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CASE REPORT

ADVANCED

CLINICAL CASE

Same-Day Discharge After Transcatheter Native Aortic and Mitral Valve-in-Valve Replacement

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ABSTRACT

Transcatheter aortic valve replacement has become the gold standard of care in the management of patients with severe aortic stenosis and transcatheter mitral valve-in-valve replacement seems to be an attractive alternative to redo surgery. We report the first case of concomitant transcatheter aortic valve replacement/transcatheter mitral valve-in-valve replacement that was performed under conscious sedation who was subsequently discharged the same day. (**Level of Difficulty: Advanced.**) (J Am Coll Cardiol Case Rep 2020;2:2199–201) © 2020 The Authors. Published by Elsevier on behalf of the American College of Cardiology Foundation. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

Transcatheter aortic valve replacement (TAVR) has become the new standard of care in patients with severe aortic stenosis (1,2). Transcatheter mitral valve-in-valve replacement (TMViVR) has been well described in literature and its results have been similar to redo surgical mitral valve replacement in an observational study (3). However, the mean age and the Society of Thoracic Surgeons Predicted Risk of Mortality score were substantially higher in the TMViVR cohort (3). TMViVR seems to be an attractive alternative to redo surgery. As volume and operator experience continue to improve over the years early discharge post uncomplicated TAVR has been shown to be safe (4). Double valve replacement has been described in the past in a setting of transapical approach and under general anesthesia (5,6). We report the first case of concomitant TAVR/TMViVR that was performed under conscious sedation who was subsequently discharged the same day.

LEARNING OBJECTIVES

- High center volume/operator experience is essential for pushing the envelope in structural intervention.
- Same-day discharge is the next frontier in structural intervention but needs further research to become standard of care.

HISTORY OF PRESENTATION

A 61-year-old woman was diagnosed with severe aortic stenosis (mean gradient, 40 mm Hg; aortic valve area, 0.8 cm^2) and bioprosthetic mitral valve stenosis (mean gradient, 10 mm Hg; EPIC 29 mm bioprosthetic valve implanted in 2004 [St. Jude, Abbott Vascular, Santa Clara, California]) with preserved left ventricular function complicated by moderate to severe tricuspid regurgitation and pulmonary hypertension (55 mm Hg) in the context New

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ABBREVIATIONS AND ACRONYMS

TAVR = transcatheter aortic valve replacement

TMViVR = transcatheter mitral valve-in-valve replacement

York Heart Association functional class II to III heart failure symptoms.

PAST MEDICAL HISTORY

Her extensive past medical history was significant for Hodgkin lymphoma that was treated with radiotherapy in the 1960s, hypothyroidism, and breast cancer treated with mastectomy and radiotherapy in 1997.

INVESTIGATIONS

Her renal function and blood counts were normal. Her electrocardiogram demonstrated sinus rhythm with a PR interval of 198 ms and narrow QRS complex of 102 ms. Her coronary angiogram revealed mild coronary artery disease. Her cardiac gated computerized tomography demonstrated adequate iliofemoral anatomy (>6.5 mm) suitable for TAVR along with adequate coronary heights (left main coronary artery of 15.6 mm and right coronary artery of 20 mm). Her annulus measured an area of 460 mm^2, perimeter of 78.2 mm. Her sinus of Valsalva measurements were >34 mm and the mean sinotubular junction measurement was 30.5 mm. The true internal diameter of the bioprosthetic valve was noted to be 27 mm. Her neo left ventricular outflow tract measured 3.66 cm^2.

DIFFERENTIAL DIAGNOSIS

In the absence of significant coronary artery disease, valvular heart disease needs to be addressed.

MANAGEMENT

In view of her previous radiation history and sternotomy it was decided on a multidisciplinary forum that she would be best treated with a transcatheter approach. The elective procedure was performed under conscious sedation. Right radial access was obtained and a 5-F/6-F slender sheath (Terumo Corporation, Shibuya City, Tokyo, Japan) was placed. Right femoral arterial/venous access was obtained with ultrasound and fluoroscopic guidance. The arteriotomy/venotomy was pre-closed with 2 perpendicular perclose proglide devices (Abbott Vascular), and an 8-F sheaths (Cordis Corporation, Miami Lakes, Florida) were placed. An inferior 5-F sheath (Cordis Corporation) was placed in the common femoral artery to address any access site complications. In the left femoral vein, a 9-F × 35 cm sheath (Cordis Corporation) was placed superiorly and a 6-F sheath (Cordis Corporation) was placed inferiorly with ultrasound and fluoroscopic guidance. A balloon-tipped temporary transvenous pacemaker was inserted into the right ventricle via the 6-F left femoral vein sheath and appropriate capture threshold was confirmed. Intravenous heparin was administered to a goal activated clotting time >250 s. Via the right radial artery sheath, a Sentinel embolic protection device (Claret Medical, Boston Scientific, Marlborough, Massachusetts) was deployed with filters in the left common carotid and right innominate arteries. Via the right inferior femoral artery sheath a 5-F straight flush catheter was placed in the noncoronary cusp for hemodynamic monitoring and aortic root angiogram. A 26 Sapien 3 device (Edwards Lifesciences, Irvine, California) was implanted at the annulus at nominal minus 1-ml fill volume via the 14-F Edwards sheath (Edwards Lifesciences). High implantation was performed to facilitate the mitral valve implantation and minimize interaction while performing the TMViVR. An aortic root angiogram and transthoracic echocardiogram showed no paravalvular regurgitation.

An 8-F ACUSON AcuNav intracardiac echocardiography probe (Erlangen, Germany) was advanced via the 9-F left femoral vein sheath into the right atrium for echo guidance. An 8-F Mullins transseptal catheter (Medtronic, Minneapolis, Minnesota) with a Brockenbrough needle (Medtronic) were used to obtain transseptal access low and posterior in the interatrial septum. Once the sheath was in the left atrium, the needle and dilator were replaced with a 0.032-inch Toray wire (Toray Industries, Tokyo, Japan) in the left atrium. The Mullins transseptal catheter was removed, and the septum was dilated with a 12.0 × 40 mm Charger balloon (Boston Scientific) at 8 atm. An 8.5-F medium curl Agilis sheath (Abbott Vascular) was then advanced into the left atrium, and the Toray wire was removed. Through the Agilis sheath the mitral valve was crossed with a 5-F pigtail catheter without a wire. A 0.035-inch Confida wire (Medtronic) was advanced into the left ventricle via the pigtail catheter, and the Agilis sheath and pigtail catheter were removed. A 29-mm Sapien 3 valve with +2 fill volume was then deployed during rapid ventricular pacing at 180 beats/min via the 16-F Edwards sheath (Edwards Lifesciences). The valve was post-dilated at high pressure with a 28 True balloon (Bard Peripheral Vascular, Tempe, Arizona). Transthoracic echocardiogram was performed, which demonstrated no evidence of pericardial effusion, a well-seated transcatheter heart valve in the mitral position with no significant MR, and mean gradient of 5 mm Hg. There was no evidence of left ventricular outflow tract obstruction by catheter or echocardiographic gradients. Significant bidirectional shunting was seen on intracardiac echocardiography imaging across the atrial septal defect along with a positive

bubble study. A 27-mm GORE CARDIOFORM ASD Occluder (Flagstaff, Arizona) was placed across the atrial septal defect. The right atrial pacing test demonstrated no Wenckebach at 120 beats/min. The Sentinel device was removed, and the S3 delivery system/sheath were removed. The arteriotomy/venotomy was closed with the predeployed perclose proglide sutures. The patient tolerated the procedure well and was transferred to cardiac stepdown in stable condition. She was observed in the stepdown unit for 8 h and later discharged the same day. Video 1 is a brief illustration of the case.

DISCUSSION

Same-day discharge is the next frontier in structural heart interventions. It has been well established that operator experience and center volume is clearly related to lower mortality and complication rates compared with low-volume centers (7). High-volume centers have extensive experience in evaluating patients, undertaking complex procedures and hence uncomplicated procedures can be performed with ease and complication free. High-volume centers also have a streamlined process and a well-established multidisciplinary heart team forum to recognize challenging patients. In addition, the use of sentinel device captures embolic debris during TAVR and could potentially reduce the risk of stroke (8). The role of right atrial pacing post-TAVR has been studied and the negative predictive value of no induction of Wenckebach atrioventricular block is nearly 99% (9). In addition, the use of unilateral femoral artery access and radial access for peripheral bailout has gained popularity in recent times (10,11).

FOLLOW-UP

At 2 months, she remains asymptomatic from a cardiac standpoint with no complications and has an excellent quality of life.

CONCLUSIONS

The doctrine of marginal gains in patients undergoing structural heart procedures can be achieved by using the aforementioned strategies. High center volume/operator experience and incorporation of various strategy resulted in the optimal management of this complex patient who was able to be discharged the same day. This is not the current standard of care, and to establish safety of same-day discharge a prospective study is essential.

AUTHOR DISCLOSURES

All authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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KEY WORDS aortic valve, stenosis, valve replacement

APPENDIX For a supplemental video, please see the online version of this paper.