Experience With Pericardiectomy for Constrictive Pericarditis Over Eight Decades

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Background. The purpose of this study was to review the surgical outcomes of pericardiectomy for constrictive pericarditis and to examine risk factors for overall mortality in a contemporary period.

Methods. We reviewed all patients who underwent pericardiectomy for constriction from 1936 through 2013. The investigation included constrictive pericarditis cases confirmed intraoperatively, all other types of pericarditis were excluded; 1,071 pericardiectomies were performed in 1,066 individual patients. Patients were divided into two intervals: a historical (pre-1990) group (n = 259) and a contemporary (1990–2013) group (n = 807).

Results. Patients in the contemporary group were older (61 versus 49 years; $p < 0.001$), more symptomatic (NYHA class III or IV in 79.6% versus 71.2%; $p < 0.001$), and more frequently underwent concomitant procedures (21.4% versus 5.4%; $p < 0.001$) compared with those in the historical group. In contrast to the historical cases in which the etiologies of constriction were mostly idiopathic (81.1%), nearly half of contemporary cases had a nonidiopathic etiology (postoperative 32.3%, radiation 11.4%). Although 30-day mortality decreased from 13.5% in the historical era to 5.2% in the contemporary era ($p < 0.001$), overall survival was similar after adjusting for patient characteristics. Risk factors of overall mortality in the contemporary group included NYHA class III or IV (HR 2.17, $p < 0.001$), etiology of radiation (HR 3.93, $p < 0.001$) or postcardiac surgery (HR 1.47, $p < 0.001$), and need for cardiopulmonary bypass (HR 1.35, $p = 0.014$).

Conclusions. There was a significant change in disease etiology over the study period. Long-term survival after pericardiectomy is affected by patient characteristics including etiology of constriction and severity of symptoms.

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Constrictive pericarditis results from inflammation and fibrosis of the pericardium, ultimately leading to impairment of diastolic filling and right heart failure [1]. Generally, constrictive pericarditis is irreversible, and once the diagnosis is made, pericardiectomy is indicated in patients with symptoms of heart failure, especially those requiring increasing doses of diuretics [2].

In Western countries, the underlying cause of constrictive pericarditis among many patients having pericardiectomy is unknown and termed idiopathic; presumably, these patients had unrecognized prior viral pericarditis [3–5]. In our practice, previous cardiac surgery has become increasingly common among patients with constrictive pericarditis who present for operation, and there appears to be increasing numbers of patients with prior mediastinal radiation therapy who present for surgical treatment of constrictive pericarditis.

The first operation to relieve constrictive pericarditis at our institution was performed in 1936 [6]. Since then, more than 1,000 patients have undergone pericardiectomy for constriction. In this study we sought to document the changes in patient presentation during this 77-year interval and to analyze risk factors for early and late outcomes in a contemporary cohort.

Material and Methods

Study Design

The study was approved by the Mayo Clinic institutional review board. We reviewed medical charts and our

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surgical database for all patients who underwent pericardiectomy for constrictive pericarditis at Mayo Clinic, Rochester, Minnesota. We included only patients with constrictive pericarditis that was confirmed intraoperatively and excluded patients with other types of pericarditis such as effusive, relapsing, and purulent pericarditis. We also excluded patients who underwent pericardial window procedures for drainage purposes and/or biopsy. We included patients who had pericardiectomy and concomitant procedures, such as coronary artery bypass grafting, cardiac valve repair or replacement, and aortic procedures. From October 1936 through December 2013, pericardiectomy for constriction was performed in 1,066 patients. Five patients had a second operation but only data from the first procedure were included in the analysis.

The frequency of pericardiectomy increased during the 77 years of records we studied as seen in Figure 1, which presents the number of cases by year of surgery. The frequency of cases was relatively low during the first 50 years of our experience. Since 1990, the number of procedures has increased noticeably; 259 cases (24.3%) were performed prior to 1990, and 807 cases (75.7%) from 1990 onwards. To determine changes in patient characteristics and surgical outcomes, we divided the period into two intervals using 1990 as the breakpoint. The historical era included all pericardiectomies performed before 1990, and the contemporary era of pericardiectomy was defined as 1990 through the present.

Definitions

Patients with a history of previous cardiac surgery and pericardiotomy were categorized as having postoperative constrictive pericarditis. Patients with a history of mediastinal radiation were defined as having post-radiation constrictive pericarditis. Patients with miscellaneous etiologies of pericarditis including tuberculosis, asbestos-related, and autoimmune disease were grouped as other types of constrictive pericarditis. Patients who did not have one of the previous designations (ie, no specific etiology) were defined as having idiopathic constrictive pericarditis.

Surgical Techniques

In the contemporary era, the standard surgical approach for constrictive pericarditis is complete pericardiectomy through median sternotomy. Our technique for pericardiectomy has been reported previously [7, 8]. Briefly, it includes removal of all the anterior pericardium (phrenic nerve to phrenic nerve), the diaphragmatic pericardium, and, when accessible, a portion of pericardium posterior to the left phrenic nerve. This extent of pericardiectomy is the standard procedure in the contemporary era unless it was not technically feasible. The use of cardiopulmonary bypass depends on the severity of constriction, primarily the need to remove calcification involving the myocardium, as well as the need for concomitant procedures. In the historical era, left anterolateral and bilateral thoracotomy were the common approaches [9, 10].

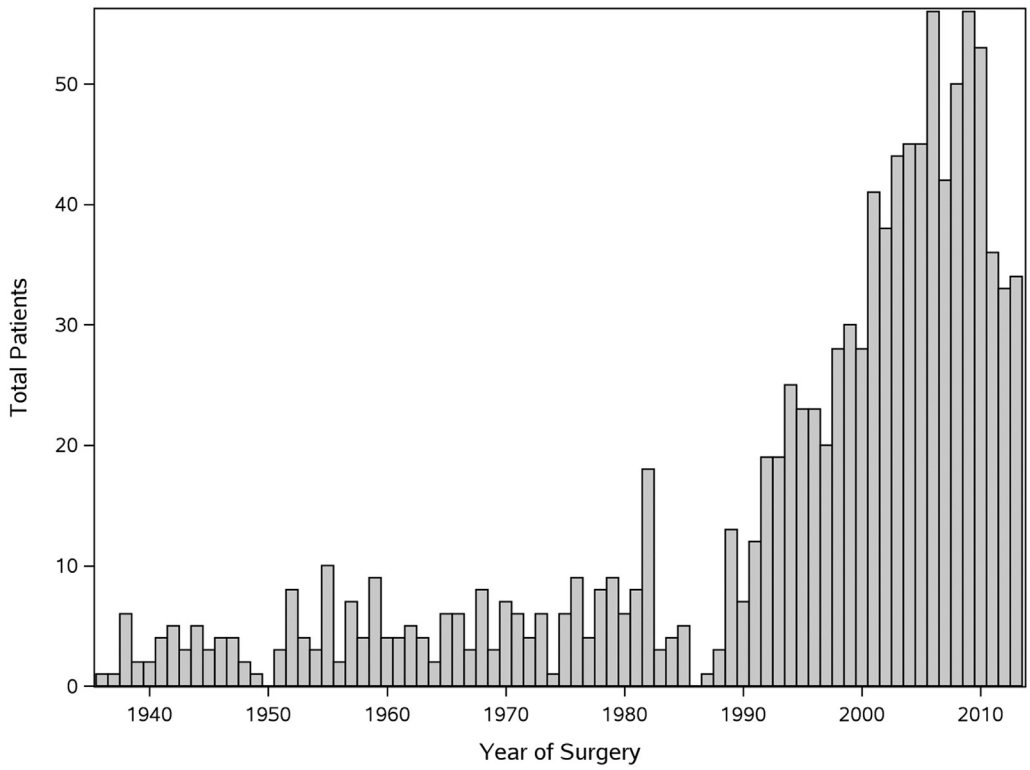

Fig 1. Number of pericardiectomies performed by surgery year (n = 1,066).