

# Surgical Experience of Chronic Constrictive Pericarditis at Quetta, Pakistan

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## ABSTRACT

**Objective:** To determine causes, surgical techniques, mortality and morbidity rates, and improvement of functional capacity.

**Subjects and Method:** This retrospective study was conducted at Sandman (Provincial) Hospital, Quetta were carried out during April 1995 to May 2011. We operated on 18 patients with a diagnosis of chronic constrictive pericarditis. Sixteen of them were men and 2 were women. The average age was 39.3 years (range, 17 to 63 yrs). The most frequent complaints were dyspnea, weakness, fatigue, chest pain, and fever. The cause of the chronic constrictive pericarditis was tuberculosis and auscultation revealed pericardial frictions rub in all patients. Our main diagnostic criteria were clinical presentation and 2-D echocardiography; a left anteriolateral thoracotomy was employed for approaching the pericardium in all patients. Pericardiectomy can be performed safely as the primary surgical therapy.

**Results:** Sixteen of our patients were men and two were women. Postoperative complications were arrhythmia, low cardiac output, there was one early postoperative death due to low cardiac out put and during the 1<sup>st</sup> postoperative month, the functional capacity of our patients improved dramatically. Their ascities and Peripheral edema were also improved.

**Conclusion:** Chronic constructive pericarditis is common disease in our country. If properly diagnosed, investigated and referred early, it can be successfully treated even in centers with limited facilities like Bolan Medical College Quetta.

**Key words:** Chronic constrictive pericarditis, Tuberculosis, Pericardiectomy

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## INTRODUCTION

The clinical table of chronic constrictive pericarditis (CCP) was first described in 1842 by Cheever in his *Observations on the Diseases of the Orifice and Valves of the Aorta*, in which he reported that dangerous symptoms arose chiefly from the compressing of muscle tissue by sticky material that surrounded the heart.<sup>1</sup> The causative factors for CCP have changed over time. For many years, most cases were due to tuberculosis, but currently the rates of uremic, postoperative, and neoplastic constriction are increasing, while those of tuberculosis and idiopathic constriction are decreasing.<sup>2-3</sup> Today, pericardiectomy is a safe procedure with available techniques.<sup>4</sup> Chronic constructive pericarditis is chronic inflammatory disease involving both visceral and parietal pericardium, resulting in pericardial thickening and obliteration of pericardial cavity.<sup>6</sup> It leads to compression of ventricles and impairment in diastolic filling.<sup>7</sup> This disease is still very common in underdeveloped countries where the majority of population has poor, general health and tuberculosis is endemic.

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## PATIENTS AND METHODS

During the 11 years period between April 1995 and May 2005, we operated on 18 patients with a diagnosis of CCP. Sixteen of them were men and 2 were women, the average age was 39.3 years (range 17 to 63 years). The most frequent complaints were dyspnea, weakness, fatigue, chest pain and fever. The cause of the CCP was tuberculosis in all patients, in all patients, auscultation revealed a pericardial friction rub (a metallic 3<sup>rd</sup> voice with high frequency, just after the 2<sup>nd</sup> voice in diastole). Physical examination further revealed ascites in 5 patients, peripheral edema in 7 and hepatomegaly in 2. Laboratory results showed hypoproteinemia and hypoalbuminemia in all patients. Two-dimensional, color-flow Doppler echocardiography revealed cardiomegaly in 3 patients (37.5%) and pericardial calcification in 5 (62.5%). Tuberculosis was associated with this calcification in 5 of the 8 patients (62.5%). Upon electrocardiography, low voltage was a finding common to all patient none of the 8 patients needed pericardiocentesis. Preoperatively, all patients were taking diuretics and digitalis at optimal doses, and those with tuberculosis or cancer were also receiving agent specific to those conditions. Majority of the patients were in New York Heart Association (NYHA) functional class 111. Our main diagnostic criteria were clinical presentation and 2-D echocardiography; a left anteriolateral thoracotomy was employed for approaching the pericardium. The

thickened pericardium was excised from the ventricles as much as possible. Post operatively all the patients were given inotropic support for 48 hours.

## RESULTS

Postoperative complications were arrhythmia, low cardiac output. Our mortality rate for the early postoperative period was in 1 patient. The causes of early death were low cardiac output and "poor general condition before operation" was in New York Heart Association (NYHA) functional class III or IV. During the 1<sup>st</sup> postoperative month, the functional capacity of our patients improved dramatically. In the 4 patients whose large calcific plaques had to be left in place, the wedge incisions successfully relieved myocardial constriction, and there was no late recurrence of CCP. Indeed, we found no postoperative recurrence of CCP in any of our patients during late follow-up (after 6 postoperative months). Most of the patients recovered smoothly after operation. Two patients were developed wound infection, which healed satisfactory. One patient had persistent difficulty in breathing during exertion; he was treated symptomatically. Majority of the patients improved postoperatively and none were in class III. Histopathology of the removed pericardium revealed tuberculosis pericarditis in all patients.

## DISCUSSION

In chronic constrictive pericarditis, there are changes in the volume elasticity slopes of both ventricles. Secondary to constriction, there is an increase in left and right ventricular end-diastolic pressures and a decrease in outflow volume<sup>8</sup>. Moreover, thickened and calcified pericardium frequently comes into direct contact with the myocardium, decreasing the heart muscle's contractility and disrupting the coordination of diastolic filling of the ventricles<sup>9</sup>. In our series, tuberculosis is the most frequent cause of CCP, but in developed western countries cases of uremic, postoperative, and neoplastic pericarditis are increasing overall. For both the effusive and constrictive forms of pericarditis associated with tuberculosis, early surgical intervention is indicated.<sup>10</sup> Fibrosis and calcification can extend very severely in tuberculosis patients, and this is the primary reason to perform the operation as early as possible<sup>11</sup>. Chronic constrictive pericarditis of more than a year in duration decreases the success rate of surgery and increases the mortality rate. Due to early diagnosis and surgery, severe cases have become rare. In patients with CCP, performing cardiopulmonary bypass is a big problem<sup>12</sup>.

Another difficulty in cases of CCP is hypoproteinemia as a consequence of nitrogenous protein loss. Portal hypertension ruptures capillaries, returning protein to the lumen of the gut. As blood colloidal pressure decreases and hydrostatic venous

pressure increases, peripheral edema develops<sup>13</sup> protein loss, especially albumin loss, increases lymph production and causes secondary dilatation in the lymphatic system. High pressure in the dilated lymph vessels increases fat and protein loss through transudation or outright tearing of the vascular wall. All of these conditions are reversible if pericardial constriction is relieved. Every patient in our series had hypoproteinemia and hypoalbuminemia preoperatively. Their rates of ascites, and peripheral edema, were 5(62.5%), 3(37.5%) respectively<sup>14</sup>. Whether pericardiectomy is indicated in cancer patients with CCP depends, of course, on the nature and extent of the underlying disease. Often, pericardial or cardiac infiltration is inoperable. The chance of a cure is high with breast cancer and lymphoma, but CCP with lung cancer is generally inoperable even at diagnosis. We performed pericardiectomy in 2 CCP patients with cancer, but the disease was primary lymphoma<sup>15</sup>. Currently, the incidence of idiopathic pericarditis has decreased, due to the improvement of diagnostic techniques. Pericardiectomy for CCP has very low morbidity and mortality rates in cases of idiopathic, traumatic, and rheumatic CCP<sup>16</sup>.

Chronic constrictive pericarditis after open-heart surgery was reported first in 1972 by Kendall<sup>17</sup>, the development period for constrictive pericarditis after coronary artery bypass averages 2 years. Fewer than 5% of CCP cases are caused by surgery, and in our series we didn't encounter a CCP case with this origin. The number of cases of CCP caused by mediastinal radiotherapy has increased in recent years, and the development period is between 8 and 16 months; in these cases, cardiopulmonary bypass is necessary because of severe attachments, Bilateral thoracotomy, left anterior thoracotomy, and median sternotomy are all approaches that can be used in treating CCP. The sternotomy incision enables exploration of the left ventricle and right part of the heart and direct vision of the great vessels<sup>18</sup>. It is possible to perform an extensive pericardiectomy with minimal cardiac manipulation. The left ventricle can be decorticated easily via sternotomy, and better cardiac hemodynamics can be achieved through a sternotomy than through a thoracotomy. Further advantages of the median sternotomy are the ease and comfort of this approach for the surgeon, the ability to initiate CPB if necessary, and the postoperative comfort of the patient<sup>15</sup>.

In some cases of CCP surgery, the importance of CPB is evident. If there is a calcific and thickened pericardial fragment without a cleavage plane, it can be left in place; but if the surgeon wants to excise the thickened part, CPB should be performed after cannulation of the femoral artery and vein under normothermic conditions (37°C)<sup>19</sup>. Large series have shown that CPB does not place the patient at serious risk for early death or severe complications. If there is low cardiac output before the operation, primary

treatment with catecholamine infusions should be started 24 to 48 hours before the operation. In unresponsive cases, an intraaortic balloon pump can be tried<sup>20</sup>.

Chronic constructive pericarditis is a common disease in our country possibly due to the endemic prevalence of tuberculosis. Unqualified medical personals and traditional healers initially treat most of the patients, thus by the time these patients reached sandman teaching Hospital Quetta, their diseases were in advanced stage and were initially admitted in cardiology unit for stabilization and investigation, with the limited available modalities for investigation. So a three months trial of medical treated was given to all the patients. Majority of the patients were accurately diagnosed by 2-D echocardiography, this along with the clinical presentation was our main diagnostic tool. Most common finding on 2-D echocardiography was; (1) thickening and calcification of pericardium, (2) pericardial effusion, (3) restricted movements of parietal pericardium. (4) thick fibrous material in pericardial cavity and (5) left ventricular diastolic dysfunction. The gold standard cardiac catheterization could not be done due to non-availability of this essential diagnostic tool at our centre. Once the diagnosis of chronic constructive pericarditis was made, the patients were referred for surgery. Our numbers of patients were low because there is no proper setup for cardiothoracic surgery unit at Bolan Medical Quetta. In spite of all our limitations we achieved good results by approaching the diseased pericardium through the anterolateral thoracotomy. Majority of our patients who were in NYHA functional class 111 preoperatively had improved considerably.

## CONCLUSION

There is an early surgical intervention indication for tuberculosis cases with effusion and constrictive form. Today, patients can be evaluated rapidly in preoperative period; decision for operation can be made in time through an anterolateral thoracotomy even in centers where cardio thoracic units are not available.

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