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Case Report

Hybrid treatment of aortic and mitral paravalvular leaks: A novel approach



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ABSTRACT

Paravalvular leak (PVL) is a well-recognized complication of prosthetic valve replacement. Peri-prosthetic regurgitation is clinically significant in 1–5% of patients with PVL causing symptoms of congestive heart failure and/or hemolysis. Traditionally, cardiac reoperation and surgical re-replacement of the valve has been the treatment of choice. Reoperations carry higher risks than primary operations and tissue fragility may make successful prosthetic valve re-replacement difficult. Percutaneous closure of PVL is a newer and less invasive technique, gaining popularity especially in high-risk surgical patients. However, the long-term efficacy is unknown, and the technique is limited by the size of the PVL. In the case of multiple PVLs in high-risk patients, another viable alternative is to employ a hybrid strategy. This combination of surgical and percutaneous approaches has not been reported previously. Our report describes the use of a hybrid strategy in the management of multiple PVLs in a high-risk patient. This synergy relies on the Heart Team concept, and may result in improved outcomes with PVLs in high-risk or non-surgical candidates.

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1. Introduction

Paravalvular leak (PVL) is a known complication of prosthetic valve replacement. Small PVLs are usually asymptomatic,

whereas large PVLs can cause congestive heart failure (CHF) symptoms and hemolysis.¹ The majority of PVLs are successfully repaired by surgical reoperation, but this approach has been associated with higher complication rates.² In

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addition, poor tissue quality may compromise the durability of surgical PVL repair and lead to subsequent worsening of symptoms. Significant deconditioning from long-standing CHF or multiple co-morbid illnesses may also preclude safe surgical PVL repair. Although medical therapy generally has only a palliative role, in some cases, it is preferable to a redo surgical procedure. Because of the higher morbidity and mortality associated with the redo surgery, percutaneous techniques for PVLs closure represent an attractive alternative and are gaining popularity.³ These procedures can be used for aortic or mitral PVL closure (aPVL or mPVL).⁴

In the case of simultaneous aortic and mitral PVLs, the options include surgical repair of both leaks, percutaneous closure of both lesions and a hybrid strategy. Although the former two strategies have been reported in the literature, this report represents, to the best of our knowledge, the first case of a hybrid repair of aortic and mitral PVLs. The objective of this report is to present the case in order to discuss the indications and techniques of this novel strategy.

2. Case

A 37-year-old male was referred to our institution with symptomatic aortic and mitral PVL following mechanical mitral and aortic valve replacement for native valve endocarditis. He was diagnosed with bacterial endocarditis requiring double valve replacement 2 years ago. As a result, he underwent mechanical mitral valve, and subsequently aortic valve, replacement for recurrent endocarditis. This operation was complicated by intraoperative cerebrovascular accident (CVA), with mild residual left upper extremity numbness.

Over the next 6 months, he had recurrent complaints of fatigue, shortness of breath, peripheral edema and chest discomfort. These were ascribed to his prior CVA and no workup was undertaken. He subsequently began to develop

significant lightheadedness and worsening shortness of breath. Repeat investigations with echocardiography showed valvular insufficiency secondary to a PVL at the prosthetic mechanical aortic valve. Eight months after his initial operations, he had a third redo sternotomy to correct aPVL at an outside hospital in Mexico, but this was not amenable to repair. Over the ensuing year, he was monitored with repeat transthoracic echocardiogram (TTE) and managed medically, but due to progressive symptoms of CHF, he was referred to our institution for definitive care.

Repeat transesophageal echocardiography (TEE) was notable for moderate to severe aPVL and mPVL (Figs. 1 and 2) with a left ventricular ejection fraction of 25–30%. After multidisciplinary evaluation, the initial plan was to attempt to repair both PVLs using a staged percutaneous approach; however, the mPVL was possibly too large for percutaneous closure. The heart team discussed the benefits of a hybrid procedure in this scenario where the aPVL would be closed percutaneously and mPVL would be repaired surgically. First, he underwent percutaneous aPVL closure. The procedure was performed in the cardiac catheterization laboratory under general anesthesia with fluoroscopic and 3-dimensional TEE guidance. The size of the PVL size was confirmed by TEE intraoperatively. Two Amplatzer vascular plugs, measuring 8 × 7 mm and 10 × 7 mm, were deployed to occlude the aPVL (Fig. 3a, b). Post-procedure TEE and aortic root angiography confirmed the resolution of aPVL (Fig. 4). Completion coronary angiography demonstrated unobstructed coronary flow following aPVL closure.

Next, an attempt was made to close the mPVL percutaneously. However, due to the large size of the mPVL, percutaneous closure was not successful. As a result, a decision was made to repair the mPVL surgically, thus constituting a hybrid approach.

Intraoperative TEE confirmed the location of the mPVL in the A1-P1 region and a markedly reduced left ventricular ejection fraction of 25–30%. There was no evidence of aPVL.

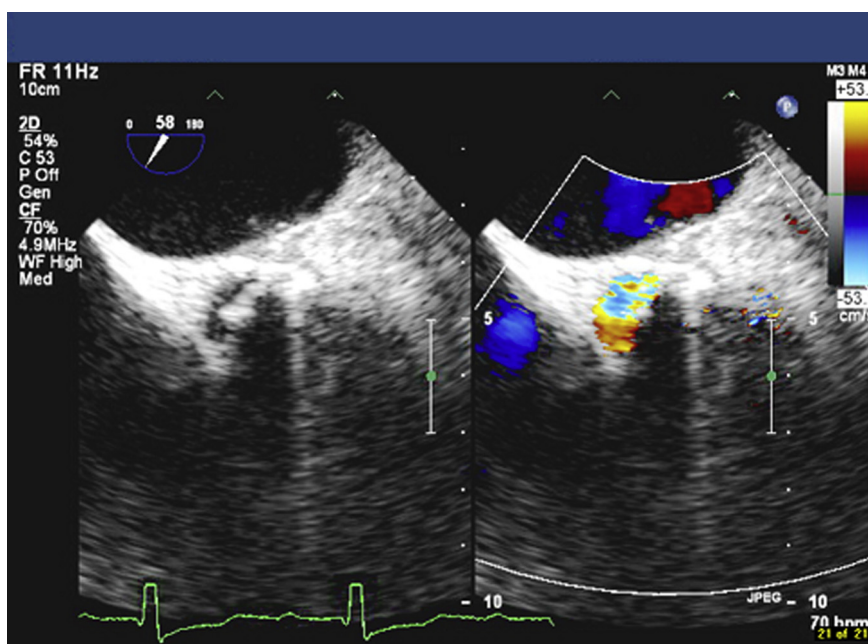


Fig. 1 – Transesophageal echocardiogram showing aortic paravalvular leak.

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