

Late leaflet dehiscence in a bovine bioprosthesis-mimicked COVID-19 infection

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Abstract

Symptoms mimicking COVID-19 infection, pulmonary emboli, or septicemia delayed diagnosis of aortic bioprosthesis failure. A 71-year-old man was admitted emergently with shortness of breath, fever, cough, and chest pain. Echocardiography performed after 2 days showed diastolic regurgitation in an aortic perimount pericardial bioprosthesis implanted 12 years previously. An urgent reoperation disclosed that one pericardial cusp was torn from the stent of the valve. We have not previously encountered sudden pericardial leaflet dehiscence of an internally mounted pericardial valve that caused heart failure and found no literature report like our finding.

Keywords

COVID-19, bioprosthesis, valve degeneration, pericardial valve

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Introduction

Biological heart valve prostheses have been used for five decades.¹ The advantage is that lifelong anticoagulation is not necessary, and the drawback is the risk of valve degeneration limiting the life span of the prosthesis. Leaflet tear is the most common mode of structural deterioration for porcine valves, whereas pericardial valves usually become fibrotic and obstructive.¹ With improved design and long-term durability, bioprostheses are implanted more frequently also in younger patients. Sudden malfunction of an aortic bioprosthesis will cause congestive heart failure and requires urgent reoperation with valve replacement or more recently in some cases can be treated by transcatheter aortic valve implantation (TAVI).² COVID-19 patients can present with acute heart failure.³ In our patient, initial symptoms of aortic bioprosthesis failure mimicked COVID-19 infection, pulmonary emboli, or septicemia that delayed assessment of the correct diagnosis.

Case presentation

A 71-year-old man with hypertension had implantation of a 25-mm glutaraldehyde pretreated aortic Carpentier Edwards Perimount 2900 bovine pericardial bioprosthesis (Edwards Lifescience, Irvine USA) for aortic stenosis in 2008, at the age of 59. His decision was a bioprosthesis to

avoid warfarin treatment. At routine control in May 2020, there was 3.3 m/s transvalvular velocity, no aortic regurgitation with left ventricular ejection fraction 57% and diastolic diameter 50 mm. He was admitted in September 2020 because of increasing of shortness of breath, fever, cough, and chest pain since a few days. At auscultation, there were pulmonary rhonchi, but no cardiac murmur was noted. Blood pressure in the emergency room was 145/60 mmHg. Body temperature was 39°C, white blood count was $9.4 \times 10^9/L$ (reference level < 8.3), procalcitonin was 0.33 $\mu g/L$ (reference level < 0.5), and N-terminal pro-brain natriuretic peptide was 7220 (reference level < 194). Computed tomography of the chest showed ground-glass opacities and consolidation most pronounced in the right lung but no pulmonary emboli (Figure 1). Multislice computed tomographic coronary angiography showed no coronary obstructions. COVID-19 infection was assumed but SARS-CoV-2-RNA test was negative.

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Body temperature normalized until the following day. Septicemia was ruled out as blood cultures were negative. Antibiotic treatment was started to treat pneumonia. Echocardiography performed after 2 days showed 3.4 m/s systolic velocity across the aortic bioprosthesis and significant eccentric diastolic transvalvular regurgitation (Figure 2(a) and (b)). Pressure half-time was short 214 ms with reversed diastolic flow in the descending aorta. Left ventricular ejection fraction was now 65%–70% with diastolic diameter 55 mm. His heart failure was worsening. Emergent TAVI was not possible. An urgent reoperation was performed and disclosed that one the pericardial cusps was torn from the top of the commissure of the stent between the left and noncoronary sinus to the nadir of the cusp (Figure 3). There were minimal calcifications and 16 SrDNA sequence analysis confirmed no signs of infection. A 25-mm Perimount Magna Ease prosthesis was implanted.

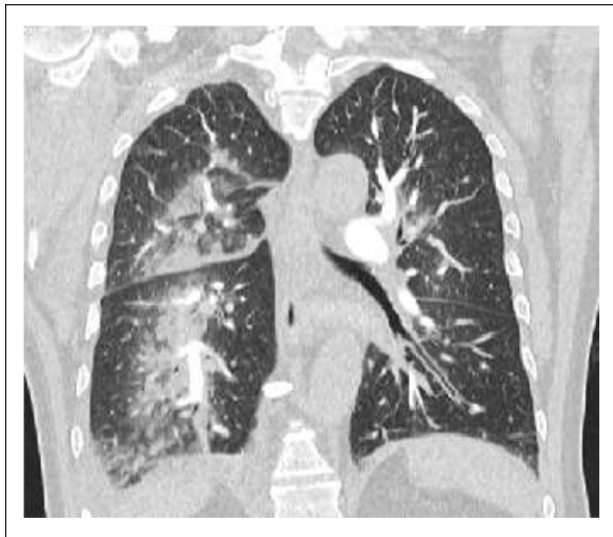


Figure 1. Computed tomography of the chest on admittance.

Recovery was uneventful except for transient atrial fibrillation. There were no pulmonary changes at chest x-ray 1 month after the operation

Discussion

The clinical presentation with sudden onset of fever, dyspnea, and heart failure mimicked COVID-19 infection, pulmonary emboli, or septicemia. These differential diagnoses were ruled out before the patient after 2 days was evaluated with transesophageal echocardiography and presented for treatment of the aortic bioprosthesis dysfunction. The expected durability of the pericardial bioprosthesis implanted in our patient was 19 years.⁴ Tears of externally mounted pericardial cusps have been reported repeatedly.^{5–7} Most commonly, tears involved the noncoronary cusp.⁶ Exterior mounted pericardial valves have a high effective orifice area and low-pressure gradient, but the repeated leaflet-to-stent contact result in tissue abrasion and ultimately tears or holes.⁷ The Carpentier Edwards Perimount bioprosthesis is made of bovine pericardium with the three leaflets mounted underneath a flexible stent with documented good long-term durability.⁴ Tear of internally mounted pericardial as in our case is exceptionally rare. Dvir et al. have reported partial tear of a pericardial cusp.⁸ We have not previously encountered sudden complete pericardial leaflet dehiscence from the strut of an internally mounted pericardial valve that caused heart failure and found no literature report like our finding.

Conclusion of study

Patients with who have undergone heart valve surgery and are admitted emergently with shortness of breath should have emergent echocardiographic evaluation even if the initially assumed diagnosis is respiratory infection.

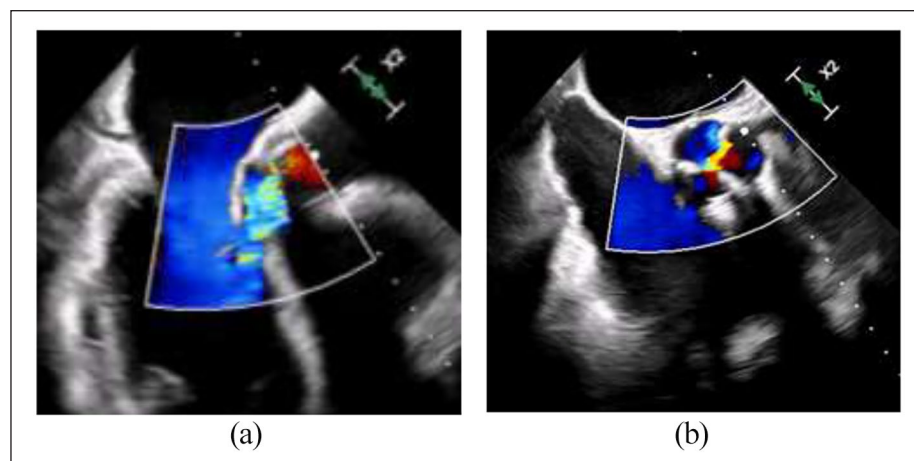


Figure 2. Transesophageal echocardiography showing diastolic transvalvular aortic regurgitation in (a) low angle, (b) high angle views.

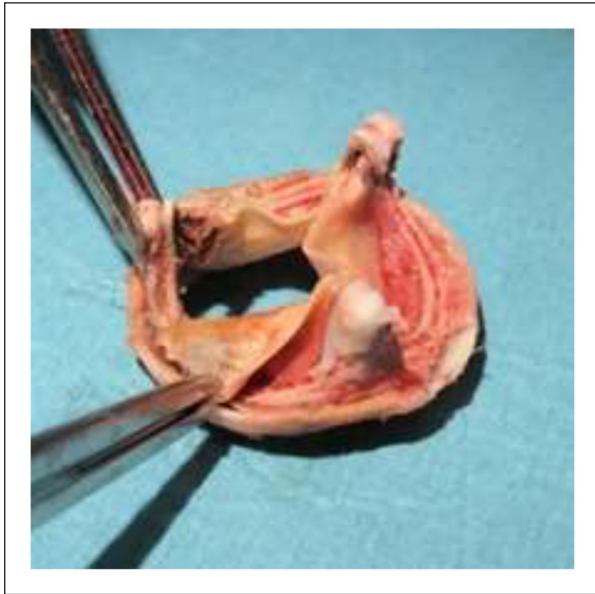


Figure 3. Operative finding of a pericardial cusp torn from the stent.

Declaration of conflicting interests

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Ethical approval


Our institution does not require ethical approval for reporting individual cases or case series.

Informed consent

Written informed consent was obtained from the patient for anonymized information to be published in this article.

The authors confirm that written consent for submission of this case report was obtained from the patient.

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References

1. Grunkemeier GL, Furnary AP, Wu Y, et al. Durability of pericardial versus porcine bioprosthetic heart valves. *J Thorac Cardiovasc Surg* 2012; 144(6): 1381–1386.
2. Giordana F, Bruno F, Conrotto F, et al. Incidence, predictors and outcomes of valve-in-valve TAVI: a systematic review and meta-analysis. *Int J Cardiol* 2020; 316: 64–69.
3. Bader F, Manla Y, Atallah B, et al. Heart failure and COVID-19. *Heart Fail Rev* 2021; 26: 1–10.
4. Bourguignon T, Lhommet P, El Khoury R, et al. Very long-term outcomes of the Carpentier-Edwards Perimount aortic valve in patients aged 50–65 years. *Eur J Cardiothorac Surg* 2016; 49(5): 1462–1468.
5. Kalra A, Rehman H, Ramchandani M, et al. Early trileaflet valve failure: report of a cluster of cases from a tertiary care referral center. *J Thorac Cardiovasc Surg* 2017; 154(4): 1235–1240.
6. Kaneyuki D, Nakajima H, Asakura T, et al. Early first-generation trileaflet valve failure: a case series and a review of the literature. *Ann Thorac Surg* 2020; 109(1): 86–92.
7. Vriesendorp MD, de Lind van Wijngaarden RAF, Rao V, et al. An in vitro comparison of internally versus externally mounted leaflets in surgical aortic bioprostheses. *Interact Cardiovasc Thorac Surg* 2020; 30: 417–423.
8. Dvir D, Bourguignon T, Otto CM, et al. Standardized definition of structural valve degeneration for surgical and transcatheter bioprosthetic aortic valves. *Circulation* 2018; 137: 388–399.