Multimodal assessment of coronary obstruction for transcatheter aortic valve implantation

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Transcatheter aortic valve implantation (TAVI) is an expanding procedure. One of the risks associated with the procedure is coronary obstruction.

An 85-year-old woman was referred to our institute to be scheduled for TAVI. Multidetector three-dimensional (3D) computed tomography was performed. The left coronary height was 13.3 mm from the annulus ring (Panel A). To predict the shift of calcification on the leaflet after valve implantation, from the 3D data we extracted the plane containing the ostium of the left main coronary trunk (LMT) perpendicular to the line joining the two commissures of the left coronary cusp. We measured the distance from the hinge of the leaflet to the LMT ostium (LMT ostium height) and to the calcium tip (calcium height). Calcium height was 14.5 mm and LMT ostium height was 14.0 mm from the hinge (Panel A). This suggested that LMT obstruction might occur during TAVI. During the procedure, we were able to visualize the LMT ostium by transoesophageal echocardiography (TEE; pre-implantation: Panels B and D; post-implantation: Panels C and E). The calcium mass invaded into the LMT ostium. Flow velocity of LMT increased (pre-implantation: Panel F; post-implantation: Panel G). Although TEE depicted no left ventricular wall motion abnormality and electrocardiogram showed no ST segment or T wave changes, we suspected coronary obstruction. We performed selective coronary angiography. The LMT ostium appeared to be compressed by the calcium mass (Panel H). Using an intravascular ultrasound, we confirmed significant stenosis at the LMT ostium (Panel I and see Supplementary material online, Videos S1 and S2). Coronary intervention was performed and obstruction of LMT was reduced.

As coronary obstruction is a potential cause of sudden death, the risk of coronary obstruction should be predicted before valve implantation and evaluation should be done immediately after valve implantation.

Supplementary data are available at European Heart Journal — Cardiovascular Imaging online.