Optical Coherence Tomography In Primary Angioplasty

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A 52 year old male was admitted with acute inferior and posterior wall ST elevation myocardial infarction 6 hours from the onset of pain. He was taken up for primary angioplasty. Coronary angiogram revealed single vessel disease with thrombotic occlusion of mid RCA. (Fig.1). After giving unfractionated Heparin, the lesion was wired with Galleo Floppy wire. As thrombus burden was low, lesion was directly stented with 3 X 25 mm Sirolimus Eluting Stent. The post procedure angiogram showed TIMI 3 flow, but there was a filling defect at the distal edge of the stent. (Fig.2). The possibility of edge dissection and deploying another stent distally was considered. To precisely identify the angiographic abnormality, an OCT (Optical Coherence Tomography) run was performed (Light Lab; St. Jude Medical ILUMIEN OCT system). It clearly showed that the filling defect was due to thrombus in the distal part of the stent. (Fig.3). There was no evidence of dissection.

The decision to deploy another stent was abandoned, GP IIb IIIa inhibitor Tirofiban was given intracoronary and the thrombus got cleared. (Fig.4)

OCT is an intravascular imaging modality that utilizes near-infrared light to generate high resolution cross-sectional blood vessel images. OCT generates in vivo images of coronary arteries and deployed stents with up to 10 to 15 µm of spatial resolution compared with the 100- to 200-µm resolution of IVUS. Although the spatial resolution of OCT is markedly superior to that of IVUS, near-infrared light does not penetrate tissue as effectively as ultrasound, and therefore OCT imaging depths range from 1 to 3 mm into the vessel wall, whereas IVUS imaging depths range from 4 to 10 mm.

OCT can delineate the trilayered vessel structure. It enables precise measurement of vessel diameter and lesion length. It can give an idea on the plaque

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structure and composition - Fibrous plaque (homogenous textured, bright pixels); Lipid rich plaque - (homogeneous, diffuse edge, dark pixels) and Calcified plaque-(heterogeneous, sharp edge, and dark pixels).

OCT is of great value in identifying intimal tear, dissection and thrombus. It can differentiate red thrombus from white thrombus. OCT is a valuable tool in optimizing the angioplasty results by detecting stent malapposition and underexpansion. It can help to optimize sizing of dilation balloons and stents. OCT is useful in choosing patients wisely for post dilatation of the stent, as post dilatation is often associated with slow flow and no reflow especially in the setting of primary angioplasty.

In addition, OCT evaluation of side branch stenosis can assist in the planning of bifurcation PCI. In instent restenosis also OCT is of value in identifying the mechanism and planning the treatment strategy.

This case demonstrates the role of OCT in primary angioplasty where it was of great help in differentiating thrombus from dissection, avoiding another stent and optimizing the result.