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Commentary: Predicting coronary obstruction—Better good than lucky

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Coronary obstruction (CO), although rare, is a devastating complication of transcatheter aortic valve replacement (TAVR) and is associated with high mortality. It occurs more frequently in the placement of a TAVR valve for a failed surgical bioprosthesis (2.3%) than in native valve TAVR (<1%).^{1,2} In today's practice, 1-dimensional measurements should not be used in the final assessment for CO risk. There may arise scenarios in which low coronary artery heights from the aortic annulus may have capacious sinuses and not pose a significant risk for CO. Conversely, patients may present with narrow sinuses in which coronary arteries arise above the maximal height of the native (or bioprosthetic) leaflets. The anatomy of the aortic root, the length of the aortic valve leaflets, the distance of the coronary ostia from the aortic annulus, and the type of implanted transcatheter heart valve thus must be taken together to assess CO risk. Investigators in the BASILICA (Bioprosthetic or native Aortic Scallop Intentional Laceration to prevent Iatrogenic Coronary Artery obstruction during TAVR) investigational device exemption trial used an integrative approach to identifying patients at high risk of CO.³ Patients were deemed to be at high risk for CO when the native or bioprosthetic leaflets fell above the coronary arteries (or the sinotubular junction) at their maximal height and when the horizontal distance

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CENTRAL MESSAGE

Models to predict coronary obstruction, with both high sensitivity and specificity, remain elusive. Models must consider the aortic root in at least 2D, favoring high sensitivity over specificity.

between the leaflet and the coronary artery (or sinotubular junction) was reduced when a virtual valve was implanted.³

In this issue of the *Journal*, Heitkemper and colleagues⁴ describe another model that uses 2-dimensional (2D) anatomic characteristics measured from computed tomography (CT). The same group also described a 3-dimensional model to predict the same distance⁵; the group's 2D model described in this issue of the *Journal*⁴ is a simplified version of this model that is thought to be a better, more practical screening tool for the heart team's risk assessment. Their 2D model achieved a better sensitivity (85%) and specificity than using coronary height (<10 mm) and sinus diameter (<30 mm) alone. A coronary height of less than 12 mm, however, had a sensitivity of 100%.

The problem with these models is that very few patients with CO from TAVR are included, because, appropriately, the heart team excluded "high-risk" patient populations whom they considered were likely to encounter this dreaded complication. In this analysis of Heitkemper and colleagues,⁴ only 1 patient had CO, and 2 were intraoperatively considered to be at risk of CO.⁴ In the analysis of Ribeiro and associates² that determined coronary artery height and sinus width to be high-risk factors, 28 patients had coronary artery obstruction and preprocedural CT data available. There is a desperate need for a large registry of patients who have had preprocedural CT scans and then

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had CO develop from TAVR so that these models can be validated.

There are other challenges with predicting CO after TAVR. Assumptions about the path of the native leaflet on valve expansion, which may vary in terms of calcification (thus width), and degree of prosthesis expansion are crude at best. Delayed CO, occurring after the patient has left an operating room after successful TAVR, may occur in 0.18% of native valve TAVR and is similarly difficult to predict.

We congratulate Heitkemper and colleagues⁴ for their continued work to improve prediction of CO after TAVR. We believe, given the devastating consequences of CO, that models should favor a high sensitivity over specificity. This is especially important as the age and risk profiles of patients undergoing TAVR decrease. Teams should consider techniques such as BASILICA (or referral to centers that

perform this) or surgical aortic valve replacement if there is potential for obstruction.

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Commentary: Preprocedural diagnostic imaging for transcatheter aortic valve implantation—*Videri quam esse*

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Esse quam videri: To be, rather than to seem.

Videri quam esse: To seem, rather than to be.

Transcatheter aortic valve implantation (TAVI)-related technology and techniques have rapidly evolved and improved almost continuously since the initial work of

CENTRAL MESSAGE

Coronary arterial complications are major adverse sequelae of transcatheter aortic valve implantation. Different approaches to ascertaining risks of such complications exist, each of which has flaws.

Cribier almost 2 decades ago. As expected, the benefits of TAVI have increased, the risks have decreased, and the indications have consequently expanded. Several important complications continue to exist, however, the risks of which may be anticipated by diagnostic studies. Coronary arterial ostial complications are noteworthy among these because of

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