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Use of Cardiac Computed Tomography Prior to Percutaneous Coronary Sinus Device Placement for the Treatment of Mitral Regurgitation

We would like to congratulate Harnek et al. (1) for showing that percutaneous implantation of the Monarc device (Edwards Lifesciences, Irvine, California) in the coronary sinus is not only feasible but also effectively reduces mitral regurgitation. The investigators found that computed tomography (CT) documented the passage of the great cardiac vein (GCV) over an obtuse marginal artery in 55% of patients. The obtuse marginal artery was associated with angiographic coronary artery compression in 15 patients and with myocardial infarction in 2 patients. In contrast, the coronary sinus/great cardiac vein (CS/GCV) did not pass over a major obtuse marginal artery in 19 patients, none of whom developed coronary artery compression. This study demonstrates that coronary artery compression may occur in patients in whom the GCV passes over a coronary artery. Cardiothoracic surgeons have appreciated for years that surgical mitral valve annuloplasty may result in ischemia from injury to the adjacent left circumflex artery (LCX) (2,3).

The potential for external coronary artery compression when the CS/GCV runs over the obtuse marginal epicardial vessels emerged as the most important consideration for use of this device. The present study by Harnek et al. (1) shows that noninvasive screening with CT is able to identify those patients in whom the obtuse marginal vessels course under the CS/GCV and are therefore at risk for this complication. Accurate pre-procedural understanding of the CS/GCV anatomy as it relates to the mitral valve, specifically the posterior mitral leaflet and the LCX with its obtuse marginal (OM) branches, is vital for this approach to be efficient and successful. We previously developed a systematic method for describing the CS/GCV and LCX/OM relationship with cardiac CT data (4). We found that a large proportion of patients have the LCX/OM arterial distribution traveling under the CS/GCV, and we found that this relationship depends on coronary arterial dominance. In addition, we found that the first OM was under the CS/GCV in 26% to 61% of patients, depending on the coronary dominance, compared with the second OM that was under the CS/GCV in 13% to 28% of patients. It should also be noted that a posterolateral branch might also course under the CS in up to 53% of patients, and thus may also be a potential artery that could be jeopardized with a CS-based annuloplasty device.

Cardiac CT imaging of the CS/GCV using an organized method should be considered an excellent tool to evaluate the anatomic course of the coronary arteries in patients being evaluated for percutaneous CS devices. The potential benefits of a minimally invasive option to treat mitral regurgitation with percutaneous transvenous catheter-based deployment of such annuloplasty devices will need prospective studies to demonstrate that procedural and late complications can indeed be avoided by using an image guidance approach with cardiac CT.

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Reply

We thank Dr. Gopal and colleagues for their interest in our paper (1) and agree that computed tomography is an important imaging modality to screen patients at risk for coronary compression before

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coronary sinus implantation with the MONARC device (Edwards Lifesciences, Irvine, California).

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