with a modified FD-OCT acquisition technique to improve imaging of severe lesions, offering a simple solution. Starting from the previous experience of

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Yamaguchi et al[4], who developed a specific technique to obtain good quality imaging in acute patients (i.e., STEMI), Tian et al

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introduced a temporised distal flushing just before FD-OCT pull-back to increase the imaging quality of severely stenotic coronary lesions. The main advantages of this approach are the simplicity of execution, as compared to the method proposed by Yamaguchi et al, the improved blood clearance distal to the lesion, and the reduced increase of contrast dye needed (only 2.5 ml more than standard acquisition).

As clearly specified by the authors, the observed results in this paper are technically interesting and serve as a proof of concept. The suggested approach seems promising in order to reduce artefacts due to incomplete blood clearance, which limit image resolution and correct interpretation of vascular elements (e.g., residual red blood cells versus intravascular red thrombus). On the other hand, the clinical application of such a technique is still unclear. For instance, the effectiveness and safety of this approach in a larger lesions database, including stable atherosclerosis or acute coronary syndromes, needs to be proved. Furthermore, there are technical aspects which are not yet understood such as the incidence of image distortion due to non-uniform rotation that may affect image quality.

Tian and colleagues should be congratulated. Any technical refinement of OCT acquisition is welcome and their effort to increase intravascular imaging quality with a rather simple technical solution merits proper consideration.

However, it goes without saying that, had we available to us in our armamentarium thinner frequency domain OCT probes, assessment of severe narrowing could be carried out without the need to embrace technical solutions which, on the one hand, are unlikely to enable optimal imaging in all cases and, on the other hand, make procedures a little more complex.

Conflict of interest statement

F. Prati has served as a consultant for St. Jude Medical. The other authors have no conflicts of interest to declare.

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