Long-term prognosis of hypertrophic cardiomyopathy after surgery

Cerrahi sonrası hipertrofik kardiyomiyopatinin uzun dönem prognozu

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ABSTRACT

Hypertrophic cardiomyopathy is a heterogeneous disease with both medical and surgical treatment options. Patients with persistent symptoms after medical therapy with a left ventricular outflow tract (LVOT) gradient of >50 mm Hg are referred for septal myectomy. A review of both early and recent literature of outcomes of surgical therapy was performed. Specialized centers referred large numbers of patients for septal myectomy were the focus. Overall improvement in symptoms, morbidity, mortality, and long-term survival were reviewed. Over the past 40 years, surgical therapy has shown consistent improvement in symptoms and reduction of LVOT gradient for patients with hypertrophic cardiomyopathy. Furthermore, there has been a significant decrease in both morbidity and mortality for septal myectomy with improved techniques in the field of cardiac surgery and better understanding of the pathophysiology of the disease process. Surgical resection of the septum for hypertrophic cardiomyopathy is a safe, reproducible, and effective procedure for symptomatic patients with a significant LVOT obstruction. *(Anadolu Kardiyol Derg 2006; 6 Suppl 2: 37-9)*

Key words: Hypertrophic obstructive cardiomyopathy, septal myectomy

ÖZET

Hipertrofik kardiyomiyopati, hem medikal hem cerrahi tedavi opsiyonları olan heterojen bir hastalıktır. Septal miyektomi için sol ventrikül çıkış yolu (SVÇY) gradiyenti >50 mm Hg'dan fazla olan semptomatik hastalar gönderilmektedir. Bu yazıda, cerrahi tedavinin etkileri ile ilgili hem öncekiler, hem yeni literatür derlenmiştir. Özellikle, büyük hasta sayısında septal miyektomi yapan uzmanlaşmış merkezler göz önüne alındı. Semptomlarda genel iyileşme, morbidite, mortalite ve uzun-süreli sağkalım gözden geçirilmiştir. Son 40 yıl içerisinde, hipertrofik kardiyomiyopatili hastalarda cerrahi tedavi ile semptomlarda istikrarlı iyileşme ve SVÇY gradiyentinde düşme görülmektedir. Ayrıca, kardiyak cerrahi alanında tekniklerin gelişmesi ve hastalığının patofizyolojisini daha iyi anlamak ile beraber septal miyektomi için morbidite ve mortalitede önemli düşüş gözlenmektedir. Hipertrofik kardiyomiyopatide ciddi SVÇY obstrüksiyonu olan semptomatik hastalarda septumun cerrahi rezeksiyonu güvenilir, tekrarlanabilir ve etkili bir prosedürdür. *(Anadolu Kardiyol Derg 2006; 6 Özel Sayı 2: 37-9)*

Anahtar kelimeler: Hipertrofik obstrüktif kardiyomiyopati, septal miyektomi

Introduction

Hypertrophic cardiomyopathy (HCM) is an autosomal dominant disease characterized by asymmetric septal and ventricular hypertrophy (1). This disease process has significant heterogeneity based on genetic phenotype. The variability of symptoms has resulted in a number of treatment options. The relatively low incidence of HCM coupled with ethical considerations of performing trials with known effective treatments have prevented the formation of large-scale randomized studies.

Pharmacologic intervention is first-line treatment for HCM with surgery reserved for those patients with left ventricular outflow tract obstruction (LVOTO) and persistent symptoms despite maximal medical therapy. Several factors influence the reporting of outcomes for these surgical patients: (1) The numbers of patients who present for surgery are small, even in large referral centers; (2) The surgical technique of myectomy can be challenging for surgeons unfamiliar with this disease; (3) Patient access to therapeutic options may be influenced by physician referral patterns.

These unique characteristics add to the complexity in evaluation of the long-term prognosis of surgery for HCM. The most relevant data is based on retrospective studies at specific tertiary-care centers. Even within these centers, there has been variability in outcomes over the past 30 years due to evolving surgical technique, advancements in myocardial protection, increased understanding of HCM pathophysiology, and the use of intraoperative transesophageal echocardiography (TEE). Long-term survival studies are the strongest data available regarding patient prognosis after surgery.

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Presented in part at "Hypertrophic Cardiomyopathy Treatment: Medical, Surgical, Sudden Death Prevention and Newer Modalities" sponsored by St. Luke's - Roosevelt Hospital Center, Columbia University, College of Physicians and Surgeons, New York City. December 2005.

What has remained constant is the recommended role of surgery as determined by the Consensus Panel on the Management of HCM in 2003. Septal myectomy is the gold standard of treatment for patients with HCM who have heart failure symptoms that are refractory to medical management. These include patients with NYHA class III or IV symptoms in the presence of LV outflow tract obstruction with a gradient of greater than or equal to 50 mmHg (under resting conditions or when provoked with exercise) (2).

The current standard approach used at most referral centers for HCM surgery includes resection of the ventricular septum as initially described by Morrow (3). Recent modifications of this procedure have proposed extended septal resection, release of hypertrophic papillary muscles that may be fused to the left ventricular free wall or septum, and repair of the mitral valve if needed for either primary valvular disease or an enlarged anterior leaflet (4-9). Regardless of technique, an essential component of current HCM surgery involves the use of pre-operative and intra-operative TEE to guide the surgeon in the repair.

The foundation of surgical resection is septal reduction with abolition of the LVOT gradient. The importance of this gradient was illustrated by Maron and colleagues in 273 patients followed for a mean of 6.3 years, where resting gradients over 30mmHg were found to be associated with a greater risk of progressive heart failure, stroke, and cardiovascular death (10). Gradient reduction decreases load-dependent diastolic dysfunction, promoting early ventricular relaxation. Long term, gradient reduction also decreases left ventricular hypertrophy.

Surgical Cohort Studies

There have been several large, long-term studies to determine outcomes of septal myectomy. With over 25 years of follow-up, Schulte and colleagues (11) proposed to answer the question of whether septal myectomy improves prognosis and late outcome of patients with advanced symptomatic HCM. Patients showed significant symptomatic relief with an improvement in their heart failure class from an average of 3.1 to 1.7. The yearly mortality in this study was 2.2% and the HCM-related death rate was only 0.6%. After 20 years, 72% of patients survived, proving that excellent long-term survival could be obtained with surgery (11).

Another study from the mid-1990's came from the Cleveland Clinic and included a mixed group of patients of whom 95 received myectomy, 41 received myectomy plus coronary artery bypass grafting (CABG), 25 patients underwent myectomy plus valve surgery, and 3 underwent mitral valve replacement. Late mortality at 5 and 10 years postoperatively was 93% and 79%, respectively, for all patients undergoing septal myectomy. The patients who received a concomitant valve operation had a lower overall survival of 51% at 5 years. The patients who received myectomy alone or in combination with CABG had the best overall survival. For this group, cardiac-death yearly mortality was 0.6% (12)

Another large study from the Stanford University group demonstrated the effectiveness of myectomy in 158 patients that presented with exertional dyspnea, chest pain, and an average provocable LVOT gradient of 118 mmHg. An improvement in NYHA class of at least one functional class was found in 94 (86%) of patients after surgery (13).

More recently, the group from University of Toronto reported their experience in a retrospective study of 338 patients who underwent septal myectomy for persistent symptoms despite medical therapy. Their overall operative mortality was 1.5% with excellent long-term survival at 1, 5, and 10 years of 98%, 95%, and 83%, respectively. Significant predictors of mortality included age >50, female gender, preoperative atrial fibrillation, concomitant coronary bypass, and increased left atrial diameter (14).

With a database composed of over 1330 patients, the Mayo Clinic group retrospectively compared patients with obstructive symptomatic HCM treated with surgery to a group of patients treated medically. Though not a randomized trial they found increased survival over the long-term in those patients treated with surgery for both all-cause and HCM-related mortality (15).

A summary (Table 1) of recent literature shows the important trends in all of these large, long-term studies: operative mortality has dropped significantly and long-term survival is excellent. A clear demonstration of this improvement was illustrated by Schulte and colleagues whose mortality in 519 patients decreased over the previous ten years from 3.6% to 1.9% (16). Overall survival can be further stratified by risk factors such as NYHA Class III or IV, additional procedures, and congestive heart failure. Those patients with none of these risks can be expected to have 10-year survival rates as high as 95% and 15-year survival of 87% (17).

Recurrence of Symptoms

Symptoms recur rarely after operation. Ventricular diastolic or systolic dysfunction, progressive or increased mitral regurgitation, arrhythmias, or recurrent LVOTO are responsible for recurrent symptoms (18). Recurrent gradients can result from limited resection at the time of initial myectomy, unrecognized mid-papillary obstruction, or mitral valve and/or papillary muscle abnormalities (18).

Table 1. Surgical resection of hypertrophic cardiomyopathy: long-term outcomes

Authors	Year	(n)	Operative Mortality (%)	5-year survival (%)	10-year survival (%)	15-year survival (%)
Schulte et al. (11)	1993	364	4.9	92	88	84
Schonbeck et al. (17)	1998	110	3.6	93	80	72
Woo et al. (14)	2005	338	1.5	95	83	NA
Ommen et al. (15)	2005	289	0.8	96	83	NA

NA - not available

Sudden Death in HCM

Sudden arrhythmic death from ventricular fibrillation is the most dreaded complication of HCM. A recent study evaluated 39 patients out of 630 non-operated patients who had either sudden death or appropriate implantable cardioverter-defibrillator (ICD) firing and showed that sudden deaths did occur in patients with septal wall thickness of less than 30 mm (19). The risk of sudden death at 5 years in patients with HCM increases from 5% in patients who have massive left ventricular hypertrophy, as their only risk factor to 34% in those patients with 3 or more additional risk factors: adverse family history, syncope, non-sustained ventricular tachycardia, abnormal blood-pressure response on exercise, and increased LV wall thickness (19). Maron et al describe that non-operated patients with a significant gradient did have a modest increase in the risk of sudden death (10).

Although decrease of the LVOT gradient plays an important role in relief of symptoms, this does not necessarily translate to abolishment of the risk of sudden death. Hypertrophic cardiomyopathy is a disease of the myocytes, the physiology of which does not change after surgical resection. The data is not clear as to which patients who have had surgery may still have sudden death. Left ventricular outflow tract obstruction in itself is not necessarily the most important risk factor. The need for an ICD in a postoperative patient is open to physician judgment. Although the risk of late cardiac death is low, there are selected patients who may benefit from an ICD. These may include those patients with a preoperative symptomatic ventricular arrhythmia, syncopal episode at rest without exercise provocation, family history of sudden death due to HCM, left ventricular wall thickness greater than 30 mm (20).

There is now 40 years of collective experience with septal myectomy. As a result of improvements in technical expertise, echocardiographic guidance, myocardial protection, anesthesia, and postoperative care, we can expect patients who undergo HCM surgery to have low perioperative mortality, significant relief of symptoms, and excellent long-term survival.

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