



Waffle Procedure for Selected Patients with Constrictive Pericarditis

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Abstract

Pericardiectomy is the standard procedure used to relieve hemodynamic conditions produced by constrictive pericarditis. Repeat surgery for constrictive pericarditis is associated with higher thirty-day mortality than that of an initial pericardiectomy. Constrictive epicardial thickness might lead to the repeat surgery in some cases. The waffle procedure, performed by incising the tight fibrotic epicardium in a crosshatched manner, releases the epicardial constriction, and it can be used to relieve the hemodynamic status produced by the constriction.

Keywords: Waffle procedure; Constrictive pericarditis; Constrictive epicarditis; Pericardiectomy; Heart failure

Introduction

Pericardiectomy is the standard procedure used to relieve hemodynamic conditions produced by constrictive pericarditis (CP), a form of severe diastolic heart failure. CP is observed in 0.2%–0.4% of patients undergoing cardiac surgery. They generally have experienced pericardial trauma or inflammation [1]. Despite its poor prognosis when untreated, CP is potentially curable. Surgical pericardiectomy can be performed at low operative risk. Cardiologists should have a high index of suspicion for CP in patients presenting with predominant right-sided heart failure (HF), particularly when accompanied by a history of cardiac surgery, pericarditis, and/or pericardial effusion. Transthoracic two-dimensional and Doppler echocardiography are usually the first diagnostic tools in the evaluation of HF and can reliably identify CP in most patients by the characteristic real-time motion of the heart and hemodynamic features. Computed tomography and magnetic resonance imaging provide incremental data for the diagnosis and management of CP and are especially helpful when clinical or echocardiographic findings are inconclusive. Cardiac catheterization has been the gold standard for the diagnosis of CP but may not be necessary if non-invasive tests demonstrate the diagnostic features of CP. Catheterization should then be reserved for selected cases or for assessing concomitant coronary disease. Although most patients with CP require pericardiectomy, anti-inflammatory therapy may be curative in patients presenting with subacute symptoms, especially when evidence of marked ongoing inflammation is seen.

Conventional Surgery

Surgical pericardiectomy is a potentially curative intervention. Gillaspie and colleagues reported a 20-year experience with isolated pericardiectomy performed at Mayo Clinic between January 1993 and December 2013 [2]. In that study, 355 patients had undergone pericardiectomy for CP. Radiation-related cases were excluded. Radical resection—defined as removal of anterior, inferior, and left lateral pericardium posterior to the left phrenic nerve—was most commonly performed, with an overall mortality of 2.5% among the 355 patients. The authors referred to specific patients who had constrictive pericardium and epicardium. They recommended that a tight epicardial peel should be left on non-contiguous islands. They did not indicate how many cases required the additional procedure. Certainly, though, some of those with thickened epicardium would have required additional attention. Repeat surgery for constrictive pericarditis is associated with 7% thirty-day mortality [3]. Constrictive epicardial thickness might lead to the repeat surgery.

Waffle Procedure

The waffle procedure, performed by incising the tight fibrotic epicardium in a crosshatched manner, releases the epicardial constriction [4]. A survey of the English-language literature since 1983 for references to the waffle procedure applied to relieve constrictive pericarditis yielded 10 articles and/or abstracts. Eight of the articles/abstracts originated in Japan [5–12]. There is no clinical

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evidence, however, that Japanese people with constrictive pericarditis tend to develop epicardial thickening. Nine of the articles/abstracts were published as case reports [4-6,8,9,11-14].

The waffle procedure is performed with electric and/or sharp dissection. Matsuura and Kanda used an ultrasonic scalpel [11,12]. Three techniques are used in our institution and are chosen on a case-by-case basis. Yamamoto and Shiraishi compared cases of isolated pericardiectomy with cases of pericardiectomy in conjunction with the epicardial waffle procedure [7,10]. The authors concluded that the waffle procedure improved diastolic function in patients with epicardial thickening and that it was effective in patients with persistent epicardial constriction. We have chosen to apply the waffle procedure in patients with constrictive pericarditis associated with thickened epicardium.

Conclusions

Constrictive pericarditis is sometimes associated with constrictive epicarditis. Extensive epicardiectomy is not easy, and the waffle procedure can be used to relieve the hemodynamic status produced by the constriction.

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