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Imaging and Case Report

Antegrade Electrosurgical Laceration of Alfieri Stitch Before Transcatheter Mitral Valve Replacement

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A 77-year-old woman presented to the hospital with a congestive heart failure exacerbation. She had a history of mitral valve repair using an Alfieri stitch from A2-P2 and placement of a 30-mm Physio annuloplasty ring (Edwards Lifesciences) performed 8 years ago for severe mitral regurgitation because of A2 prolapse. Additional medical history includes coronary artery disease status-post multivessel percutaneous coronary intervention, atrial fibrillation, sick sinus syndrome status-post dual-chamber pacemaker placement, type 2 diabetes mellitus, and chronic obstructive pulmonary disease. Transthoracic and transesophageal echocardiography revealed a mildly reduced left ventricular systolic function estimated at 45%, moderate aortic regurgitation, moderate-to-severe mitral regurgitation with an intact Alfieri stitch, and moderate-to-severe tricuspid regurgitation. Coronary angiography demonstrated patent stents in the mid-to-distal right coronary artery and mid left circumflex coronary artery, along with an 80% stenosis of the proximal left anterior descending coronary artery. Right heart catheterization performed after diuresis during the stay in hospital demonstrated an elevated pulmonary capillary wedge pressure (a mean of 18 mm Hg; V-waves to 24 mm Hg) and a mildly elevated pulmonary artery pressure (s/d/m of 40/17/25 mm Hg). Her transmitral gradient was 5 mm Hg, and her cardiac index was reduced (1.73 L/min/m^2). She was deemed high-risk for redo surgical intervention on the mitral valve (a Society of Thoracic Surgeons risk of mortality of 8.2%). Therefore, she underwent percutaneous revascularization of the proximal left anterior descending coronary artery lesion with drug-eluting stent placement and was then referred for a transcatheter mitral valve replacement for persistent and symptomatic congestive heart failure.

A 26-mm SAPIEN S3 Ultra RESILIA (Edwards Lifesciences) was determined to be the appropriate size for implantation in the 30-mm Physio annuloplasty ring based on cardiac computed tomography data and consultation with the valve-in-valve mitral application.

Cardiac computed tomography demonstrated an adequate new left ventricular outflow tract (LVOT) area of 207 mm^2 after virtual implantation of a 26-mm transcatheter heart valve and an angle of 130° between the aortic and mitral valve planes (Figure 1); however, we realized that presence of the Alfieri stitch from A2-P2 could cause improper orientation and positioning of transcatheter heart valve at the time of deployment. Therefore, we opted for electrosurgical laceration of the Alfieri stitch before valve implantation.

The procedure was performed under general anesthesia with transesophageal echocardiographic guidance. A 20F DrySeal sheath (GORE) was placed in the right femoral vein after pre-close placement of 2 Perclose ProStyle sutures (Abbott). A 6F left femoral artery vascular access was obtained, and a dual-lumen Langston pigtail catheter (Teleflex) was placed across the aortic valve to monitor LVOT gradients after deployment. Transeptal access was obtained in the standard fashion, 3.5 cm above the mitral valve plane. The atrial septostomy was dilated with a 12.0-mm × 40.0-mm Mustang balloon (Boston Scientific). Then, two 8F steerable Agilis sheaths (Abbott) were introduced into the left atrium from the right femoral access. Two 6F Judkins right 4 (JR4) guide catheters were placed through the Agilis sheaths, one each into medial and lateral orifice of the previously repaired mitral valve under echocardiographic guidance. A gooseneck snare was positioned in the left ventricle through one of the JR4 guide catheters, and a 0.14-inch Astato guide wire (ASAHI INTECC) was advanced into the left ventricle through the other JR4 guide catheter. A "flying V" was created by denuding a 1.0-cm section of the Astato guide wire and kinking the guide wire over the back of a scalpel blade. Next, the Astato guide wire was snared and externalized, thereby advancing and positioning the flying V across the Alfieri stitch. The Astato guide wire was electrified (cutting mode; 70 W energy) for 2 seconds and simultaneously tensed, lacerating the Alfieri stitch. Afterward, the Astato guide wire was removed, and a Safari guide wire (Boston Scientific) was placed in the left ventricular apex through the Agilis sheath with the aid of a pigtail catheter. After removing both Agilis sheaths, a 26-mm SAPIEN 3 Ultra RESILIA valve was introduced over the Safari guide wire, positioned across the mitral annuloplasty ring, and deployed. There was no significant transmitral gradient or mitral regurgitation after valve deployment. There was no

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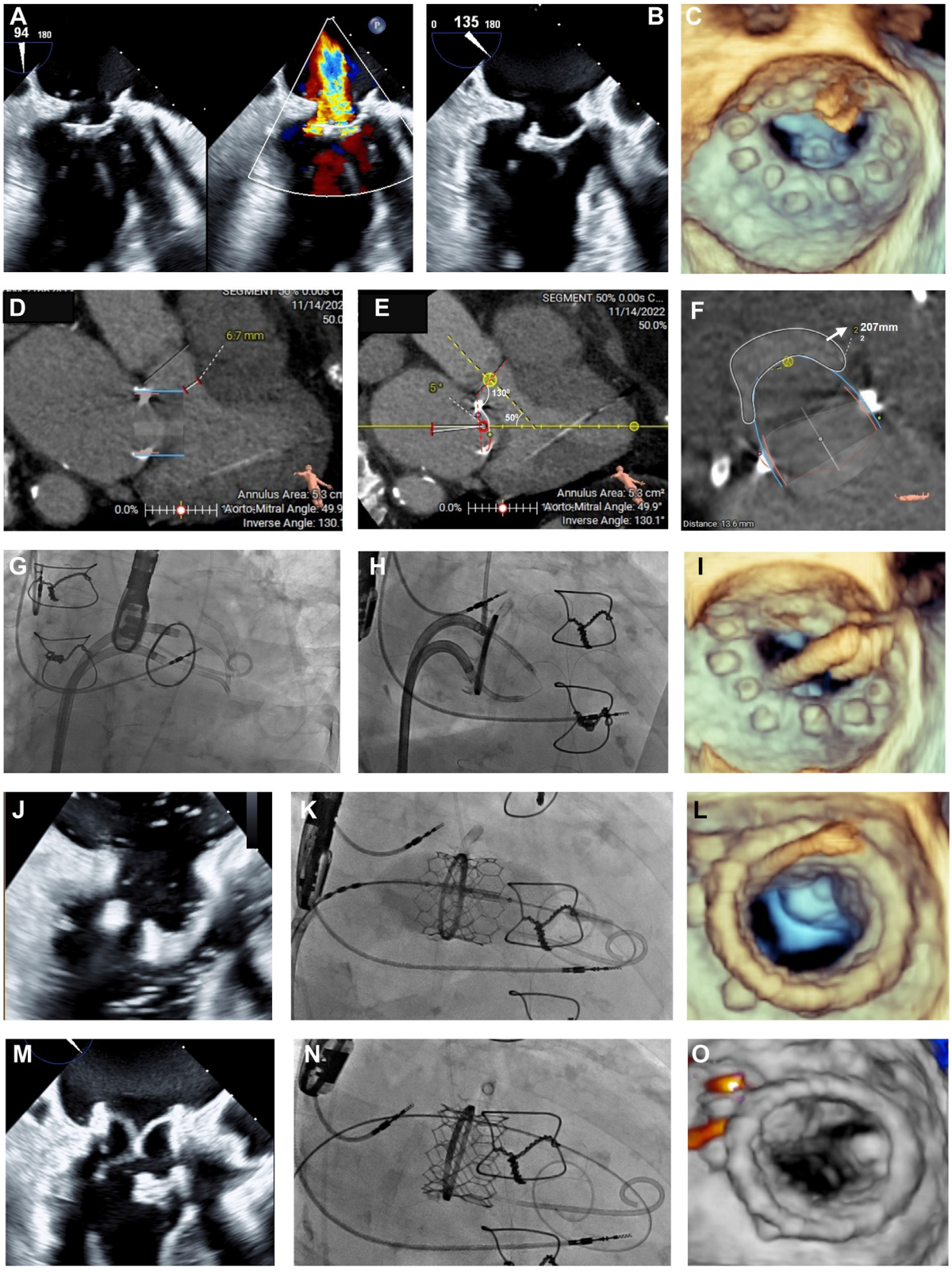

Figure 1.

Transcatheter mitral valve replacement after antegrade transcatheter Electrosurgical Laceration of Alfieri STItCh (antegrade ELASTIC). (A-C) Transesophageal echocardiogram (TEE) demonstrating repaired mitral valve with an intact Alfieri stitch and moderate-to-severe mitral regurgitation. (**D**) Cardiac computed tomography demonstrating virtual implantation of a 26-mm transcatheter heart valve in mitral position. (**E, F**) The angle between the aortic and mitral valve planes and a new left ventricular outflow tract area after virtual implantation of a 26-mm transcatheter heart valve. (**G-H**) Fluoroscopic images depicting Judkins right 4 guide catheters in each medial and lateral mitral valve orifice with "flying V" of Astato guide wire (ASAHI INTECC) positioned at the Alfieri Stitch. (**I-J**) Mitral valve immediately after electrosurgical laceration of the Alfieri Stitch. (**K**) Fluoroscopy depicting deployment of a 26-mm SAPIEN 3 Ultra RESILIA valve (Edwards Lifesciences) in a mitral annuloplasty ring. (**L, M**) TEE after deployment of valve demonstrating appropriate positioning of the transcatheter heart valve. (**N**) Fluoroscopic image after deployment of the transcatheter heart valve. (**O**) Final 3D TEE image showing trivial paravalvular regurgitation at the 11-o'clock position.

significant gradient (peak-to-peak gradient of 5 mm Hg) across the LVOT after deployment. Trivial paravalvular regurgitation was noted. The patient experienced an uneventful recovery and was discharged on hospital day 2.

Discussion

Transcatheter mitral valve replacement in patients with previous mitral valve repair with Alfieri stitch is associated with an increased risk of transcatheter heart valve malapposition, maldeployment, or underexpansion.[1] Hence, it is desirable to lacerate the Alfieri stitch and create a single orifice to obtain a more predictable valve deployment. First, Khan et al[1] described electrosurgical laceration of the Alfieri stitch (ELASTIC) from a retrograde approach; later Lisko et al[2] described electrosurgical laceration of the anterior mitral leaflet from an antegrade approach (antegrade LAMPOON). Our case describes electrosurgical laceration of Alfieri stitch from an antegrade or transseptal approach by creating a guide wire loop across the Alfieri stitch (antegrade ELASTIC). Use of catheters that can loop around the Alfieri stitch can further simplify snaring of the guide wire and shorten the procedure time. Laceration from an antegrade approach avoids the need for additional arterial vascular access because it can be performed from the same access used for valve deployment. Lisko et al[3] demonstrated antegrade laceration of anterior mitral leaflet in patients with Mitraclip before Tendyne transcatheter mitral valve replacement. We believe that, for operators with some experience in electrosurgical laceration procedures, laceration of Alfieri stitch from the antegrade approach is replicable and achievable.

Declaration of competing interest

Vijay Iyer reports a relationship with Boston Scientific Corp that includes consulting or advisory and with Edwards Lifesciences Corporation that includes speaking and lecture fees. The other authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethics statement and patient consent

The research reported has adhered to the relevant ethical guidelines, and the patient signed an informed procedural consent form.

References

1. Khan JM, Lederman RJ, Sanon S, et al. Transcatheter mitral valve replacement after transcatheter Electrosurgical Laceration of Alfieri STItCh (ELASTIC): first-in-human report. *J Am Coll Cardiol Intv.* 2018;11(8):808–811.
2. Lisko JC, Greenbaum AB, Khan JM, et al. Antegrade intentional laceration of the anterior mitral leaflet to prevent left ventricular outflow tract obstruction: a simplified technique from bench to bedside. *Circ Cardiovasc Interv.* 2020;13(6), e008903.
3. Lisko JC, Greenbaum AB, Guyton RA, et al. Electrosurgical detachment of MitraClips from the anterior mitral leaflet prior to transcatheter mitral valve implantation. *J Am Coll Cardiol Intv.* 2020;13(20):2361–2370.