

Paravalvular Leaks with Iatrogenic Ventricular Septal Defect in a Patient with Double Valve Replacement: A Case Report

Tabbah R¹, Rachoin R², Sawaya F³, Harb B⁴ and Saroufim K⁵

¹Department of Cardiology, CHU-NDS Jbeil, Holy Spirit University, Kaslik, Lebanon

²Department of Echocardiography at Notre Dame de Secours, Jbeil, Lebanon

³Department of Interventional Cardiology and Structural Heart Disease, AUBMC, Lebanon

⁴Department of Interventional Cardiology at Notre Dame de Secours, Jbeil, Lebanon

⁵Pulmonary and Critical Care Medicine at Notre Dame de Secours, Jbeil, Lebanon Holy Spirit University, Kaslik, Lebanon

*Corresponding author: Tabbah R, Department of Cardiology, CHU-NDS Jbeil, Holy Spirit University, Kaslik, Lebanon, Tel: + 96170238849; E-mail: randa_22tabbah@hotmail.com

Received: February 01, 2020; Accepted: February 11, 2020; Published: February 18, 2020

Copyright: © 2020 Tabbah R, et al. This is an open-access article distributed under the terms of the creative commons attribution license, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

Abstract

Background: Para-prosthetic leaks post valvular replacement is a relatively rare complication. Burden of mortality and morbidity and recurrence increase with reoperation. Hemolysis is commonly seen in paravalvular leaks (PVL). Transcatheter repair is a less invasive technique with lower procedural mortality risk.

Case presentation: A 59-year-old male patient, presented to his primary physician for dyspnea on exertion with no known previous medical history. Cardiac ultrasound revealed an aortic and mitral valve disease. A severely calcified aortic valve with a moderately severe aortic regurgitation grade II to III and an aortic area of 1.3 cm². On the other hand, a severely calcified mitral valve mainly the anterior leaflet and a severe mitral regurgitation grade III with a mean gradient of 7 mmHg. Patient was sent for surgery. Two months after, patient presented with signs of heart failure and hemolytic anemia. Transesophageal echocardiography (TEE) revealed a severe eccentric paravalvular mitral leak aiming to the left atrial appendage, with several paravalvular aortic leaks moderate to severe and a small ventricular septal defect. Transcatheter repair was done for the mitral paravalvular leak, 3 plugs were needed and yield excellent results, with one plug for the aortic paravalvular leak. Patient symptoms were better.

Discussion: In this case, we illustrate the need for TEE with 3D TEE to have a more accurate diagnosis of post-operative complications. Always think about post-operative leaks in the setting of hemolytic anemia. Furthermore, a wider use of the transcatheter techniques to reduce mortality and morbidity due to surgery.

Keywords: Paravalvular leaks; Valve replacement; Hemolysis; Iatrogenic ventricular septal defect; Transesophageal Echocardiography (TEE); Transcatheter techniques

Introduction

The prevalence of valvular disease is important and increase with age. In Europe 2.5% suffers from this condition [1]. Para-prosthetic leaks post valvular replacement is a relatively rare complication. It is commonly seen in mechanical valves. Mitral valve is more affected with this complication than aortic valve. Burden of mortality and morbidity and recurrence increase with re-operation. Hemolysis with is commonly seen in paravalvular leaks (PVL). 1% to 5% of these leaks need repair. Large leaks can lead to heart failure with a high risk of infective endocarditis [2-5]. Due to high risk of surgery in these cases, transcatheter repair is a less invasive technique with lower procedural mortality risk but need high expertise in this field and is technically challenging [6].

Clinical Presentation

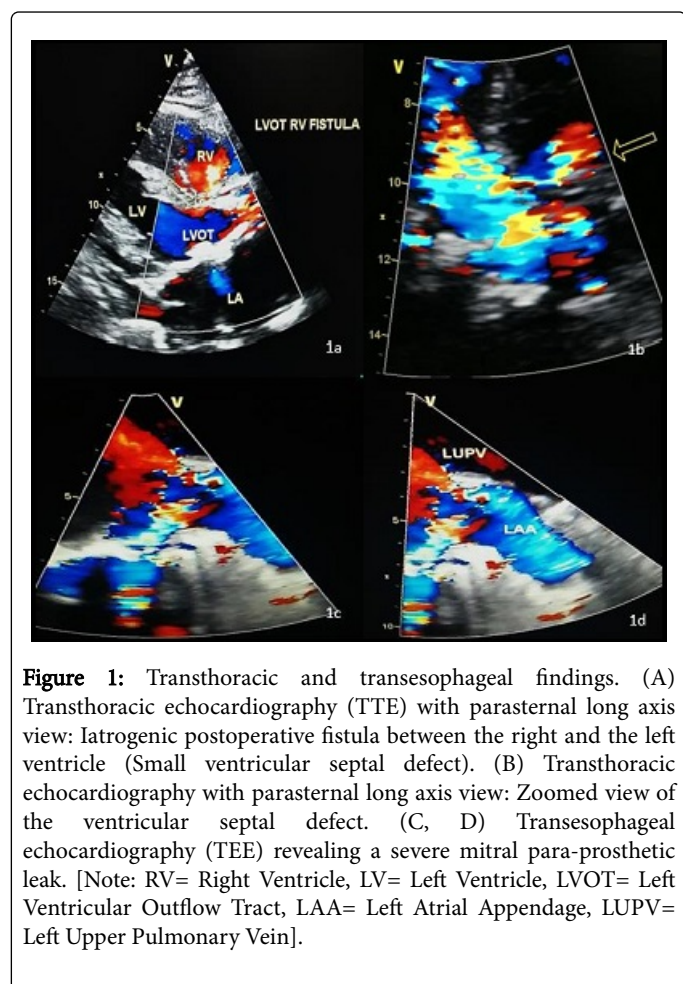
A 59 years old male patient presented to his primary physician for dyspnea on exertion. No known previous medical history, risk factors

nor any family history of cardiovascular disease. No chest pain or palpitation. On physical examination: A systolodiastolic murmur best heart in the third intercostal space with a holosystolic murmur best heart in the apex radiating to the left axilla, clear lungs and no limbs edema. Electrocardiogram was done with normal pattern. Cardiac ultrasound was suggested. It revealed an aortic and mitral valve disease. A severely calcified aortic valve with a moderately severe aortic regurgitation grade II to III and a mean gradient of 34 mmHg and a maximal gradient of 51 mmHg with an aortic area of 1.3 cm².

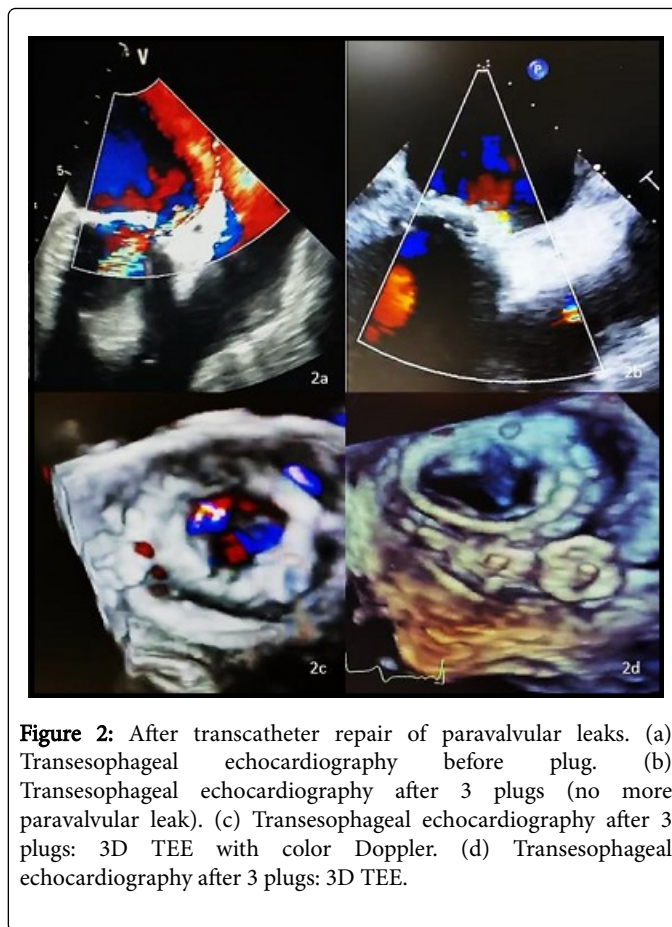
On the other hand, a severely calcified mitral valve mainly the anterior leaflet with no rupture of chordae tendineae, with a severe mitral regurgitation grade III with a mean gradient of 7 mmHg. In addition, a severely dilated left atrium (volume = 118 ml/m²) with an increased left ventricular end diastolic pressure. Furthermore, a preserved systolic function with a 63% ejection fraction on 2D and a preserved longitudinal contraction with a GLPS average of -21% with severe concentric hypertrophy. Patient was sent for evaluation for surgery. Cardiac catheterization was done revealing normal coronary arteries. Carotid duplex was also normal. Surgery was done with two biological prosthetic valves and patient was stable post operatively. No cardiac ultrasound was done post operatively due to financial issues.

Two months later, patient complained again from dyspnea on exertion and at rest NYHA IV with peripheral edema and an altered general status. Lab test showed a severe hemolytic anemia with a hemoglobin of 7.9 and normal mean corpuscular volume. A decrease in haptoglobin levels and a positive coombs test. High LDH and bilirubin is noticed with a high reticulocyte count. Iron, ferritin, folate and B12 were normal. In addition, an increase in serum creatinine to 1.7 mg/dl with a creatinine clearance of 43 ml/min/1.73 m² with an increased NT-proBNP.

Cardiac ultrasound revealed a severe para-prosthetic leak of the mitral valve with moderate to severe aortic para-prosthetic leaks with a small iatrogenic ventricular septal defect and a left to right ventricular shunt. A circumferential moderate pericardial effusion with 13 mm behind the left ventricle in diastole. No signs of tamponade. Furthermore, pulmonary hypertension noticed with a systolic pulmonary pressure of 65 mmHg. A preserved systolic function of 72% with Teicholz ejection fraction with a mildly reduced longitudinal contraction of the right ventricle post operatively. A moderate to severe right pleural effusion is also noticed (Figure 1).



Transesophageal echocardiography (TEE) was crucial in this setting to confirm the diagnosis. It revealed a severe eccentric mitral para-valvular leak aiming to the left atrial appendage, with several paravalvular aortic leaks moderate to severe with a thrombi free left atrial appendage (Figure 2a). No signs of vegetation or abscess on TEE.



Patient was treated with erythropoietin as injections and with transfusion, but the main cause of this anemia was valvular induced. Surgical treatment of para-prosthetic leaks has a high mortality rate (Euroscore >5%), so the patient was sent for Transcatheter repair. For the mitral para-valvular leak, 3 plugs were needed and yield excellent results (Figures 2b, 2c, 2d). Three dimensional (3D) transesophageal ultrasound was also used in this case for more accuracy. On the other hand, an aortogram done showed multiple leaks, one plug was used, and the other leaks were mild to moderate and left intact. The iatrogenic ventricular septal defect was a small and restrictive one and left with no repair. After repair pulmonary pressure dropped from 70 mmHg to 35 mmHg and symptoms were much better.

Discussion

It's a very rare case of post-operative complications associating several conditions. From a severe mitral para-prosthetic leak to several moderate leaks in the aortic prosthesis with an iatrogenic ventricular septal defect. These conditions have a lot of etiologies and mechanism the most common one is a disruption of sewing ring sutures due to calcification and pannus formation or infective endocarditis with abscess formation. But in our case no sign of endocarditis or abscess nor infection fever or inflammation. Neither possible pannus formation nor calcification noticed on TEE [7]. The most reliable etiology is a malposition of valvular structures against annulus leading to leak formation. Furthermore, an iatrogenic ventricular septal defect as a very rare complication is also noticed but small defects may not cause significant hemodynamic impact. The most common

presentation in this case was hemolytic anemia with signs of heart failure due to the large paravalvular mitral leak. Two types of leak can be presented postoperatively. Early leaks which sometimes can heal when they are small or cause hemolytic anemia, and late leaks years after due to endocarditis and dehiscence [2,3,8].

Decision making and choice between surgery and interventional technique was due to high mortality rate postoperatively because of the need for double valve replacement and closure of a ventricular septal defect. Reoperation in this case is risky. Postoperative mortality for mitral paravalvular leak is between 3.7% and 22%, and Euroscore in this patient was high due to the number of valve needed to be replaced, the condition of the patient in heart failure with high pulmonary pressures, acute renal injury after this manifestation. Further, an increase in LDH is a high predictive of mortality. More discussion about this issue led to the choice of a para-prosthetic leak treatment with transcatheter deployment of an occluder device (plug). The most common indications for this procedure are repeated surgeries or isolated leak. This technique was able to close the large leak with three plugs with a moderate to large aortic leak. These leaks were the most hemodynamically debilitating [9-12].

Conclusion

It's a rare case of post-operative complications combining several conditions in one patient: A severe para-prosthetic mitral valve leak, several aortic para-prosthetic leaks and an iatrogenic ventricular septal defect. Hemolytic anemia and heart failure were the outcomes of these complications. In the setting of hemolytic anemia, paravalvular leaks are the most important differential diagnosis to think about. In this case, we illustrated the need for TEE with 3D TEE to have a more accurate diagnosis of post-operative complications. Furthermore, a wider use of the transcatheter techniques to reduce mortality and morbidity due to surgery.

Conflict of Interests

The authors declare no conflicts of interest.

References

1. Dávila-Román VG, Waggoner AD, Kennard ED, Holubkov R, Jamieson WE, et al. (2004) Prevalence and severity of paravalvular regurgitation in the Artificial Valve Endocarditis Reduction Trial (AVERT) echocardiography study. *J Am Coll Cardiol* 44: 1467-1472.
2. Movsowitz HD, Shah SI, Ioli A, Kotler MN, Jacobs LE (1994) Long-term follow-up of mitral paraprosthentic regurgitation by transesophageal echocardiography. *J Am Soc Echocardiogr* 7: 488-492.
3. Rallidis LS, Moyssakis IE, Ikonomidis I, Nihoyannopoulos P (1999) Natural history of early aortic paraprosthentic regurgitation: A five-year follow-up. *Am Heart J* 138: 351-357.
4. O'Rourke DJ, Palac RT, Malenka DJ, Marrin CA, Arbuckle BE, et al. (2001) Outcome of mild periprosthetic regurgitation detected by intraoperative transesophageal echocardiography. *J Am Coll Cardiol* 38: 163-166.
5. Safi AM, Kwan T, Afflu E, Al-Kamme A, Saliccioli L (2000) Paravalvular regurgitation: A rare complication following valve replacement surgery. *Angiology* 51: 479-487.
6. Pate GE, Al Zubaidi A, Chandavimol M, Thompson CR, Munt BI, et al. (2006) Percutaneous closure of prosthetic paravalvular leaks: Case series and review. *Catheter Cardiovasc Interv* 68: 528-533.
7. Genoni M, Franzen D, Tavakoli R, Seiffert B, Graves K, et al. (2001) Does the morphology of mitral paravalvular leaks influence symptoms and hemolysis?. *J Heart Valv Dis* 10: 426-430.
8. Dziubek M, Pierrakos C, Chebli L, Demanet H, Sanoussi A, et al. (2018) Para-prosthetic leaks following mitral valve replacement: A case analysis on a 20-year period. *Curr Cardiol Rev* 14: 15-24.
9. Smolka G, Ochała A, Jasiński M, Pysz P, Biernat J, et al. (2010) Percutaneous treatment of periprosthetic valve leak in patients not suitable for reoperation. *Kardiologia Polska (Polish Heart Journal)* 68: 369-373.
10. Nietlispach F, Johnson M, Moss RR, Wijesinghe N, Gurvitch R, et al. (2010) Transcatheter closure of paravalvular defects using a purpose-specific occluder. *J Am Coll Cardiol Intv* 3: 759-765.
11. Bairaktaris A, Haas NA, Seifert D, Schaeffler R, Koertke H, et al. (2008) Pitfalls in catheter-based interventions to treat paravalvular leaks. *J Thorac Cardiovasc Surg* 136: 1076-1077.
12. Merin O, Bitran D, Fink D, Asher E, Silberman S (2007) Mechanical valve obstruction caused by an occlusion device. *J Thorac Cardiovasc Surg* 133: 806-807.