Journal of Clinical Case Reports

Case Report Open Access

VA-ECMO as a Bridge to Surgery on Bioprosthetic Valve Thrombosis: Approaches to Consider in Emergency

Akoluk A[1], Douedi S[1]*, Meleka M[2], Asgarian K[3], Apolito R[2] and Hossain MA[1]

[1]Department of Internal Medicine, Jersey Shore University Medical Centre, Neptune, USA
[2]Department of Cardiology, Jersey Shore University Medical Centre, Neptune, USA
[3]Department of Cardiothoracic Surgery, Jersey Shore University Medical Centre, Neptune, USA

Abstract

Prosthetic Valve Thrombosis (PVT) is a rare complication of bioprosthetic valve. Surgery is the preferred treatment for PVT. Severe cases of prosthetic valve thrombosis may result in cardiopulmonary failure with Acute Respiratory Distress Syndrome (ARDS). This case report emphasis the role of VA-ECMO in cases of PVT with ARDS as a bridge to surgery.

Keywords: Surgery; Bioprosthetic valve; Hypertension

Learning Objectives

- To be able to recognize Prosthetic valve thrombosis.
- To be able to acknowledge the potential of VA-ECMO as a bridge to surgery in severe cardiopulmonary failure cases due to Prosthetic Valve Thrombosis.

Introduction

Degenerative valve disease is on the rise with greater than 100,000 valve operations performed in the US alone per year. The majority of those procedures employ tissue bio prostheses to avoid the attendant risk of anticoagulation, especially in the elderly. The literature has extensively addressed the risks and benefits of anticoagulation following bioprosthetic valve replacement to prevent bioprosthetic valve thrombosis (BPVT), without conclusive evidence-based recommendations. In this review, we summarize BPVT as a clinical and subclinical entity, outline its diagnostic challenges, provide an overview of its pathophysiological basis, and discuss various therapeutic options.

Case Report

History of presentation and past medical history

The patient is a 35-year-old female with history of severe mitral valve degenerative disease, status post mitral valve replacement with a bioprosthetic valve, Atrioventricular nodal re-entry tachycardia ablation, and asthma presented with dyspnoea on exertion. One week prior to admission she went to her cardiologist and outpatient echocardiogram showed significant bio-prosthetic mitral valve regurgitation which was completely normal on echo done 4 months ago. At admission, her vitals were stable. Lung exam showed no crackles, rhonchi or wheezing, cardiac exam was consistent with mitral valve regurgitation. During her hospitalization, she became hypotensive and developed respiratory failure required ventilator and vasopressor support

Investigations

Initial laboratory results were unremarkable except mild elevation AST and ALT with 111 and 191 respectively. Extensive coagulopathy workup was done showed factor two heterozygous mutation. HIV, Hepatitis B and C screening was negative. Transthoracic echo showed severe pulmonary hypertension. Trans Esophageal Echocardiogram (TEE) revealed the left atrium had extensive echo densities along the bioprosthetic mitral valve and along the walls and cavity of the left atrium. The thrombus was severely limiting bioprosthetic mitral valve function resulting in severe mitral stenosis and pulmonary hypertension. Surgical pathology showed bioprosthetic valve covered with, valvular leaflet tissue with organizing fibrin/ haemorrhage consistent with thrombosis.

Management

The patient developed severe acute pulmonary edema and respiratory failure. She was placed on femoral VA-ECMO and after hemodynamic stabilization taken to operation room for declotting and removal of thrombus from the left atrium with redo mitral valve with a 31 mm mechanical St. Jude valve. The patient remained in the intensive care unit for 10 days postoperatively. She was weaned from ECMO and extubated but was kept on multiple pressor and milrinone for ionotropic support. Eventually, she was weaned off from milrinone before discharge. She was bridged with anticoagulation and discharged to rehab.

Follow-up

On follow up, she was feeling better and symptoms free for 6 months. She had a repeat TEE done outpatient which showed normal functioning mechanical valve.

Discussion

Bioprosthetic Heart Valves (BHVs) tend to be thrombogenic than MHV and have natural hemodynamic properties but are less durable. Although BHV thrombosis generally presents with PV degeneration, PV thrombosis may also be associated with new-onset regurgitation or mixed stenosis and regurgitation. Surgery is the preferred treatment for left-sided PVT [1,2]. Severe cases of prosthetic valve thrombosis may result in cardiopulmonary failure with Acute Respiratory Distress Syndrome (ARDS) [3]. Veno-arterial ECMO (VA-ECMO) is a device that provides both circulatory and pulmonary support by draining blood from a vein and sending oxygenated blood to artery [3,4]. This

***Corresponding author:** Douedi S, Department of Internal Medicine, Jersey Shore University Medical Centre, Neptune, USA, Tel: +7323302771; E-mail: Steven.douedi@hackensackmeridian.org

Received December 10, 2019; **Accepted** December 30, 2019; **Published** January 06, 2020

Citation: Akoluk A, Douedi S, Meleka M, Asgarian K, Apolito R, et al. (2019) VA-ECMO as a Bridge to Surgery on Bioprosthetic Valve Thrombosis: Approaches to Consider in Emergency. J Clin Case Rep 10: 1309

patient was very unstable with multiorgan failure who needed an urgent VA-ECMO for cardiogenic shock as a bridge to surgery. He was successfully weaned off from ECMO and extubated.

This is the fourth case using VA-ECMO as a bridge for cardiogenic shock caused by PVT [5,6]. Gottfried et al., describes a case of bioprosthetic mitral valve thrombosis while on VA-ECMO, not as a briding method. The patient passed away 3 days later while on VA-ECMO. Kagiyama et al., described 2 cases with prosthetic valve thrombosis treated with VA-ECMO. First one was treated with percutenous mitral valvuloplasty and re-mitral valve replacement. Second patient was undergoing emergent mitral valve replacement after MI due to papillary muscle rupture, VA-ECMO was started during the procedure. Subsequently patient was found to have bioprostetic valve thickening which was treated with IV urokinase for 3 days. Our case originally presented with very mild symptoms and was hemodynamically stable at presentation however she decompansated throughout her hospital course. VA-ECMO was started emergently as a bridge for surgery, which was a life saving measure at the time as the patient was hemodynamically too unstable for surgery. Our patient successfully weaned off from VA-ECMO and disease free currently for 6 months. These cases prove that VA-ECMO, when used as a bridge to another treatment method, can be successfully used in patients with PVT presenting with ARDS.

Conclusion

PVT is a rare complication of bioprosthetic valve which can lead to cardiopulmonary shock and ARDS. VA-ECMO should be considered in such cases and use as a bridge to surgery. More study and case reports need to be reported in this area to establish it as a standard of care in a critical patient like in our case.

References

1. Lengyel M (1997) Guidelines for management of left-sided prosthetic valve thrombosis: A role for thrombolytic therapy. J Am College Cardiol 30: 1521-1526.
2. Vongpatanasin W, Hillis LD, Lange RA (1996) Prosthetic heart valves. New Eng J Med 335: 407-416.
3. Makdisi G, Wang IW (2015) Extra Corporeal Membrane Oxygenation (ECMO) review of a lifesaving technology. J Thorac Dis 7: 166.
4. Muller G (2016) The Encourage mortality risk score and analysis of long-term outcomes after VA-ECMO for acute myocardial infarction with cardiogenic shock. Intens Care Med 42: 370-378.
5. Gottfried R (2012) Thrombosis of a bioprosthetic mitral valve under extracorporeal membrane oxygenation: Thrombus formation in the left heart. Ann Thorac Surg 94: 657.
6. Kagiyama N (2014) Two cases of acute bioprosthetic mitral valve thrombosis immediately after mitral valve replacement. Circul 129: 328-330.