



Pericardiectomy through a Right Anterior Thoracotomy for Constrictive Pericarditis after Coronary Artery Bypass Grafting

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Constrictive pericarditis after coronary artery bypass grafting (CABG) is an unusual disease. Pericardiectomy is necessary when medical treatment fails to relieve the congestive symptoms. Surgery for constrictive pericarditis after CABG often jeopardizes the bypass grafts. We conducted a right anterior thoracotomy without a cardiopulmonary bypass to avoid injury to the bypass grafts, which might otherwise have occurred during sternotomy and mediastinal dissection.

Key words: CABG, constrictive pericarditis, thoracotomy.

INTRODUCTION

Constrictive pericarditis is an uncommon disorder with a variety of causes, of which tuberculosis was common worldwide before the 1960s¹. Although it is most often idiopathic (42%), it may also occur after cardiovascular surgery (11%), radiation therapy, connective tissue disease, or tuberculosis, especially in developing countries^{1,2}. The incidence of constrictive pericarditis after open heart surgery is estimated to be 0.2%-0.3%^{1,3,4}. Constrictive pericarditis is a pathological condition that may lead to significant morbidity. The encasement of the heart by a rigid pericardium results in characteristic pathophysiological effects such as impaired diastolic filling of the ventricles and dissociation of intracardiac pressures during respiration². Although medical treatment may temporarily alleviate the symptoms of heart failure, patients do not recover well without pericardiectomy². Definitive management of constrictive pericarditis requires pericardiectomy.

CASE REPORT

A 72-year-old man who had suffered from diabetes mellitus for 17 years and coronary artery disease for 13 months underwent coronary artery bypass grafting (CABG; left internal thoracic artery to left anterior descending artery, vein grafts to circumflex and right posterolateral branches) without a closed pericardium. On presentation, he suffered from progressive dyspnea, harsh breathing sounds, basal rales, abdominal fullness, shifting dullness, and bilateral grade IV leg-pitting edema. He had undergone coronary bypass surgery 12 months previously. Pre-operative cardiac catheterization was performed, and it revealed elevated intracardiac pressures (right atrium, 17 mmHg; right ventricular end-diastole, 20 mmHg; pulmonary artery, 42 mmHg; pulmonary capillary wedge, 21 mmHg). Magnetic resonance imaging revealed a calcific pericardium 5 mm thick surrounding the heart (Fig. 1). A diagnosis of right congestive heart failure with constrictive pericarditis was made based on these clinical findings.

Massive ascites was noted, and abdominal tapping was performed every week. As the patient's condition was only slightly improved by routine decongestive therapy, he was treated with pericardiectomy. The presence of a patent left internal thoracic artery bypass was particularly challenging as the grafts lay just beneath the sternum. To avoid injury to the bypass grafts, which could have occurred with sternotomy and mediastinal dissection, we performed a right anterior thoracotomy. A partial pericardiectomy was executed safely without cardiopulmonary bypass. On the day after operation, the right atrial pressure was 9 mmHg.

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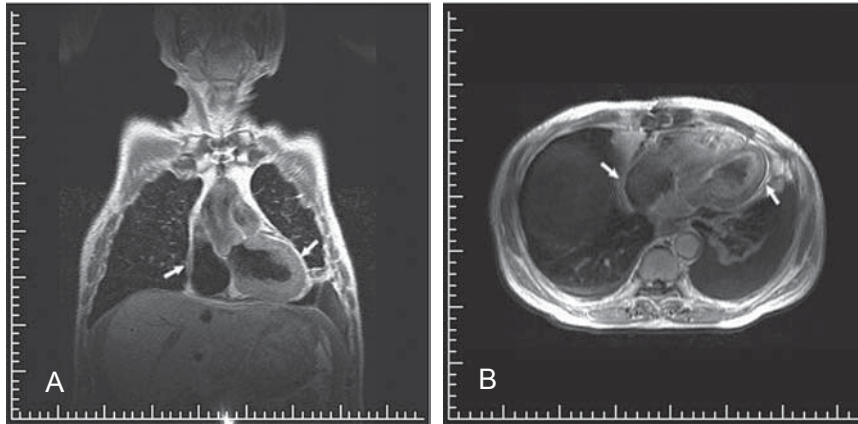


Fig. 1 Axial (A) and coronal (B) T1-weighted magnetic resonance images showing an area of high signal intensity, which represents the thickening of the pericardium (maximal thickness of the pericardium was about 5 mm; indicated by arrow).

The patient showed satisfactory hemodynamic improvement and no evidence of circulatory congestion during the subsequent six months of follow-up.

DISCUSSION

Constrictive pericarditis following CABG is a rare complication and is problematic for surgeons. It is a pathological condition that may lead to significant morbidity. Our patient was diagnosed using magnetic resonance imaging and cardiac catheterization as having constrictive pericarditis. The mean interval between cardiac surgery and diagnosis of constrictive pericarditis is 23.4 months⁵. When treating patients who have circulatory congestion after CABG, it is important that the physician considers the possibility of constrictive pericarditis and does not presume that clinical findings are consequences of myocardial failure. Pitting edema, dyspnea, fatigue, and chest pain are the most common symptoms of constriction. Preoperatively, 70% of patients are categorized as New York Heart Association classes III and IV with clinical signs suggestive of constriction (raised jugular venous pressure (99% of patients), pleural effusion (77% of patients), pitting edema (61% of patients), and ascites (55% of patients)⁶. Constrictive pericarditis typically presents with chronic insidious signs and symptoms of predominantly systemic venous congestion.

Both medical and surgical treatments have been used successfully. Steroidal and nonsteroidal anti-inflammatory agents have been used successfully during the acute inflammatory phase^{3,5}. Definitive management of constrictive pericarditis requires early pericardiectomy⁷. Me-

dian sternotomy and left anterolateral thoracotomy facilitate good access for pericardiectomy⁸, but extensive manipulation of the heart is necessary for complete decortication of all surfaces of the ventricle. This approach can potentially increase bleeding associated with the cardiopulmonary bypass or injure the bypass graft. In our patient, the grafts ran just beneath the sternum. A median sternotomy in the presence of a patent left internal thoracic artery bypass crossing the midsternal line could jeopardize the graft and consequently elicit a hemodynamic compromise. In pericardiectomy for constrictive pericarditis after CABG, injury to the bypass

grafts during sternotomy and mediastinal dissection must be avoided. U incisions, T-shaped thoracotomies, bilateral anterior thoracotomies, and right lateral thoracotomies have been used to avoid injury to bypass grafts during sternotomies and mediastinal dissections^{7,9-11}. Bilateral thoracotomy is a useful approach for patients with constrictive pericarditis and for whom a median sternotomy is contraindicated. Complete pericardiectomy has been performed safely without cardiopulmonary bypass¹⁰ but is tolerated to a lesser extent by the patient than median sternotomy or left anterolateral thoracotomy. In cases of severe epicardial involvement and recurrence of constrictive pathology, the Waffle procedure is an effective and atraumatic alternative to epicardiectomy¹². Operative mortality rates vary from 5.5% to 14.5%^{1,3,5}.

In our case, the pericardium was not closed after CABG. Constrictive pericarditis with severe right heart failure was diagnosed. Right heart failure with recurrent massive ascites and significant bilateral lower limb edema were noted. Pericardiectomy is necessary when medical treatment fails to relieve congestive symptoms. However, in selected cases in which the disease process is limited to the pericardium, partial pericardiectomy may offer a mode of therapy for relieving constrictive pericarditis. Appropriate planning of the best approach is an important part of any reoperation, and the decision as to which approach should be taken should be based on the nature of the original operation and personal preference. Of the possible surgical approaches, we chose right anterior thoracotomy to avoid injury to the bypass grafts and to achieve good surgical exposure, especially for pericardiectomy on the right side of the heart. The pericardiectomy was performed safely without cardiopulmonary bypass.

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