Subacute Tuberculous Pericarditis With Fibroelastic Constriction Diagnosed Upon Pericardietomy

Tsutomu Ryoke, MD; Hiroyuki Kakukawa, MD; Hideki Kunichika, MD; Yuko Nishimura, MD; Hisanori Sakai, MD; Yoshihide Minami, MD*; Takashi Fujii, MD**; Masunori Matsuzaki, MD**

A patient with subacute pericarditis showed no evidence suggesting tuberculosis until pericardietomy was performed because of hemodynamic deterioration. The excised pericardium had a rubbery fibroelastic consistency; histologically, there were granulomatous changes characteristic of tuberculosis. Although tuberculous pericarditis is a difficult diagnosis, this case illustrates the diagnostic and therapeutic importance of early pericardietomy before myocardial inflammatory infiltration occurs together with end-stage pericardial fibrosis and calcification. (Jpn Circ J 2000; 64: 389 – 392)

Key Words: Constrictive pericarditis; Pericardietomy; Tuberculosis

Although tuberculous pericarditis has become uncommon in industrialized countries, it continues to be clinically important because of the progression within several years to ventricular constrictive due to the rigid calcified pericardial shell. Some etiologic studies of chronic constrictive pericarditis in Western countries have found tuberculosis to account for 2–10% of all cases.1–3 Although tuberculous pericarditis typically is diagnosed by demonstration of tubercle bacilli, its histologic features, and elevation of adenosine deaminase activity (ADA) in pericardial effusions3 the diagnosis is often elusive. We report a case of subacute pericarditis with elastic constriction caused by tuberculosis, which was diagnosed by histologic examination of the pericardietomy specimen without other specific evidence suggesting tuberculosis.

Case Report

A previously healthy 55-year-old woman was admitted to the Department of Cardiovascular Medicine, Konan Saint Hill Hospital in November 1998 because of progress of fatigue and exertional dyspnea (New York Heart Association (NYHA) class II) following a 2-week history of sore throat, cough, and pyrexia. She had a past history of surgery for myoma uteri 20 years ago. She was 154cm in height and weighed 55kg. On auscultation, a third heart sound was audible without abnormal murmurs at the fourth left interspace at the sternal border. The lung fields were clear. The jugular veins were distended, but Kussmaul’s sign, pulscus paradoxus and peripheral edema were not present. Results of the remainder of the physical examination were normal. Blood pressure was 120/78 mmHg; pulse was 88 beats/min and regular. Body temperature was 36.3°C without a fever during the hospitalization. In screening blood tests, serum transaminase, lactate dehydrogenase, C-reactive protein concentrations (0.8 mg/dl), and erythrocyte sedimentation rate (30 mm/h) were slightly increased, but other biochemical studies and blood counts were normal. Rheumatoid factor levels and anti-nuclear antibodies also were normal. The chest radiograph revealed mild cardiomegaly (cardiothoracic ratio, 53%), bilateral pleural effusion, and mild pleural thickening at the left lung apex without other lesions. The electrocardiogram showed sinus rhythm and complete right bundle branch block pattern with diffuse nonspecific ST-T changes. A two-dimensional echocardiogram on admission showed normal sizes for the left ventricle (LV) and right ventricle (RV) with normal systolic performance (LV end-diastolic diameter, 41 mm; LV ejection fraction, 70%). The pericardium was shown to be diffusely thickened and immobile. The inferior vena cava was dilated (23 mm), without significant respiratory variation. A restrictive pattern of transthoracic and mitral valve flow and exaggerated reversed flow in the hepatic veins at atrial contraction were shown by Doppler echocardiography. This restrictive pattern became more prominent and the deceleration time for the early flow velocity of transmural flow shortened (105 ms) after 2 weeks. Computed tomography (CT) of the chest on admission revealed a diffusely thickened pericardium without calcification, as well as bilateral pleural effusions (Fig 1). These findings strongly suggested constrictive pericarditis. Serum antibody titers against various viruses showed no significant change between the time of admission and repeat determinations 2 weeks later. The patient gave no past or family history of definite tuberculosis or human immunodeficiency virus infection, and had not taken any immunosuppressive drugs.

A tuberculin skin test was negative (1×2 mm), and no evidence of tuberculous infection was shown by culture or polymerase chain reaction methods in 3 samples each from sputum, pleural effusion, and gastric aspirates. The pleural effusion was not bloody, but showed characteristics of an
Fig 1. Enhanced chest CT image demonstrating diffuse pericardial thickening overlying a low-density area, and also showing bilateral pleural effusion.

Fig 2. Pathologic findings. (A) Excised pericardium that had covered the anterior portion of the right ventricle shows fibroelastic pericarditis, with thickening up to 13 mm. (B) Microscopic section showing the caseating granuloma characteristic of tuberculous pericarditis (H&E, x200).

Japanese Circulation Journal Vol. 64, May 2000
Table 1 Swan-Ganz Catheter Data

<table>
<thead>
<tr>
<th></th>
<th>Initial</th>
<th>After 3 weeks</th>
<th>Post pericardiectomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>HR (beats/min)</td>
<td>91</td>
<td>89</td>
<td>90</td>
</tr>
<tr>
<td>Pcv P (mmHg)</td>
<td>15</td>
<td>(17)</td>
<td>(7)</td>
</tr>
<tr>
<td>PA P (mmHg)</td>
<td>27/16 (21)</td>
<td>27/20 (22)</td>
<td>25/12 (17)</td>
</tr>
<tr>
<td>RV P (mmHg)</td>
<td>28/15</td>
<td>29/18</td>
<td>24/5</td>
</tr>
<tr>
<td>RV P dip-plateau</td>
<td>–</td>
<td>(15)</td>
<td>(4)</td>
</tr>
<tr>
<td>RA P (mmHg)</td>
<td>2.27</td>
<td>1.96</td>
<td>2.80</td>
</tr>
</tbody>
</table>

HR, heart rate; Pcv, pulmonary capillary wedge; P, pressure; PA, pulmonary artery; RV, right ventricular; RA, right atrial; CI, cardiac index. Values in parentheses are means.

exudate, though the concentration of ADA was normal (17.5 IU/L). Initial catheterization of both left and right sides of the heart on the third hospital day showed equalization of the elevated diastolic pressures and low cardiac output, but the RV pressure did not show the typical dip-and-plateau pattern (Table 1). In spite of aggressive diuretic therapy, the patient's exertional dyspnea progressed to NYHA class III, and a second right heart catheterization 3 weeks after initial examination revealed further elevation of the diastolic pressures with the typical dip-and-plateau pattern in the RV, and a further decrease in cardiac output (Table 1). The patient was referred for pericardiectomy.

On December 26, 1998 pericardiectomy was performed as completely as possible, in particular removing all the constricting pericardium and epicardium around the heart. The pericardium was markedly thickened and enclosed the heart tightly, showing a rubbery fibroelastic consistency (Fig 2A). FIG. 2B. A fibrous tissue, which had been depicted as a low-density area on the chest CT, created attachments of the parietal pericardium to the epicardium without any pericardial effusion or calcification. Histologic examination of the excised pericardium showed many granulomas with caseating necrosis, epitheloid cells, and Langhans's giant cells, all characteristic of tuberculous pericarditis (Fig 2B). No tubercle bacilli were demonstrated by Ziehl-Neelsen staining or by culture of the pericardium. After pericardiectomy, antituberculous chemotherapy with isoniazid, rifampicin, ethambutol and pyrazinamide was administered for 2 months, followed by a combination of the first 3 drugs for another 4 months. The hemodynamic data markedly improved after 1 month (Table 1). The patient's symptoms also improved satisfactorily, and she remained well with no evidence of recurrence.

Discussion

Diagnostic proof of tuberculosis rests on the demonstration by staining or culture of tubercle bacilli, but a definitive bacteriologic diagnosis often is difficult. Recently, the diagnostic usefulness of measuring ADA in fluid samples in several conditions due to tuberculosis, including tuberculous pericarditis, has been reported.6,8 In the present case, tubercle bacilli were not isolated from sputum, gastric aspirate, pleural effusion or excised pericardium, and the tuberculin skin test was negative. The level of ADA in the pleural effusion was not increased despite its exudative nature; no pericardial effusion was examined because none was present. Chest CT did not definitively show active pulmonary tuberculosis. Thus, positive evidence suggesting tuberculosis was not found before pericardiectomy. However, a diagnosis of tuberculosis should always be considered in primary pericarditis, and a thorough workup is necessary. The tuberculin skin test is not a reliable indicator of tuberculous pericarditis; one-third of patients with tuberculous pericarditis had a negative tuberculin skin test due toergy.6,8 Although the pathogenesis of pericardial involvement by tuberculosis is not clear, the pericardium is usually infected via lymphatic spread; frequently no other lesion, including pulmonary involvement, is detectable. Pericardial infection rarely arises from direct spread from the lung or pleura. Maish et al have reported that cell-mediated immunity may play a significant role in the pathogenesis of tuberculous pericarditis.

Hancock has described subacute constrictive pericarditis with elastic constriction, which shows a course measured in weeks or months and presents a hemodynamic pattern intermediate between cardiac tamponade and classic constriction.9 Patients with subacute constriction show various degrees of pericardial effusion (effusive-constrictive pericarditis). Less prominence of the ventricular dip-and-plateau pressure pattern is seen in patients with subacute constriction because of the elasticity of the pericardium or the presence of effusion.9 Pathophysiologic disturbances arising from this nonrigid fibroelastic form of constrictive pericarditis resemble those in cardiac tamponade. In the present case, Swan-Ganz data did not show the typical dip-and-plateau RV pressure pattern at initial examination, but this pattern became evident after 3 weeks. The rubbery pericardium tightly encased the heart without any effusion.

In tuberculous pericarditis, pericardiectomy should be performed early, before the inflammatory process infiltrates the myocardium. Such infiltration further compromises cardiac function and makes surgery difficult. At the time of operation in the present case, the disease was beginning to enter the last of 4 stages, though it had progressed subacutely. These stages include a fibrinous stage, which is associated with a granulomatous reaction including caseation, a stage of effusion (which can be serous, serosanguineous, or bloody), a stage of pericardial thickening by fibrous tissue and granulomas, and the final stage of cardiac constriction, in which the pericardial space is obliterated by fibrous adherions.8 In the latter stage, after complete absorption of the pericardial effusion, viable tubercle bacilli may no longer be present, and eventually the granulomas become completely replaced by fibrous tissue with or without calcification.8 At this point the pericardial disease would be pathologically classified as idiopathic, and the adherent pericardium would be difficult to remove. Among the many cases of constrictive pericarditis lacking specific features and labeled as idiopathic, a number could probably be related to unrecognized prior tuberculosis.

A recent report has suggested the diminished importance of tuberculosis (0.7% incidence) in all causes of chronic constrictive pericarditis in the past decade in United
States. However, the epidemiology of tuberculosis depends on the geographic region and the recent increase of its incidence causes fear in Japan again. Therefore, the consideration of a tuberculous origin is essential in the diagnosis of primary pericarditis.

**Conclusion**

We have presented a case of subacute tuberculous pericarditis with fibroelastic constriction, which showed no evidence of tuberculosis before pericardectomy. This case suggests the importance of early pericardectomy for diagnosis as well as therapy in primary constrictive pericarditis.

**Acknowledgment**

We would like to thank Dr. Chikao Yatani (Department of Pathology, National Cardiovascular Center) for his valuable comments on the pathological specimens.

**References**