

Surgical Treatment Of Constrictive Pericarditis: A Single Centered Experience

Konstriktif Perikarditin Cerrahi Tedavisi: Tek Merkezli Bir Deneyim

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ABSTRACT

Introduction: Constrictive pericarditis (CP) is a rare and potentially lethal disease. It's one of the important reasons of right sided heart failure and it requires immediate intervention. The aim of this study was to investigate the short-term and mid-term results of patients operated due to constrictive pericarditis in our hospital centre.

Materials and Method: We evaluated the data of 27 patients who undergone pericardiectomy due to constrictive pericarditis (CP) in our center. Clinical findings, results of imaging modalities, surgical technique and follow-up were retrospectively evaluated

Results: Mean age of our patients was 49,78 years. The most common symptom of our patients was dyspnea. Peripheral edema was the most common sign during physical examination. The mean pericardium thickness was ranging between 3.4 mm to 6.6 mm in diameter. Total pericardiectomy was performed in 15 patients (55,6%) while partial pericardiectomy was performed in 12 patients (44,4%) . Pericardiectomy with concomitant cardiac surgery was performed in 5 patients (18,5%). Unfortunately, postoperative mortality occurred in 4 patients (14,8%).

Conclusion: Surgical removal of pericardium is a treatment modality that should be preferred in patients with constrictive pericarditis(CP) despite of high mortality rates reported in some series

Keywords: Constrictive pericarditis; Pericardiectomy; Mortality

ÖZET

Giriş: Konstriktif perikardit (CP) nadir ve potansiyel olarak ölümcül bir hastalıktır. Sağ kalp yetmezliğinin önemli nedenlerinden biridir ve acil müdahale gerektirir. Bu çalışmanın amacı, hastane merkezimizde konstriktif perikardit nedeniyle ameliyat edilen hastaların kısa ve orta dönem sonuçlarını araştırmaktır.

Hastalar ve Metod: Merkezimizde konstriktif perikardit (CP) nedeni ile perikardiyektomi uygulanan 27 hastanın verileri değerlendirildi. Klinik bulgular, görüntüleme modaliteleri, cerrahi teknik ve takip sonuçları retrospektif olarak değerlendirildi.

Bulgular: Hastalarımızın yaş ortalaması 49,78 idi. Hastalarımızın en sık görülen semptomu dispne idi. Fiziksel muayene sırasında periferik ödem en sık görülen işaretti. Ortalama perikardiyum kalınlığı 3,4 mm ile 6,6 mm arasında değişmekteydi. Toplam 15 hastada (% 55,6) perikardiyektomi, 12 hastada (% 44,4) parsiyel perikardiyektomi uygulandı. Eşlik eden kardiyak cerrahi ile perikardiyektomi 5 hastada (% 18,5) perfüze edildi. Maalesef postoperatif mortalite 4 hastada (% 14,8) meydana geldi.

Sonuç: Perikardın cerrahi olarak çıkarılması, bazı serilerde bildirilen yüksek mortalite oranlarına rağmen konstriktif perikarditli (CP) hastalarda tercih edilmesi gereken bir tedavi yöntemidir.

Anahtar Kelimeler: Konstriktif perikardit; Perikardiyektomi; Mortalite

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Introduction:

Constrictive pericarditis (CP) is one of the important reasons of right sided heart failure and it requires immediate intervention [1]. Normally pericardium consists of two layers. The chronic inflammatory process towards these layers causes the pericardium to become rigid and noncompliant. CP is the result of this chronic inflammatory process. CP was first described by Lower in 1669 [2]. Eventually the incomppliance leads to heart failure [3].

The causes of CP are mostly idiopathic. Viral, postcardiotomy or pericarditis due to irradiation may also be seen [4]. Although tuberculosis is a rare cause of pericarditis it can be seen widely in developing countries [5]. Uremia, neoplasms and autoimmune disorders are the other causes [6].

In CP the constrictive physiology bulges the interventricular septum towards left ventricle which makes the left ventricular volume to be lower than the right ventricle. Thereby it enhances the ventricular filling leading to high end diastolic pressures, low-end diastolic volume and stroke volume. As the impairment progresses it leads towards heart failure [7].

Surgical treatment of CP is the most effective treatment. However, it is an operation that both surgeons and patients avoid because of high mortality rates during postoperative period. Even in experienced centers mortality rates are higher than 6% [8]. There are series with mortality rates as high as 23% [9].

The aim of this study was to investigate the short-term and mid-term results of patients operated due to constrictive pericarditis in our hospital.

Methods:

We evaluated the data of patients who had undergone pericardiectomy due to CP in our center. Between 2011-2018 we operated 27 CP patients who were diagnosed by physical examination, echocardiographic findings or computed tomographic findings. Demographic and operative data were evaluated. Clinical findings, results of imaging modalities, surgical technique and follow-up were retrospectively evaluated.

Surgery

All patients were operated through median sternotomy. During surgery 12 patients were on pump operated where by 15 patients were off pump operated. Total pericardiectomy was performed starting from ascending aorta through left ventricle, pulmonary artery to right ventricle in order to relieve the cardiac's outflow tracts. Afterwards pericardiectomy continued through atria(left and right) to vena cava(superior and inferior).During partial pericardiectomy, decortications was generally terminated on the left side as soon as the left atrioventricular groove was reached after mobilization and retraction of the left phrenic nerve. On the right side, the decortications were limited to the right atrioventricular groove.

Results

A total of 27 patients undergone surgery for constrictive pericarditis. Mean age of our patient population was 49,78 years (18-80 years). 21 of the patients were male, 6 were female. Dyspnea was the most common symptom in our patient population. Peripheral edema was the most common sign during the physical examination. Preoperative characteristics of the patients are summarized in **Table-1**.

The most common etiologic factor in our study population was idiopathic (n=16). Tuberculosis (n=5) was the second leading cause. Pericardiectomy was performed in 3 patients secondary to radiotherapy as the result of pulmonary malignancy. One of our patients had rheumatoid arthritis, one patient had uremic pericarditis and one patient had pericardial mesothelioma. Etiologic factors of our patient population are summarized in **Table-2**.

Smoking was found in 15 of our patients, normal sinus rhythm was observed in 23 patients and atrial fibrillation was seen in 4 patients. Electrocardiographs of the patients revealed low QRS voltage (**Figure-1**). Chest x-rays and computed tomography images of 10 patients revealed calcific pericardium (**Figure-2**). Pericardium thickness was ranging between 3.4mm to 6.6 mm in diameter. Preoperative echocardiographic results revealed pericardial edema, biatrial dilatation, respiratory variations and paradoxical septum movements in most of our study patient population.

Total pericardiectomy was performed in 15 patients whereas the remaining 12 patients had undergone partial pericardiectomy. Concomitant cardiac surgery with pericardiectomy was performed in 5 patients where by one patient undergone coronary artery by-pass grafting (CABG), one patient undergone CABG+AVR (aortic valve replacement), one patient undergone AVR+MVR (mitral valve replacement) +TVP (tricuspid valvuloplasty), one patient undergone MVP (mitral valvuloplasty)+TVP and one patient undergone right ventricular apical aneurysm repair. Concomitant surgeries are summarized in **Table-3**. Cardiopulmonary bypass (CPB) was utilized in 12 patients (44,4%) during surgery. A 49-month Kaplan-Meier survival rate of 59% was obtained from our data. (**Figure 3**)

Mean intensive care unit (ICU) stay length was 3,81 days (1-35 days in range). Mean hospital stay length was 9,44 days (1-35 days in range). During ICU admission 10 patients required inotropic support. Unfortunately, mortality was observed in 4 patients during postoperative period (14,8%).

Discussion:

Surgical treatment of CP remains debatable up today. The choice of median sternotomy or lateral thoracotomy during surgery is still not fully elucidated. The arguments to perform total or partial pericardiectomy are also still a question of the day.

The course of the disease is usually slow and the symptoms are nonspecific; consequently, in many cases the symptoms may be present for 12 months or longer before a diagnosis is made (8). The diagnosis of constrictive pericarditis is mostly a challenging process, but it seems advisable that patients with heart failure but preserved left ventricular function be considered for this diagnosis(9).

In our study, patients were mostly admitted with symptoms of dyspnea and peripheral edema. During physical examination peripheral edema and jugular venous distension were the leading signs.

In the literature idiopathic factors are the most common cause of constrictive pericarditis [10]. However, it should not be forgotten that in developing countries tuberculosis is still a leading cause for pericardial diseases [11]. Idiopathic constrictive pericarditis is increasing. In our study, the most common etiological factor was idiopathic. Tuberculosis was the second leading reason. Radiotherapy due to malignancies, rheumatoid arthritis and uremia were the other causes.

Surgical technique in CP has been debated over the past years. In a comprehensive study of Chowdhury et al, it was observed that total pericardiectomy gave better results in terms of survival, surgical results and recurrence than partial pericardiectomy [12]. In our clinic, 2 of 4 patients who had mortality were treated with total pericardiectomy while 2 patients were treated with partial pericardiectomy. More efficient results can be obtained by increasing the number of cases. In our series, all patients were operated via median sternotomy which enabled to perform total

pericardiectomy easily. Median sternotomy is also helpful during concomitant cardiac surgery in patients with CP. Median sternotomy also facilitates to enter CPB when required.

The use of routine CPB during pericardiectomy is recommended in some studies [13]. The use of CPB allows easier dissection with the emptying ventricles during surgery. However, the systemic effects of CPB should not be ignored. In our study, 44,4% of the patients needed CPB utilization. The reason for this is that some of these patients were candidates for other cardiac procedures. Only two cases with isolated constrictive pericarditis required CPB as they had severely calcified pericardium strictly attached to the epicardium.

Surgery is the absolute treatment in patients with constrictive pericarditis. In some studies, early mortality reached up to 15% and late mortality reached up to 70% [14]. Early mortality rate in our patients was around 14,8%. Mortality rates decrease as surgical experience increases, progress in anesthetic techniques and increase in quality of postoperative intensive care. Depboylu et al discussed in their study with a 7-year Kaplan Meier survival rate of 27-88% depending on the etiologic factor [15]. Our Kaplan-meier survival rate was 59% in 49 months similar to the studies on the subject.

There are several limitations to our study. Sample size is small. It is a retrospective study. A prospective study with a larger sample size will give better results for mortality and long-term survival. Larger, multi-center studies will be necessary.

Conclusion:

Examining the short term and mid-term results of our patients diagnosed with constrictive pericarditis revealed that total excision of pericardium is the treatment modality that should be preferred despite of high mortality rates as reported by other literatures.

Conflict of interest:

The authors declare no conflict of interest.

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Tables

Table-1: Preoperative characteristics

Variables		Results
Mean age (years)		49,79 (18-83)
Sex	Male	21
	Female	6
Symptoms (no of patients, %)	Dyspnea	24 (88,9%)
	Chest pain	4 (14,8%)
	Palpitation	2 (7,4%)
	Fatigue	2 (7,4%)
Signs (no of patients, %)	Edema	14 (51,9%)
	JVD	9 (33,3%)
	HSM	5 (18,5%)
	Ascites	3 (11,1%)
	Pericardial knock	2 (7,4%)
	Pulsus paradoxus	1 (3,7%)

JVD: jugular venous distension, HSM: hepatosplenomegaly

Table-2: Etiologic factors

Etiologic factor	No of patients (%)
Idiopathic	16 (59,2%)
Tuberculosis	5 (18,5%)
Malignancy/Radiotherapy	3 (11,1%)
Uremia	1 (3,7%)
RA	1 (3,7%)
Mesothelioma	1 (3,7%)

RA: Romatoid Arthritis

Table-3 Concomitant Surgeries

Concomitant surgery types	n (no. of procedures)
CABG	1
CABG + AVR	1
AVR + MVR + TVP	1
MVP + TVP	1
RV apical aneursym repair	1

AVR: aort valve replacement
 CABG: coronary artery bypass grafting
 RV: right ventricle
 MVR: mitral valve replacement
 TVP: tricuspid valvuloplasty

Figures

Figure-1: one of the patients with atrial fibrillation and low QRS voltage

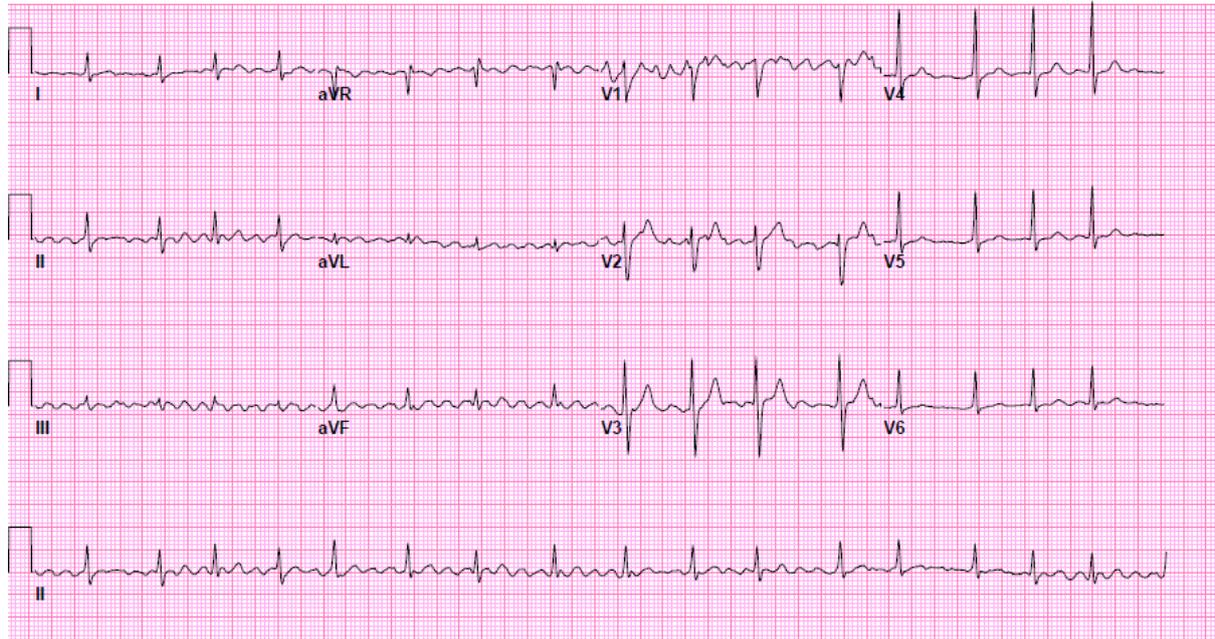


Figure-2A-B: chest x-ray (A) and computed tomography (B) images showing calcific pericardium



Figure 3: Kaplan-Meier Survival Analysis

