JACC: CASE REPORTS VOL. 2, NO. 5, 2020

MINI-FOCUS ISSUE: TAVR

INTERMEDIATE

CASE REPORT: CLINICAL CASE

Massive TAVR

Complex Transcatheter Aortic Valve Replacement in the Setting of an Enormous Adnexal Mass

Siddharth Chauhan, MD,[a] Simbo Chiadika, MD,[b] Tariq Dayah, MD,[c] Sam Chitsaz, MD,[b] Prakash Balan, MD, JD[b]

ABSTRACT

A 65-year-old woman with a large adnexal mass was found to have severe bicuspid aortic valve stenosis. Transcatheter aortic valve replacement was chosen rather than surgical aortic valve replacement because of concerns over risks. We demonstrate the value of pre-operative transcatheter aortic valve replacement before prompt noncardiac surgery. Furthermore, it illustrates some useful bailout techniques in this challenging scenario. (**Level of Difficulty: Intermediate.**) (J Am Coll Cardiol Case Rep 2020;2:711-5) © 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/).

Surgical resection of an intraperitoneal or abdominal mass is considered an intermediate-risk surgery; however, patient comorbidities play an important role in the estimation of operative risk. The presence of severe aortic stenosis (AS) considerably increases the risk of a cardiac event with such a noncardiac surgery (NCS) (1). Transcatheter aortic valve replacement (TAVR) provides a minimally invasive method of minimizing the risks.

LEARNING OBJECTIVES

- To understand the role of TAVR as a minimally invasive method of treating low-risk patients with severe symptomatic AS who require noncardiac surgeries.
- To understand that in patients with large intra-abdominal or adnexal masses careful planning and attention to modification of routine TAVR technique is essential for adequate access and groin management and to facilitate valve passage.

HISTORY OF PRESENTATION

A 65-year-old woman presented to the hospital with dyspnea and demonstrated New York Heart Association functional class III symptoms of congestive heart failure.

PAST MEDICAL HISTORY

The patient has a history of hypertension, hyperlipidemia, diabetes mellitus, and obesity.

INVESTIGATIONS

Computed tomography scan revealed a large adnexal mass measuring 36.2 × 24.7 × 33.6 cm, and occupying

From the [a]Department of Internal Medicine, McGovern Medical School, The University of Texas Health Science Center at Houston, Houston, Texas; [b]Division of Cardiology, Department of Internal Medicine, McGovern Medical School, The University of Texas Health Science Center at Houston, Houston, Texas; and the [c]Heart & Vascular Institute, Memorial Hermann Katy Hospital, Katy, Texas. Dr. Balan is a consultant for Abiomed, Chiesi, and Osprey Medical. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

The authors attest they are in compliance with human studies committees and animal welfare regulations of the authors' institutions and Food and Drug Administration guidelines, including patient consent where appropriate. For more information, visit the *JACC: Case Reports* author instructions page.

Manuscript received March 5, 2020; accepted March 11, 2020.

ISSN 2666-0849 https://doi.org/10.1016/j.jaccas.2020.03.026

ABBREVIATIONS AND ACRONYMS

AI = aortic insufficiency

AS = aortic stenosis

BAV = balloon aortic valvuloplasty

NCS = noncardiac surgery

SAVR = surgical aortic valve replacement

TAVR = transcatheter aortic valve replacement

VDS = valve delivery system

most of the pelvis and lower abdomen (**Figure 1**). The mass was deemed likely a benign ovarian serous or mucinous tumor. The primary consequence was the mass effect, which was elevating both hemidiaphragms and compressing both lungs. Furthermore, echocardiography revealed severe bicuspid AS with a mean gradient of 66 mm Hg, peak velocity of 5.4 m/s, and a calculated aortic valve area of 0.6 cm^2 in the setting of normal ejection fraction (60% to 65%) and mild-to-moderate aortic insufficiency (AI) (Supplemental Figure 1, Videos 1 and 2).

FIGURE 1 Abdominal-Pelvic Computed Tomography Scan

Computed tomography scan illustrating the large adnexal mass.

MANAGEMENT

The patient was referred for consideration of aortic valve replacement before adnexal mass resection. The patient was deemed intermediate risk for surgical aortic valve replacement (SAVR) because of the risk of prolonged intubation and respiratory failure related to the mass effect of the growth. The multidisciplinary heart team did not want to delay the patient's progress toward mass resection by subjecting the patient to a more prolonged recovery post-SAVR. Simultaneous mass resection and SAVR as combined procedure was considered but deemed high risk. Balloon aortic valvuloplasty (BAV) as a bridge to NCS was not an option given the baseline AI and the bicuspid valve. The gynecologic oncology team deemed her to have well over a 1-year life expectancy. Hence, TAVR was chosen as the optimal treatment strategy. Balloon-expandable prosthesis was chosen over a self-expandable prosthesis for the following reasons. The angle of entry from aorta into the left ventricle measured 62° (**Figure 2**) making it more difficult to seal with a self-expanding prosthesis (2). A balloon expandable SAPIEN 3 prosthesis was used for its greater radial force (**Figure 3**). Outcomes with TAVR in bicuspid versus tricuspid AS have been studied and are largely comparable with later-generation devices (3).

The TAVR procedure posed numerous technical challenges. The size of the mass posed some challenges with respect to vascular access and fluoroscopic visualization (**Figures 4** and **5**). Given the excellent quality of her iliac-femoral vasculature, a transfemoral access was chosen compared with such alternatives as transaxillary, transcarotid, or transapical accesses because it provided the least invasive method for this patient. After the valve delivery system (VDS) was successfully introduced, despite numerous maneuvers, there was difficulty crossing the stenotic native valve with the

FIGURE 2 Aortoventricular Fluoroscopy

Aortoventricular angle of 62°.

transcatheter valve. We ultimately had to resort to a second valve crossing with BAV via this second crossing to facilitate passage of the valve (**Figures 6** and **7**, Video 3). We ultimately achieved successful valve deployment with minimal residual gradient and excellent hemodynamics (**Figure 8**, Videos 4 and 5, Supplemental Figure 2). There was a new left bundle branch block with prolonged PR interval.

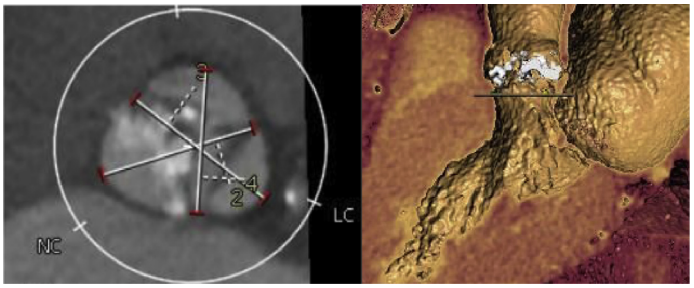
DISCUSSION

This case was unique for several reasons. This was a relatively young patient with a severe bicuspid AS (Sieverts type I with R-L fusion) with concomitant significant AI without an ascending aortic aneurysm in the setting of an enormous adnexal mass that needed prompt resection. Our patient was hospitalized because of respiratory compromise resulting from the combination of her severe AS and the extrathoracic compression of the lungs by the mass. The reduced lung volumes create an increased risk of prolonged intubation post-SAVR. More so, prompt valve intervention was required to facilitate operative resection of the adnexal mass. TAVR is an excellent method of providing a safe and effective treatment for this patient with low morbidity/mortality and short recovery time (4).

This case serves as a reference for patients needing prompt NCS in the setting of severe AS. Although an enormous adnexal mass needing prompt resection is somewhat rare, more commonly patients present with AS-related syncope complicated by orthopedic injuries, such as hip fracture, and are in need of prompt valve intervention before definitive correction of the orthopedic injury. Although the mass presented a technical challenge, the case illustrates the advantages of performing TAVR on low-risk patients. Recent publications of the low-risk TAVR trials demonstrate that in low surgical risk patients, TAVR is at least as good if not superior to SAVR (5,6).

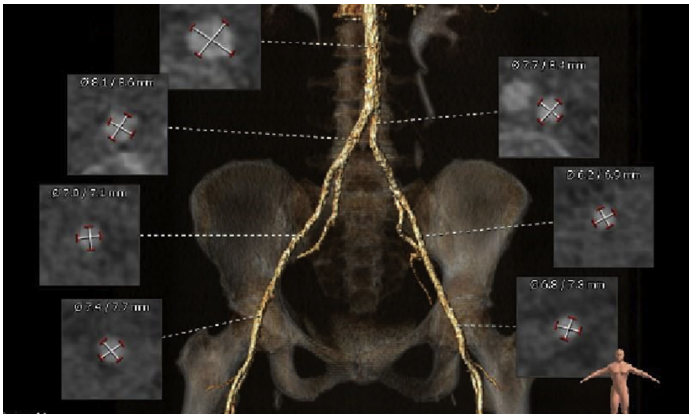
The intraprocedural aspects of the case were also illustrative of useful techniques in managing a complicated TAVR. Because of difficulty with fluoroscopic penetration and thus visualization through the mass, vascular access was obtained using the stiff, and radiopaque Meier wire and long sheaths. With the VDS in place, passage of the prosthetic valve across the native valve was surprisingly challenging. Preparatory BAV was not chosen because of the moderate AI at baseline. Multiple unsuccessful techniques were attempted to cross the valve including flexion and angulation of the catheter and nominal inflation of the VDS balloon. Recent data have suggested that elimination of routine BAV during TAVR may be beneficial (7); however, cases such as ours raise the question as to when it is necessary. Certainly the presence of

FIGURE 3 Axial and 3-Dimensional Imaging of Aortic Valve



Axial and 3-dimensional virtual rendering demonstrating bicuspid valve with heavy leaflet calcification.

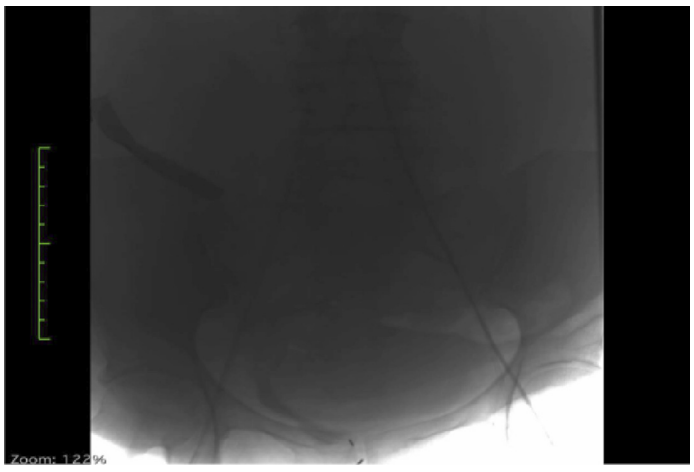
FIGURE 4 Computed Tomography 3-Dimenstional Volume Rendering of Ileofemoral System



Computed tomography 3-dimensional volume rendering of ileofemoral system demonstrating excellent vascular access.

JACC: CASE REPORTS, VOL. 2, NO. 5, 2020
MAY 2020:711–5

FIGURE 5 Pelvic Angiogram

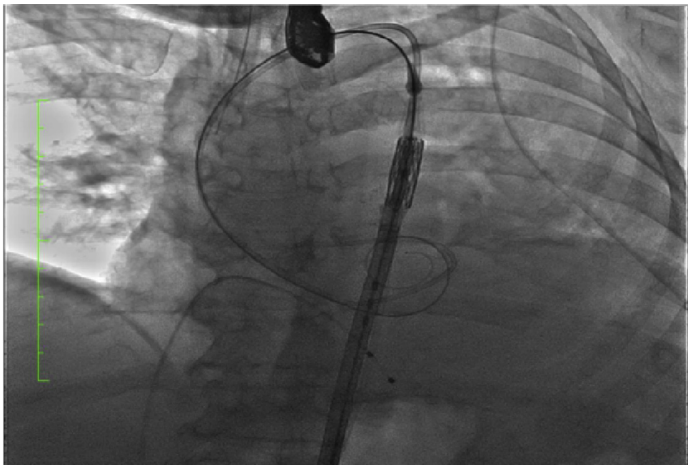


Pelvic angiogram demonstrating poor fluoroscopic visualization.

high gradients, extensive leaflet calcification, and bicuspid valve should be considerations favoring preparatory BAV.

Inability to primarily pass the prosthetic valve resulted in performing a BAV from the contralateral femoral access. However, rather than attempting a second crossing with a straight wire, we placed the stiff Meier wire within the pigtail catheter and forced our way across the native valve (**Figure 2**, Video 3). This "battering-ram" technique was used because the patient was becoming hypotensive and unstable. Such a forceful technique should not be used routinely but was necessary under urgent circumstances. The Meier wire was exchanged for a standard J-wire and a 10 × 40 mm peripheral balloon was used to perform BAV. Valve passage was again attempted but was unsuccessful. Valvuloplasty was repeated but the transcatheter heart valve was simultaneously passed with the peripheral balloon inflated across the native valve. Use of this "buddy-balloon technique" propping the leaflets open just enough to allow simultaneous advancement of the VDS allowed for advancement and successful deployment of the prosthesis. The patient did, however, develop a new left bundle branch block with first-degree atrioventricular block.

FIGURE 6 Second Valve Crossing



The contralateral pigtail was forced into the left ventricle over a Meier wire to provide a second crossing over which a valvuloplasty could be performed.

FOLLOW-UP

An electrophysiology study the next day demonstrated infrahisian and intrahisian disease resulting in placement of a permanent pacemaker. The patient did well subsequently and was discharged home with a plan for adnexal mass resection in the near future as an outpatient.

CONCLUSIONS

TAVR is a useful tool in patients with severe AS facing necessary NCS. Careful attention to access and groin management was essential in dealing with the enormous adnexal mass. Furthermore, bailout techniques, such as use of a "buddy-balloon," helped in facilitating valve passage and ultimately obtaining a good clinical outcome.

ADDRESS FOR CORRESPONDENCE: Dr. Simbo Chiadika, University of Texas Health Science Center at Houston, McGovern Medical School, 6431 Fannin Street, MSB 1.230, Houston, Texas 77030. E-mail: Olasimbo.M.Chiadika@uth.tmc.edu.

REFERENCES

1. Zahid M, Sonel AF, Saba S, Good BC. Perioperative risk of noncardiac surgery associated with aortic stenosis. Am J Cardiol 2005;96:436–8.

2. Abramowitz Y, Maeno Y, Chakravarty T, et al. Aortic angulation attenuates procedural success following self-expanding but not balloon-expandable TAVR. J Am Coll Cardiol Img 2016;9:964–72.

3. Yoon SH, Bleiziffer S, De Backer O, et al. Outcomes in transcatheter aortic valve replacement for bicuspid versus tricuspid aortic valve stenosis. J Am Coll Cardiol 2017;69:2579–89.

4. Arora S, Vaidhya SR, Strassie PD, et al. Meta-analysis of transfemoral TAVR versus surgical aortic valve replacement. Catheter Cardiovasc Interv 2018;91:806–12.

5. Mack MJ, Leon M, Thourani VH, et al. Transcatheter aortic valve replacement with a balloon expandable valve in low-risk patients. N Engl J Med 2019;380:1695–705.

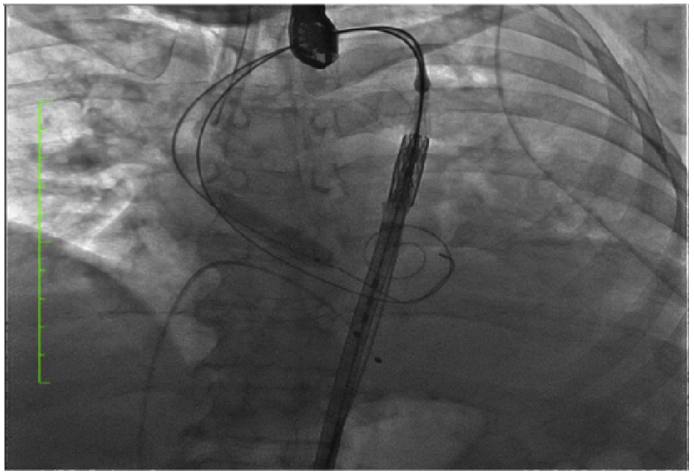
6. Popma JJ, Deeb GM, Yakubov SJ, et al. Transcatheter aortic valve replacement with a self-expanding valve in low-risk patients. N Engl J Med 2019;380:1706–15.

7. Deharo P, Jaussaud N, Grisoli D, et al. Impact of direct TAVR without balloon aortic valvuloplasty on procedural and clinical outcomes: insights from the FRANCE TAVI Registry. J Am Coll Cardiol Intv 2018;11:1956–65.

KEY WORDS abdominal masses, aortic stenosis, preoperative evaluation, transcatheter aortic valve replacement

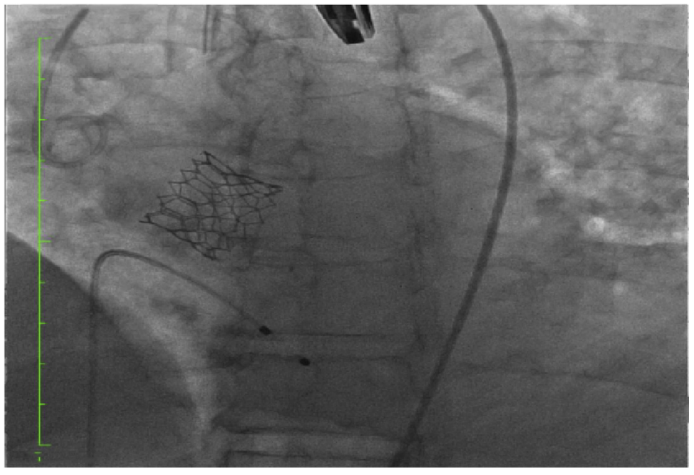
APPENDIX For supplemental figures and videos, please see the online version of this paper.

FIGURE 7 Valvuloplasty Using 10 x 40 mm Peripheral Balloon



Valvuloplasty using 10 × 40 mm peripheral balloon via second crossing.

FIGURE 8 Deployment of Transcatheter Heart Valve



Successful deployment of a 23-mm SAPIEN 3 transcatheter heart valve.