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IMAGES IN INTERVENTION

Gluing of an Aortic Perforation During Transcatheter Aortic Valve Replacement

An Alternative Treatment for Annular Rupture?

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A 96-year-old man was referred to our cardiology center for a transcatheter aortic valve replacement (TAVR). Pre-implantation transthoracic echocardiography showed preserved ejection fraction, mean transvalvular pressure gradient at 46 mm Hg, aortic valve area of 1 cm^2, and maximal aortic jet velocity at 4.1 m/s, confirming severe aortic stenosis. Aortic annulus diameter was 25 mm as measured by transesophageal echocardiography, and its surface was 671 mm^2 by 3-dimensional multidetector computed tomography (**Figures 1A and 1B**). A 29-mm Sapiens XT valve (Edwards Lifesciences, Irvine, California) was implanted using left transfemoral access. During prosthetic valve deployment, contrast extravasation into the pericardium occurred (**Figure 1C**) causing cardiac shock and pericardial tamponade demonstrated by transthoracic echocardiography. Percutaneous pericardiocentesis and fluid infusion were immediately performed allowing hemodynamic stabilization. Tissue glue composed of a 1/1 mixture of N-butyl-2-cyanoacrylate (Histoacryl) and Lipiodol (B. Braun, Melsungen, Germany) was injected into the perforation using a Progreat microcatheter (Terumo Corporation, Tokyo, Japan) introduced through a 6-F Amplatz left guiding catheter (Medtronic, Dublin, Ireland) (**Figure 1D**). This successfully stopped the pericardial effusion (**Figure 1E**) and allowed the procedure to be completed without further complications. The patient was discharged 5 days after the valve deployment.

Aortic rupture occurs in about 1% of all TAVR implantations (1,2). Potential causes include radial forces during valve deployment inducing tissue overdistention along with calcification of the annulus and/or valve leaflets (1). Depending on the severity and location of the perforation, treatment can include: cardiac surgery, isolated percutaneous pericardiocentesis, or a conservative strategy (1). N-butyl-2-cyanoacrylate is a tissue glue that has the capacity to harden immediately when in contact with blood. The adjunction of oily radiopaque substance (Lipiodol) delays polymerization and allows radiopacity (3). Thus, reported here is a novel potential treatment for aortic rupture during TAVR by an endovascular approach.

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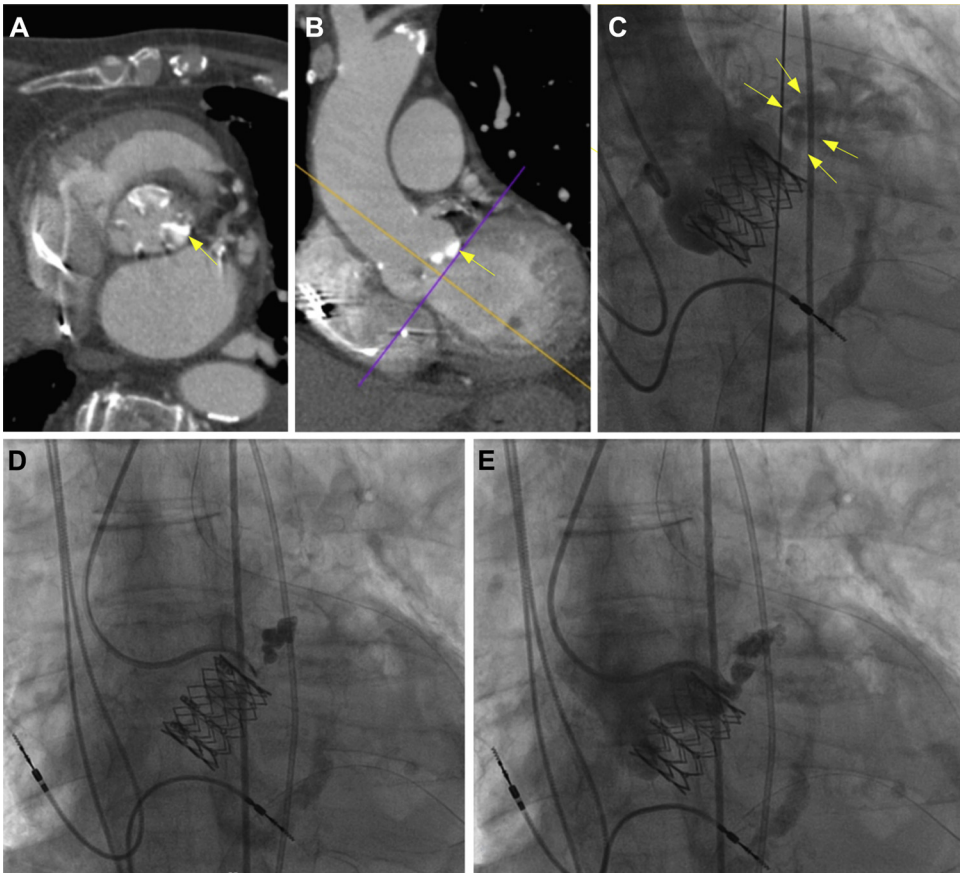
FIGURE 1 Computed Tomography and Angiography Imagery Before and During TAVR Procedure



(A and B) Pre-operative computed tomography showed massive calcification on the aortic valve annulus and left anterior leaflet **(yellow arrow)**. **(C)** A severe contrast extravasation **(yellow arrows)** was identified during angiography after transcatheter aortic valve implantation. **(D)** Tissue glue was injected into the perforation with a microcatheter. **(E)** Severe contrast extravasation was stopped successfully by liquid embolization mixtures.

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