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Surgical management of mitral regurgitation in a patient with constrictive pericarditis, a case report

Abstract

Constrictive pericarditis is a rare clinical entity often presenting with signs of right heart failure. Diagnosis typically involves the use of transthoracic echocardiography, computed tomography, and magnetic resonance imaging. Pericardiectomy is the cornerstone of treatment, but in cases of end-stage disease, it may not be feasible. In complex surgical procedures, such as those involving valve and coronary artery surgery, surgeons must carefully weigh the potential benefits and risks. In our case, we opted to perform a mitral valve replacement while avoiding manipulation of the pericardial calcification to protect the myocardium. We believe that this surgical approach was the most beneficial method for the patient, and its novelty makes our case noteworthy.

Keywords: Pericarditis, constrictive, mycobacterium tuberculosis, pericardiectomy, mitral valve insufficiency

INTRODUCTION

Pericarditis is the most common disease affecting the pericardial tissue (1). In developed countries, viruses are the most common cause of pericarditis (1). However, in developing countries, tuberculosis is the most frequently encountered reason for pericarditis (1). Constrictive Pericarditis (CP) can occur after any pericardial diseases (1). The incidence of constrictive pericarditis varies based on the underlying cause: there is a low incidence following viral pericarditis, an intermediate incidence after immune-related pericarditis, and a higher incidence following bacterial pericarditis (1). Additionally, constrictive pericarditis has been reported after COVID-19 infection and COVID-19 vaccination (2). Constrictive pericarditis leads to reduced diastolic filling, resulting in a clinical picture of right heart failure (1). Patients may experience symptoms such as shortness of breath, peripheral edema, fatigue, and

abdominal swelling (1). Other manifestations include venous congestion, hepatomegaly, pleural effusions, and ascites (1). Pericardiectomy may be considered for patients with New York Heart Association (NYHA) class 3 or 4 symptoms (1). However, the procedure should be performed only when feasible, as it carries high mortality rates if not carefully selected (1). For patients with end-stage constrictive pericarditis, pericardiectomy may not provide significant benefits (1). End-stage disease is characterized by cachexia, atrial fibrillation, low cardiac output, and hypoalbuminemia (1).

Given that mitral regurgitation is a common condition, degenerative mitral valve disease is the most frequent cause in developed countries (3). In contrast, rheumatologic diseases are the most common cause in low-income countries (3). If the issue is with the valve itself, this is classified as primary mitral regurgitation (3). In cases of primary mitral regurgitation

where symptoms are present, a heart team should decide on surgical intervention based on the potential benefits and risks for the patient (3). When surgery is considered, valve repair is typically the first-choice intervention (3). However, if there are rheumatic lesions, extensive valve prolapses, leaflet calcification, or annular calcification, repairing the valve can be challenging (3). In such cases, valve replacement with preservation of the subvalvular apparatus is recommended (3).

Even though both pericarditis and mitral regurgitation result in heart failure, but mitral regurgitation is regarding left ventricular dysfunction (4) and pericarditis is associated with right ventricular dysfunction. Fatigue and dyspnea are seen in both disease (1,4). On the other hand, left ventricular dysfunction may exacerbate right ventricular dysfunction and contribute clinical severity of right heart failure.

Our aim is to make a contribution to the literature in this field.

CASE REPORT

An 83-year-old female patient was admitted to the hospital with shortness of breath. The cardiology department investigated her and found severe mitral insufficiency via transthoracic echocardiography (TTE). Consequently, she was referred to the cardiovascular surgery department. Although the electrocardiogram (ECG) did not show low amplitude, the TTE report indicated a septal bounce and calcification, raising suspicion for pericarditis. Computed tomography revealed pericardial calcification. The patient's systolic blood pressure was approximately 80 mm Hg, and her ejection fraction was calculated to be low at about 30%. She was classified as having mild heart failure. Therefore, we decided against total pericardiectomy due to her low cardiac output and opted for mitral valve repair instead.

A median sternotomy was performed; however, we encountered difficulties due to the thickness of the pericardium, which complicated cannulation. Eventually, aorta-bicaval cannulation was achieved. A suction device was inserted into the right superior pulmonary artery, followed by left atriotomy, where Barlow's disease was observed in the mitral valve. Mitral valve repair was completed using a size 32 St. Jude 3D ring and Alfieri technique. The patient was evaluated for pericardiectomy, but due to the severe thickness of the pericardium involving the myocardium and coronary arteries (as seen in video), this procedure was not performed, and standard closure was executed.

During the planning phase for mitral valve repair, we unexpectedly identified tuberculosis pericarditis (TBP). Although mitral valve repair was successfully performed, pericardiectomy could not be carried out due to the risk of damaging the myocardium and coronary arteries.

The intensive care unit (ICU) period proved eventful. The patient's hemodynamic parameters were unstable,

necessitating the insertion of an intra-aortic balloon pump (IABP). Pathological investigations confirmed the diagnosis of tuberculosis pericarditis. Unfortunately, the patient passed away on the fifth day of follow-up in the ICU due to low cardiac output.

DISCUSSION

Tuberculosis (TB) is one of the most significant infectious diseases worldwide, responsible for approximately 1.25 million deaths annually (5). In the pericardium, lymphocytes infiltrate the tissue, supported by proinflammatory and profibrotic mediators (5). This process leads to the clinical stages of TBP (6). This initial stage presents with symptoms of acute pericarditis (6). At effusive stage, patients develop pericardial effusion. The pericardial fluid contains lymphocytic exudates, monocytes, and foam cells (5). This stage is often associated with symptoms of heart failure and cardiac tamponade. During absorptive stage, the effusion is absorbed, and granulomatous tissue begins to organize. Pericardial thickening occurs due to fibrin deposition, collagen formation, and fibrosis (6). Although clinical symptoms of constrictive pericarditis may be present, radiologic evidence may not yet be apparent (5). The final stage is marked by constrictive scarring due to fibrosis of the visceral and parietal pericardium. Calcification can encase the heart in a fibrocalcific layer, impairing diastolic filling and leading to the classic symptoms of constrictive pericarditis (6).

Encountering both mitral valve disease and constrictive pericarditis is the seldom clinical table. Patel et al. (7) considered that situation as a "diagnostic dilemma". They mentioned they consulted the patient for cardiothoracic surgery and examined this rare condition with its clinical and radiologic assessments (7). Okabe et al. (8) operated a 47-year-old male patient with constrictive pericarditis and rheumatoid valvular disease. They mentioned about their successful pericardiectomy and aortic valve replacement, tricuspid and mitral annuloplasty (8). Their treatment looks successful via surgery (8), probably because their patient had mild symptoms and without heart failure. Another positive impact of their technique is mitral and tricuspid annuloplasty (8), because mitral regurgitation may be seen after pericardiectomy (9). Tribak et al. (10) shared their experiments on a young female patient. They performed both pericardiectomy and mitral valve replacement in their patient (10). Comparing with our case, their patient is a young female with normal ejection fraction (10). Although their study seems logical and successful, I would personally try mitral annuloplasty first if I were in their position.

We decided to operate on the mitral valve but chose not to address the constrictive pericarditis to preserve the myocardium and coronary arteries. This was because the patient's myocardium was fragile and calcific tissues were involved with the coronary arteries, including the left anterior descending coronary artery. We also had to consider low cardiac output.

On the other hand, there is another case similar to ours (11). Abdallha et al. (11) reported that repairing the mitral valve after pericardiectomy may result in severe mitral regurgitation, which is another reason to avoid pericardiectomy, as it may exacerbate mitral insufficiency. If we had not taken this approach, we probably would not have been able to complete the operation successfully. Because our patient at final stage constrictive pericarditis with cachexia and severe heart failure.

CONCLUSION

In conclusion, constrictive pericarditis due to tuberculosis remains important, especially in countries like ours. Surgery is the mainstream therapy, but the benefits and risks should be considered. If a patient has end-stage constrictive pericarditis, they may not benefit from surgery. We aim to contribute to the literature with this rare case. Because pericardiectomy is not the only option for patients with low cardiac output, avoiding it may be more effective in complicated cases like ours. Our case clearly demonstrates this. In a patient with low ejection fraction, cachexia, and debilitation, not performing a pericardiectomy may be a more prudent approach. We believe our approach may be helpful for other surgeons dealing with similar challenging cases.

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