

Experience of Pericardiectomy in Tikur Anbessa University Hospital, Ethiopia

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Background: Pericardiectomy is the only accepted curative treatment for improving cardiac haemodynamics in chronic constrictive pericarditis (CCP). This study was aimed at reviewing the experience and functional outcome of patients undergoing Pericardiectomy in Tikur Anbessa Hospital between January 1996 and December 2005.

Methods: This was a retrospective Analysis done at the Thoracic Surgical unit, Tikur Anbessa Hospital, Department of Surgery, Medical Faculty, Addis Ababa University, Addis Ababa, Ethiopia. During the period under review, 26 patients underwent Pericardiectomy for CCP. Medical records and operation theatre registers of 19 patients were retrieved and analysed.

Results: Thirteen of the patients were males and six were females (M: F=2.2:1) The ages ranged from 14 to 42 years (mean 24.3 ± 7). The duration of illness ranged between 2 and 36 months with a mean of 15.2 ± 10.8). Diagnosis of constrictive pericarditis was based on the clinical picture of right sided heart failure along with chest roentgenogram, electrocardiogram, echocardiography and histological examinations. The most common presenting symptoms were dyspnea in 19 (100%) patients, abdominal discomfort in 14 (73.7%) and abdominal distension in 11 (68.4%) patients. On physical examination raised JVP, peripheral edema, hepatomegaly and ascites were seen in the majority of cases. Chest x-ray revealed pleural effusion in 12 (63.2%) patients, enlarged cardiac silhouette in 9 (47.4%) and pericardial calcification in 7 (36.8%). ECG showed low QRS voltage and T wave abnormality in 10 (52.6%) and 9 (42.1%) cases respectively. Pericardial thickening/calcification (52.6%), left ventricular septa motion abnormality (42.1%) and pericardial effusion (36.8%) were seen by echocardiography. The surgical approach was mainly median sternotomy in 15 (79%) patients, and the mean operation time was 112 (range $90-135 \pm 18.9$) minutes. Fifteen (79%) patients had uneventful postoperative course. Two patients developed pneumonia and one a hydropneumothorax. There was one death in the immediate postoperative period. Long-term mortality of 10.5% was noted. Mean hospital stay and follow-up time were 14.3 ± 5.3 (range 7-24) days and 12.8 ± 6.9 (range 3-24) months respectively.

Conclusion: Pericardiectomy can be performed without the use of CPB and with low mortality, and can result in an improved functional capacity in the majority of the patients.

Introduction:

Constrictive pericarditis (CP) is an uncommon disorder with various causes^{1,2}. Chronic constrictive pericarditis (CCP) is a chronic inflammatory process of pericardium, leading to pericardial fibrosis and thickening that restricts diastolic filling of the ventricles³⁻⁵. Tuberculosis (TB) was a leading cause in the past, but most are cases now idiopathic or follow prior radiation therapy or operation^{6,7}. Yet TBC remains a leading cause of pericarditis in some non-industrialized countries^{8,9}, such as those of sub-Saharan Africa⁸⁻¹⁰, where infection with human immunodeficiency virus (HIV) has become pandemic.

In Ethiopia only one report on Pericardiectomy for constrictive pericarditis was found by

Johanson¹¹. Tuberculous pericarditis affects 1% to 2% of all patients with TB by direct extension from the mediastinal lymph nodes and, occasionally, by haematogenous spread or by contiguous spread from the myocardium^{8,12}. Tuberculous is responsible for approximately 4% of cases of acute pericarditis, 7% of cases of cardiac tamponade, and 6% of instances of constrictive pericarditis¹³. Accurate diagnosis is essential as pericardiectomy is the only effective treatment^{4,5,14}. A variety of surgical approaches have been described, including left anterior thoracotomy, bilateral thoracotomies, or median sternotomy. Best exposure is usually provided by the latter^{3,12,15}.

The purpose of this study is to review our experience of pericardiectomy in patients with constrictive pericarditis in Tikur Anbessa Hospital between January 1997 and December 2006.

Patients and Methods:

Of 26 patients who had undergone pericardiectomy in Tikur Anbessa Hospital between January 1996 and December 2005, the medical records of 19(73.1%) patients were retrieved and included in the study. Data concerning socio-demographic status, clinical manifestations, diagnostic studies, operative procedures, post operative course final outcome and histological examination results of pericardium were recorded in the structured format. Analysis was done using computer based statistical software SPSS version 11.0.

Diagnosis of CP was based on the clinical picture of right sided heart failure complimented by chest roentgenogram, echocardiography, Doppler echocardiography and electrocardiogram findings. All patients had received chemotherapy for tuberculosis before the present admission. Pre and postoperative New York Heart Association (NYHA) functional classification was done to assess early postoperative outcome of pericardiectomy.

The extent of decortication of the pericardium varies from a procedure that decorticates:

1. all surfaces of the heart and major intrapericardial vessels including the anterolateral and diaphragmatic surfaces, with the phrenic nerves defining the posterior extent of pericardial resection to
2. all of the right and left ventricles without the pericardium overlying the atria and vena cavae.

Resected pericardium was subjected for histopathological examinations.

Results

There were 13 males, 6 females (M: F ratio = 2.2:1), mean age 24.3±7 years (range 14-42). Duration of illness prior to admission to surgical ward for pericardiectomy ranged between 2-36 months (mean 15.2±10.8). Dyspnea (100%), fatigue (75%), abdominal discomfort (73.7%) and abdominal distension (68.4%), raised JVP (89.5%), hepatomegaly (79) and ascites (63%)

were the most common clinical presentation of patients with constrictive pericarditis (Table 1).

Physical examination of the heart in the majority of cases revealed distant / soft heart sound, soft & diffuse apical impulse (quiet precordium) and pericardial knock was heard in one-quarter of the patients. On electrocardiography, low QRS voltage was detected in half of the patients, T wave abnormality and atrial fibrillation was found in 9 and 4 patients respectively (Table 2). Echocardiography showed pericardial thickening / calcification in 10 (52.6%) patients, left ventricular septal motion abnormality in 8 (42.1%) and pericardial effusion of different degrees in 7 (36.8%). The mean ejection fraction was 0.55.7±11.7 (range 0.27-0.65), as determined by echocardiography. Chest radiography showed pericardial calcification in 7 patients (36.8%), enlarged cardiac silhouette/cardiomegaly in 9 (47.4%) and pleural effusion in 12 (63%).

In 15 patients (79%), pericardiectomy was performed through median sternotomy and in 4 (21%) through left anterolateral thoracotomy. Extent of pericardiectomy was subtotal in all patients. Thick pericardium was the classical finding in all cases of pericardiectomy. Pericardial effusion and calcification were seen in 21.1% and 15.8% of the cases respectively (Table 4). Non-fatal intraoperative complications affected 8 patients (42.1%). However there was one patient who continued to have low-output syndrome beyond the intraoperative period and died secondary to severe low-cardiac-output syndrome despite resuscitation with catecholamine, dopamine, and blood transfusion. Postoperative complications; and condition of patients during discharge and follow-up are shown table 4 and 5 respectively. One of the eighteen surviving patients was readmitted 4 years after pericardiectomy and died from complications of post TB fibrothorax and persistent pericardial constriction. Marked improvement in 13 (87%) of the 15cases and long-term mortality in 2 (13%) during follow-up period were noted.

Postoperative outcome was compared using the New York Heart Association (NYHA) functional status. Preoperatively, there was no patient in class I or II, 11(58%) in class III, 8 (42%) in class IV (Figure 1). Postoperatively 8/18(45 %) patients were in class I, 9/18(50%) in class II. The mean stay in the intensive care unit

and duration of post operative hospitalization was 3.38 ± 1 (range 2-5) and 14.3 ± 5.3 (range 7-24) days respectively. All patients received anti-tuberculous therapy preoperatively and in the postoperative period. Preoperative indications for anti-TB treatment were TB pericarditis,

pulmonary TB and other focus of tuberculosis. Microscopic examination of the excised pericardium showed

Table 1 Clinical Presentation of 19 Patients.

Manifestation	No of Patients	Percentage
Symptoms		
Dyspnoea	19	100
Fatigue	14	73.4
Abdominal discomfort	14	73.4
Abdominal Distension	13	68.4
Cough	12	62.5
Weight loss	11	57.9
Fever	11	57.9
Chest pain	9	47.4
Palpitations	8	42.1
Orthopnoea	7	36.8
Signs		
Raised JVP	17	89.5
Peripheral Oedema	15	79
Hepatomegaly	15	79
Ascites	12	63

Table 2. Investigation Findings

<u>Chest X-ray</u>	<u>No</u>	<u>%</u>
Pleural effusion	12	63.2
Enlarged cardiac silhouette	9	47.4
Pericardial calcification	7	36.8
<u>ECG</u>		
Low QRS voltage	10	52.6
T wave abnormality	9	47.4
ST segment abnormality	5	26.3
Atrial fibrillation	4	21.1
<u>Echocardiography</u>		
Pericardial thickening /calcification	9	47.4
Motion abnormality		
Left ventricular septal	8	42.1
Posterior wall	4	21.1
Pericardial effusion	7	36.8

Table 3. Intra and post operative morbidity.

Operative data	Number	%
Bleeding	4	21.1
Low cardiac Output*	2	10.5
Atrial fibrillation	1	5.3
Myocardial perforation	1	5.3
Post operative complication		
Uneventful	15	79
Pneumonia	2	10.5
Hydropneumothorax	1	5.3
Death	1	5.3

Table 4. Intraoperative Finding in 19 Patients with Constrictive Pericarditis.

Operative finding of the pericardium	No of patient	(%)
Thick & adherent pericardium	10	(52.1)
Thick pericardium with effusion	4	(21.1)
Thick & calcified pericardium	3	(15.8)
Thick pericardium with pus	2	(10.5)

Table 5. Histological Examination of Pericardiectomy Specimen in 18 patients.

Pericardial Biopsy Result	No of Patients	(%)
Tuberculous (glaucomatous) pericarditis	6	(31.6)
Non specific chronic inflammation	6	(31.6)
Suppurative pericarditis	2	(10.5)
Chronic active fibrosing (glaucomatous)*	2	(10.5)

* Granulomas not characteristic of TB

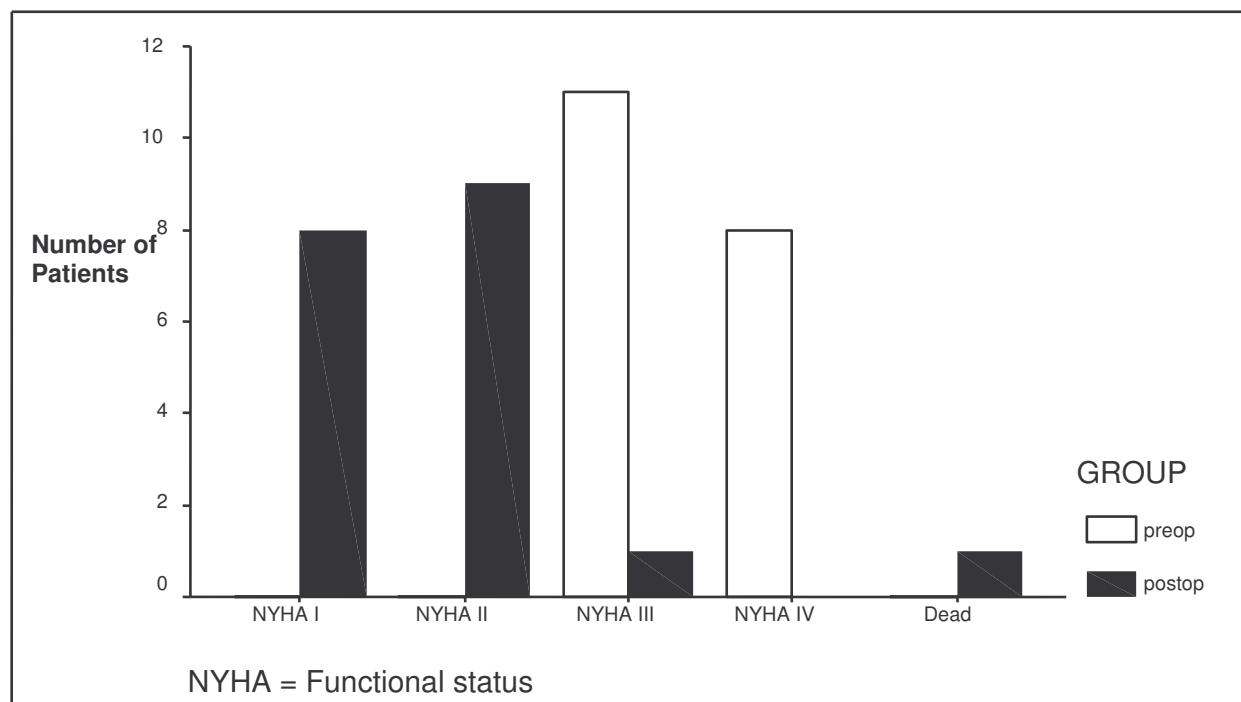
**Figure 1.** Preoperative and Postoperative New York Heart Association (NYHA) Functional Status of the 19 patients.

Table 5 shows the histological findings of the pericardiectomy specimens in 18 cases. Tuberculous pericarditis was diagnosed in 6 cases. There were 6 non-specific chronic inflammatory specimens and 2 cases of suppurative pericarditis (Table 5). Five had been treated for proven TB of the lung or pericardium in the medical ward prior to admission to surgical side. Four patients had HIV/AIDS in addition to tuberculosis.

Discussion:

The occurrence of chronic constrictive pericarditis in the young age group (mean 24.3 ± 7 years) is similar to O.Johanson's review and others^{11,12,15} but our patients are significantly younger than the patients reported by Bozbuga N (2003) and Abdelmeguid I (2002) ($p < 0.001$), who reported mean age of 32.2 and 35 years respectively. In agreement with many reports, our results showed predominance of males over females. The interval from surgery to presentation varies in different series, 1< to >4 years by Johanson, mean of 23 months by Killian and 2.3(range 0.5-6) years by Bozbuga^{11,12,16}. Duration of complaints in our review was 14.5 ± 12.8 months.

Pericardiectomy is the only accepted curative treatment for improving cardiac hemodynamics in CCP. It may be difficult to distinguish constrictive pericarditis from restrictive cardiomyopathy. Every effort should be directed to confirm the diagnosis, eliminate other causes of right sided failure and determine its etiology^{12,17-19}. The clinical presentations of our patients were in agreement with previous reports^{11,12,15}. The diagnosis CCP was clear in all patients, symptoms and signs of right heart failure, low QRS voltage in electrocardiography (52.6%), pericardial thickening/calcification in echocardiography (42.1%), cardiomegaly and pericardial calcification seen by chest roentgenogram in 36.8% and 31.6% patients respectively. Moreover, intraoperatively, the finding of thickened pericardium in all cases was in favour CCP.

Although tuberculosis was considered as the main cause of CCP, most cases are now idiopathic or follow prior radiation therapy or operation^{6,7}. But still TB is the most common cause of pericarditis in some developing countries (8, 9). In our group of patients, a total of 11(75%) patients were

diagnosed to have TB CP, six proven TB pericarditis on histological examination, five treated for clinically proven TB of the lung, pericardium or both.

Indications for operation were effusive disease in 7 patients and constriction in 12 patients. Regardless of the surgical approach or use of cardiopulmonary bypass, investigators have reported normalization of cardiac haemodynamics after total or subtotal pericardiectomy^{15,20,21}. Median sternotomy and left anterolateral thoracotomy were used in 15 and 4 patients respectively. The amount of pericardium to be decorticated is a matter of controversy, but most surgeons advocate a procedure that decorticates all the right and left ventricles from phrenic to phrenic, including the anterolateral and diaphragmatic surfaces. Resection of pericardium overlying the atria or vena cavae probably adds little haemodynamic benefit but reported to increase the risk of bleeding complications³. Total pericardiectomy was considered as wide excision of the pericardium from all surfaces of the heart and major intrapericardial vessels; with the phrenic nerves defining the posterior extent of pericardial resection. Whereas subtotal pericardiectomy was defined as decortication of the constricting pericardium from both ventricles without the removal of pericardium overlying the atria and venae cavae. In this review, all patients had subtotal pericardiectomy. All patients were operated without the use of cardiopulmonary bypass. Most surgeons do not or rarely use cardiopulmonary bypass; standby machine may be primed in patients with concomitant heart operations, and low ejection fraction^{12,15}.

Both Bozbuga et al¹², Abdelmeguid et al¹⁵ reported a 30-day operative mortality rate of 6%, while McCaughan¹⁸ reported 5% to 15%. These findings are in accordance with our in-hospital and long-term mortalities of 5.6% and 10.5% respectively. The mean stay in-hospital and intensive care unit were also similar to that of Bozbuga and others¹². At the 1-year follow-up, improved functional status was noted in 94% of the surviving patients which is similar to other reports^{12,15}.

In conclusion, Pericardiectomy is a gratifying procedure that can be performed in an environment where cardiopulmonary bypass is unavailable, resulting in low mortality and

improved functional capacity of the heart in the majority of the patients.

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