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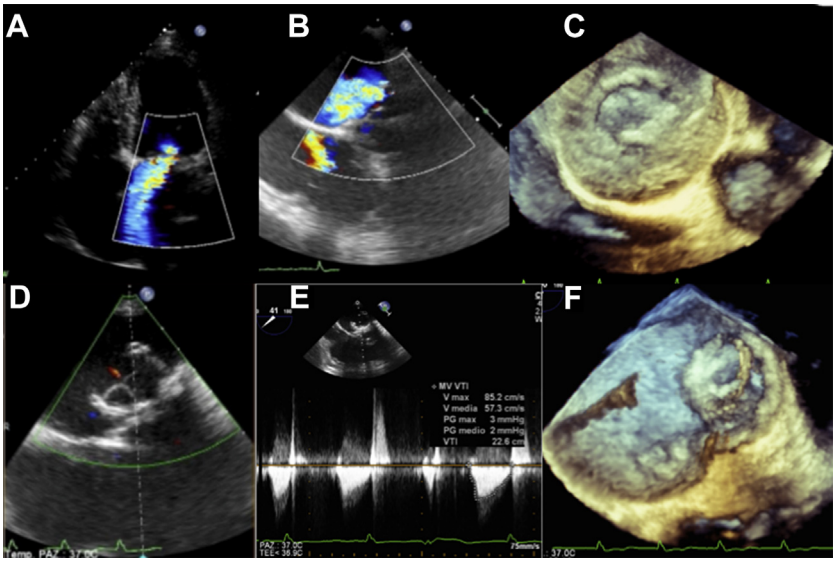
IMAGES IN INTERVENTION

First-in-Human Implantation of a Direct Flow Medical Valve in a Radiolucent Mitral Annuloplasty Ring

Azeem Latib, MB ChB,*† Matteo Montorfano, MD,† Eustachio Agricola, MD,* Alessandro Castiglioni, MD,‡ Andrea Blasio, MD,‡ Fabrizio Monaco, MD,§ Pietro Spagnolo, MD,‖ Ottavio Alfieri, MD,‡ Antonio Colombo, MD*†

Recurrent mitral regurgitation (MR) may occur after mitral annuloplasty and reoperation may be associated with significant morbidity and mortality. Recently, transcatheter mitral valve-in-ring procedures via the transvenous, transatrial, and transapical routes have been shown to be

FIGURE 1 Echocardiographic Imaging at Baseline and Post-Implantation



Echocardiographic imaging before and after implantation of the Direct Flow Medical (DFM) valve: severe central mitral regurgitation (MR) on transthoracic **(A)** and transesophageal **(B)** echocardiography. **(C)** Three-dimensional echocardiographic image of mitral annuloplasty ring. **(D)** Post-implantation echocardiography confirming the absence of MR and **(E)** a transprosthetic gradient of 2 mm Hg. **(F)** Three-dimensional echocardiographic image of the DFM valve in the mitral ring (Online Video 1).

From the *Interventional Cardiology Unit, EMO-GVM Centro Cuore Columbus, Milan, Italy; †Interventional Cardiology Unit, San Raffaele Scientific Institute, Milan, Italy; ‡Department of Cardiothoracic Surgery, San Raffaele Scientific Institute, Milan, Italy; §Department of Cardiac Anesthesia, San Raffaele Scientific Institute, Milan, Italy; and the ‖Centre for Cardiovascular Prevention, San Raffaele Scientific Institute, Milan, Italy. Dr. Latib is a consultant for Direct Flow Medical; and on the advisory board of Medtronic. Dr. Montorfano is a proctor for Edwards Lifesciences. Dr. Colombo is a minor shareholder in Direct Flow Medical. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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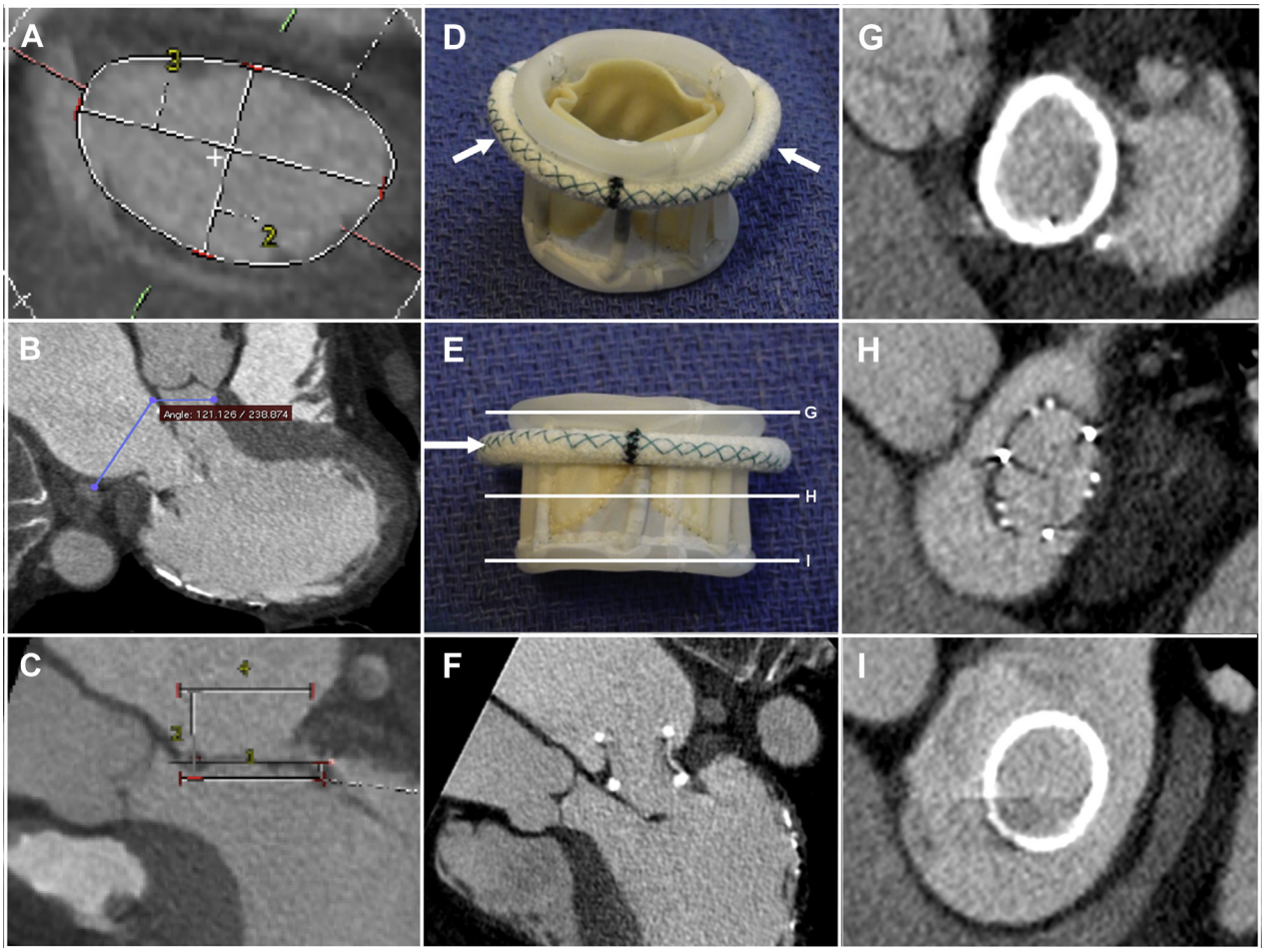
FIGURE 2 CT Evaluation Pre-Implant, Benchtop Evaluation and Follow-Up CT



(A) Multislice computed tomography (CT) evaluation: a diameter of 32.9 × 20 mm and a perimeter-derived diameter of 27.4 mm at the center of the surgical annuloplasty ring. **(B)** Aortomitral annular angle of 121° suggesting a low risk of left ventricular outlet tract (LVOT) obstruction from mitral valve implantation. **(C)** Simulation of DFM dimensions showing that LVOT obstruction would be unlikely with the valve placed only 4 mm into the left ventricle. **(D,E)** Benchtop image of a 29-mm DFM implanted in a 34-mm Seguin ring **(arrows)** in same position as patient. **(F to I)** Follow-up CT images at 9 month showing stable valve position that is not interfering with LVOT **(F)**; axial CT images (Online Video 2) of the DFM valve (as shown in **E** at the level of the D-shaped ventricular ring conforming to the shape of the surgical ring **(G)**, at the leaflets showing good coaptation **(H)**, and at the circular atrial ring **(I)**.

a feasible alternative in selected high-risk patients and associated with good short-term outcomes (1). However, there are still numerous procedural challenges that can occur such as device malpositioning, valve stability and anchoring, paravalvular leak, and left ventricular outflow tract (LVOT) obstruction. Until now, only balloon-expandable valves have been used for this indication with the limitation that this is a one-shot procedure. We report the first-in-human implantation of a fully repositionable and retrievable transcatheter valve in the mitral position.

A 76-year-old woman with chronic atrial fibrillation presented with recurrent episodes of heart failure. She had previously undergone surgical mitral valve repair (edge-to-edge plus annuloplasty with a St. Jude Seguin 34-mm ring) and coronary artery bypass grafting (left internal mammary artery to left anterior descending artery and a saphenous vein graft to the first diagonal). Echocardiography demonstrated severe central MR without evidence of the previous edge-to-edge repair (**Figures 1A** to **1C**) and an ejection fraction of 34%. Multislice computed tomography (MSCT) demonstrated a perimeter-derived diameter of 27.4 mm (**Figures 2A** to **2C**) compatible with a 29-mm prosthesis. Our multidisciplinary heart team agreed that a transcatheter procedure was indicated.