Successful Percutaneous Transluminal Coronary Angioplasty of Heavily Calcified Coronary Vessels Using Non-Compliant (NC) Balloon Dilatations at Higher Pressures

Sir,

Coronary arteries calcification is an indicator of poor prognosis of coronary artery disease, depending upon its severity and extent. Balloon dilatation or stenting in such cases can be risky. It can cause calcified plaque rupture, endothelial damage or thrombus formation.[1] Due to uneven calcifications, there is a non-uniform distribution of force along the vessel, which can lead to coronary artery dissection, vasospasm, under-deployment of stents, or restenosis.[2]

A 60-year male, presented with acute ST elevation inferior wall MI. After ACS protocol and informed written consent for primary PCI, his coronary angiography was performed, which showed severe double vessel coronary artery disease with acute occlusion of RCA, having severe proximal disease and thrombus *in situ*. Moreover, LMCA and LAD were heavily calcified, with two severe tanem lesions in proximal calcified LAD. Lt Cx had minor disease in mid segment. After pre-dilatation with semi-compliant balloon 2.5×3.0 up to 12 ATM, the culprit lesion in RCA was stented with Drug Eluting Stent (DES) 3.0×20 at 15 ATM. The result was excellent with good flow (Figure 1 a-d). Patient remained hemodynamically stable. However, LAD was heavily calcified with proximal disease as well. Using a semi-compliant balloon 2.5×10 up to 12 ATM followed by NC balloon 3.5×10 up to 40 ATM (higher pressures), the lesion was pre-dilated, then stented with DES 3.5×20 at 14ATM (Figure 1 e-h). This was followed by post-dilatation with NC balloon 3.5×12 at 22 ATM. During this process, I/V glycoprotein IIb-IIIa inhibitor was also given. The end result was excellent flow in both RCA and LAD with no complications. He was discharged from the hospital on dual antiplatelet and lipid lowering treatment, and had no complaints on follow-up visits.

Use of conventional NC balloons to dilate heavily calcified plaques in coronary vessels at maximum pressure can be insufficient,[3] such plaques being resistant to conventional balloon dilatations. Special modified double-walled high pressure NC balloons and devices for atherectomy like rota ablation have been developed to tackle with such lesions,[4] which are not routinely available in most of the cath labs in developing countries due to cost issues. With double-walled NC Balloon, a maximum pressure of 40 ATM can be achieved, while with conventional NC balloon, maximum pressure upto 16 ATM should be kept in mind.[2] Even with double-layer high pressure NC balloon, while reaching a maximum pressure of 40 ATM, up to 75% success rate has been reported with no complications.[5] Dealing with such heavily calcified coronary arteries in such difficult scenarios as reported here is difficult, risky and challenging.

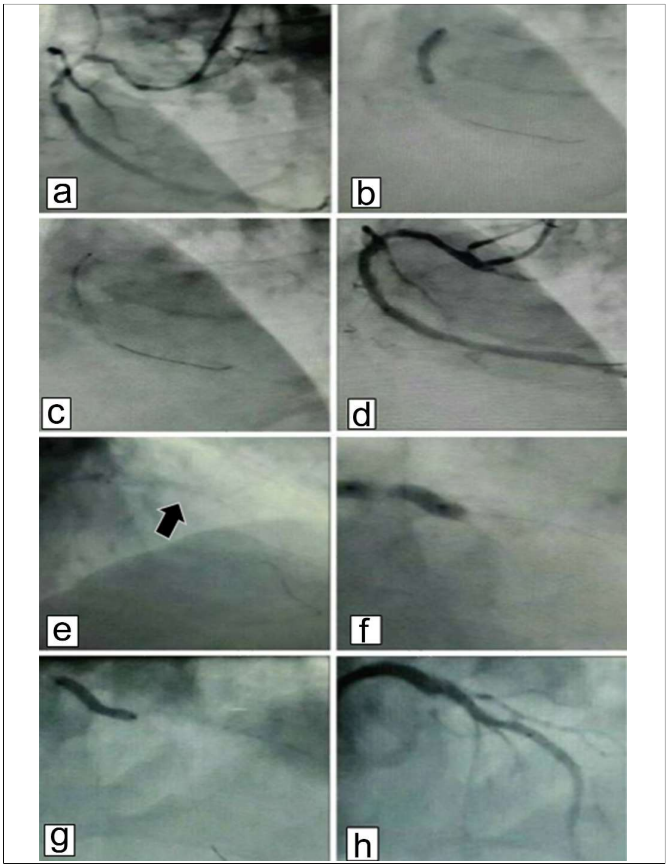

Figure 1: (a - d) Primary PCI of culprit vessel: **(a)** Culprit lesion in RCA **(b)** pre-stenting balloon dilatation **(c)** stenting **(d)** good circulation restored in RCA. **(e - h)** Handling of the non-culprit vessel LAD with calcification: **(e)** Calcification (arrow) in non-culprit vessel LAD **(f)** N.C Balloon serial inflation across the lesion **(g)** successful balloon dilatation using N.C. balloon at higher pressures **(h)** stenting with excellent end results.

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Uzma Zahid and Asad Islam

Department of Interventional Cardiology, Hearts International Hospital, The Mall, Rawalpindi, Pakistan

Correspondence: Dr. Uzma Zahid, Department of Interventional Cardiology, Hearts International Hospital, 192-A, The Mall, Rawalpindi, Pakistan
E-mail: druzmazahid@yahoo.com

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