JACC: CASE REPORTS VOL. 1, NO. 5, 2019
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CASE REPORT

BEGINNER

CLINICAL CASE

Tragic End or Expected Destiny?

Pulmonary Edema Due to Sewing Ring Dehiscence of Bioprosthetic Mitral Valve

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ABSTRACT

The present case is unique because it describes transcatheter mitral valve replacement with a valve-in-valve procedure in an emergent setting of pulmonary edema and cardiogenic shock. Although transcatheter mitral valve replacement is in its initial phase, it remains a viable option in an emergency. Further research is needed to evaluate the short term and long-term outcomes. (**Level of Difficulty: Beginner.**) (J Am Coll Cardiol Case Rep 2019;1:865–8) © 2019 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/).

CASE

PRESENTATION. This case report describes a patient who presented with flash pulmonary edema secondary to sudden dehiscence of the sewing ring of the bioprosthetic mitral valve. A 64-year-old Filipino male was admitted with sudden onset dyspnea and hypotension. On presentation, the patient had a blood pressure of 80/40 mm Hg. Heart examination revealed jugular venous distention and a soft 2/6 holosystolic murmur in the mitral region. Examination of the lungs revealed extensive bibasilar crepitation, and the patient was using his accessory muscle of respiration. Because he eventually went into severe respiratory distress, he was intubated and transferred to the cardiac intensive care unit for further management and treatment.

LEARNING OBJECTIVES

- Durability of prosthetic mitral valve varies based on multiple factors, especially time.
- The VIV approach can be a lifesaving and an alternative approach in high-risk patients when surgical intervention is not feasible.
- Ischemic ECG changes does not always mean obstructive coronary artery disease; other etiologies should always be sought.

MEDICAL HISTORY. Rheumatic heart disease, hypertension, dyslipidemia, diabetes mellitus type 2, coronary artery disease (CAD), status post coronary artery bypass grafting and status post aortic and mitral valve replacements with bioprosthetic valves.

DIFFERENTIAL DIAGNOSIS. The catheter laboratory ruled out any significant obstructive CAD, and the grafts of the coronary artery bypass graft were also patent. Simultaneously, an intra-aortic balloon pump was inserted to stabilize the patient further.

INVESTIGATIONS. An emergent, transthoracic echocardiography was performed. The transthoracic echocardiogram revealed severe mitral valve regurgitation (MR). A transesophageal echocardiogram was performed for further evaluation of the MR. The transesophageal echocardiogram confirmed the presence of severe MR. The MR was severely eccentric and directed posteriorly through the flail anterior leaflet and the sewing ring without the

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Informed consent was obtained for this case.

Manuscript received October 1, 2019; revised manuscript received November 5, 2019, accepted November 5, 2019.

ISSN 2666-0849 https://doi.org/10.1016/j.jaccas.2019.11.027

ABBREVIATIONS AND ACRONYMS

CAD = coronary artery disease

MR = mitral valve regurgitation

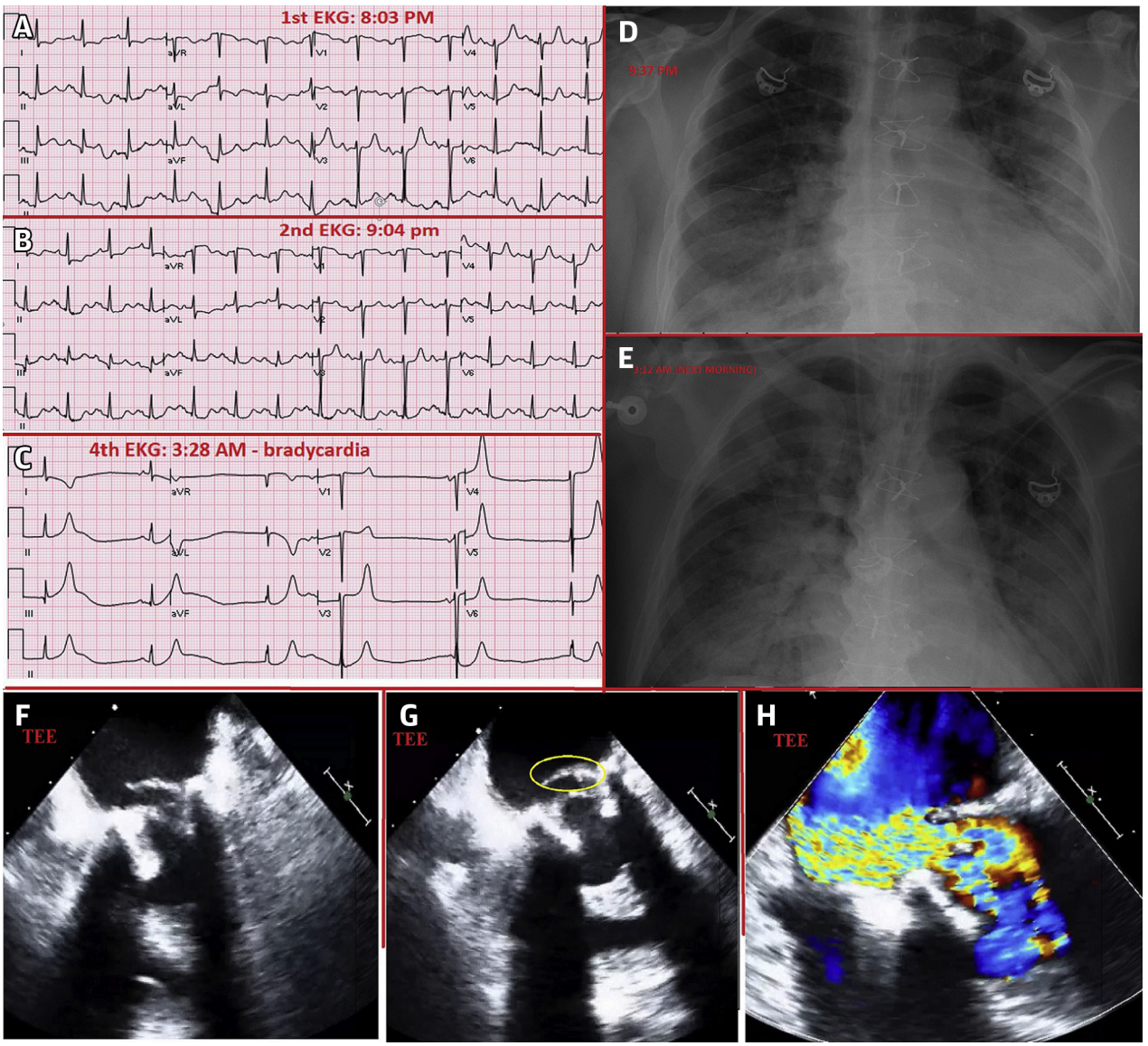
TMVR = transcatheter mitral valve replacement

VIV = valve-in-valve

presence of a perivalvular leak (Figure 1). After initial stabilization with pressors, the patient was also taken to the catheterization laboratory for urgent coronary catheterization.

MANAGEMENT. The patient's flash pulmonary edema and cardiogenic shock precluded emergent cardiac surgery for mitral valve replacement. This peculiar catch situation required a different approach for saving the patient's life. Hence, a novel transcatheter-based valve-in-value (VIV) approach was used to treat the MR and alleviate the symptoms. In this approach, the existing transcatheter aortic valve replacement assembly and hardware were used to deploy an aortic valve (29-mm SAPIEN XT, Edwards Lifesciences, Irvine, California) in the existing dysfunctional prosthetic mitral valve.

FIGURE 1 EKGs and Imaging of the Patient During Stay



(A) EKG on arrival. **(B)** EKG after 1 h, when the ED called the cardiac team to rule out STEMI. **(C)** EKG that showed 3rd degree block is basically a junctional escape rhythm at a rate of around 30 beats/min, with complete heart block. **(D)** Chest radiograph initially. **(E)** Chest radiograph during the night when the patient had pulmonary edema and was in distress needing intubation. **(F, G)** TEE shows the flail leaflet of the ruptured mitral valve. **(H)** TEE shows the severe mitral regurgitation jet. EKG = electrocardiography; ED = emergency department; STEMI = ST-segment elevation myocardial infarction; TEE = transesophageal echocardiography.

DISCUSSION

It has been almost 60 years since Starr and Edwards' first description of successful prosthetic valve replacement in 1961 (1). Annually, approximately 85,000 patients undergo heart prosthesis implantation in the United States (2). Multiple factors guide the choice of the prosthesis to be selected. The decision is usually based on the patient's age and comorbidities and the type of valve to be replaced. Another important factor is the patient's choice, especially if the patient wants or does not want to take long-term oral anticoagulation. Most studies until recently, evaluating different types of valves, mechanical versus prosthetic, are observational (1). Generally, prosthetic valves are less durable than mechanical valves, but they do not require long-term oral anticoagulation (3). Usually, mechanical valves last for approximately 30 years in comparison to the prosthetic valves, which last for only 10 to 15 years. Eventually, bioprosthetic valves require reoperation once they start failing (4). Studies have also shown that there is a higher chance of failure of prosthetic valve at the mitral position than in the aortic valve position (5,6). Most of the valves which fail present with regurgitation secondary to tear or rupture of one or more leaflets, which have become calcified or rigid (7,8). Rarely prosthetic valves do fail secondary to sewing ring dehiscence as well. However, the presentation is usually a gradual onset of dyspnea and heart failure.

Several observational studies have shown that reoperation in patients with prosthetic valves, especially at the mitral position, have a higher incidence of morbidity and mortality. One study showed the mortality was 10.6% for prosthetic valve dysfunction or periprosthetic leak compared to 3.0% in reoperation for failed repair or reoperation at a new site. The same study also showed that the mortality for aortic valve replacement was 6.4% compared to 7.4% for mitral valve replacement (9). Another similar study showed that reoperative mortality for emergency surgery was 13% compared to elective surgery, which was 6.4%. Also, patients with higher New York Heart Association (NYHA) functional class had higher mortality, 16% for NYHA functional class IV versus 2% for NYHA functional class I (10). In short, patients with prosthetic mitral valve in cardiogenic shock requiring emergent intervention have significantly higher mortality.

Transcatheter mitral valve replacement (TMVR) is a novel approach for MR secondary to the failed prosthetic mitral valve. The number of such procedures is on the rise worldwide. A recent study using data from the VIVID (Valve-in-Valve International Date) registry showed that the 30-day mortality of TMVR with the VIV approach was 7.7% and the occurrence of stroke was 2.9%. Late mortality beyond 12 months was 20.5% (11). The current mortality rates for the TMVR with VIV approach can be attributable to both patient and device-related factors (12,13). However, due to its less invasive nature, it is appealing to both physicians as well as to patients.

CONCLUSIONS

Most cases that have been described are elective cases, but the present case is unique because it describes TMVR with a VIV procedure in an emergent setting of flash pulmonary edema and cardiogenic shock. This case report demonstrates that, although TMVR is in its initial phase, it remains a viable and practical option in emergency settings. Further research in the form of similar case reports and studies of TMVR in the setting of pulmonary edema is needed to evaluate the short-term as well as the long-term outcomes.

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KEY WORDS coronary angiography, mitral valve, pulmonary edema