Echocardiography is a sensitive diagnostic tool for detecting pericardial effusion and intrapericardial abnormalities. Tuberculosis accounts for up to 4% of all cases of acute pericarditis and 7% of cases of cardiac tamponade. The mortality rate of tuberculosis still ranges from 14% to 40%. In Taiwan, the prevalence rate of tuberculosis decreased from 1.02% in 1957 to 0.11% in 1987; however the prevalence seemed to have increased again. We encountered a case with tuberculous pericarditis. The echocardiographic findings are reported and relevant literature is reviewed.

CASE REPORT

A 70 year-old man had a history of intermittent low grade fever and productive cough with mucoid sputum for 2 months. The cough became severe and he was admitted for further examination and management. Physical examination at admission revealed a blood pressure of 140/80 mmHg, heart rate of 86 per minute, and respiratory rate of 24 per minute. No significant palpable mass was noted over both sides of the neck. Mild jugular vein engorgement was also noted. The lungs were clear but with diminished breathing sound over both lower lung fields. The intensity of heart sounds was reduced, and a pericardial friction rub was audible. Peripheral pulses were intact. No peripheral edema, cyanosis, or digital clubbing was found.

The chest X-ray examination showed cardiomegaly and bilateral pleural effusion. The electrocardiogram showed sinus tachycardia and generalized low voltage. Two-dimensional echocardiography revealed a large amount of pericardial effusion with thickened visceral and parietal pericardium. In addition, there were many linear, echo-dense, fibrous strands protruding into the...
pericardial cavity (Figs. 1 and 2).

The fibrous strands showed undulating movements resembling the fronds of a plant waving in the breeze, resulting in a to-and-fro motion during ventricular systole. The dense layers of echo conglomerated into several linear dense structures protruding into the pericardial cavity (Fig. 3). Echocardiography-guided pericardiocentesis was performed. Gram stain and acid fast stain did not find any bacteria, however, the biopsy of pleura showed evidence of *Mycobacterium tuberculosis* (TB) infection. The culture of the pericardial fluid was also positive for TB 6 weeks later. The patient received anti-TB treatment and was discharged subsequently with improved condition.

**DISCUSSION**

The diagnosis of tuberculous pericarditis is often missed because of the difficulty in isolating the causative organism. The incidence of tuberculous pericarditis among patients with pulmonary tuberculosis ranges from 1 to 8%. Tuberculous pericarditis is a potentially lethal manifestation of extrapulmonary tuberculous. The pericardial effusion is thought to be due to a hypersensitivity reaction to tuberculoprotein. Pericarditis can result from the rupture of adjacent involved lymph nodes or hematologic spread. Typically, the process begins as effusive-constrictive disease and progresses into constrictive pericarditis without effusion. In the later stage, acid-fast bacilli are usually not detected, but caseating granulomas involving the pericardium and epicardium may be present. Chia et al. reported their experience of intrapericardial abnormalities in association with tuberculous pericardial effusion. They found linear frond-like intrapersicardial echodense structures which showed undulating movements and were seen to conglomerate into a...
dense mass protruding into the pericardial cavity. Ko et al.\textsuperscript{7} considered that frond-like structures and pericardial thickening seen on echocardiography might be characteristics in patients with tuberculous pericarditis and indicated early institution of antituberculous therapy. Although echocardiographic features of tuberculous pericarditis include visceral pericardial thickening, with a shaggy layer of material that is presumably fibrinous exudates, they are not specific. Similar echocardiographic findings may occur in patients with chronic renal disease, malignant tumor metastasis to the pericardial space, or in patients undergoing radiation therapy. Careful history-taking and physical examination usually can differentiate the tuberculous pericarditis from the above entities.

The chronic and recurrent pericardial processes are most likely to develop adhesive or fibrinous pericardial bands. Besides, thickened pericardium\textsuperscript{8} or signs of constrictive pericarditis\textsuperscript{9} and cardiac tamponade\textsuperscript{1,10} have been reported in patients with tuberculous pericarditis. Furthermore, in previous studies, small to large amount of pericardial effusion were also observed in these kind of patients.\textsuperscript{5-7,10,11} Echocardiographic findings of tuberculous pericarditis are summarized in Table 1.

The diagnosis of tuberculous pericarditis based on findings of acid-fast organisms in the pericardial fluid is often difficult. Four to 6 weeks is often required for the culture of the bacilli from a pericardial effusion. This case received pericardial fluid evaluation, the gram stain and acid fast stain did not find any bacteria. The tuberculosis was diagnosed after culture of the pericardial fluid. Pericardial biopsy is useful to assess the histologic features of pericardial tissue; it is a more sensitive technique in confirming the tuberculosis infection.\textsuperscript{9}

In conclusion, this report describes the possible echocardiographic findings of tuberculous pericarditis. Aggressive study is indicated to confirm the possibility of tuberculous pericarditis if there is evidence of a massive pericardial effusion with fibrous strands and thickened pericardium.

### REFERENCES


### Table 1. The echocardiographic findings in patients with tuberculous pericarditis

<table>
<thead>
<tr>
<th>Echo findings</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small/moderate/large amount of pericardial effusion</td>
<td>Permanyer et al.\textsuperscript{5} Chia et al.\textsuperscript{6} Ko et al.\textsuperscript{7} Horowitz et al.\textsuperscript{10} Scully et al.\textsuperscript{11} Fowler et al.\textsuperscript{1} Horowitz et al.\textsuperscript{10} Chia et al.\textsuperscript{6} Ko et al.\textsuperscript{7} Hinds et al.\textsuperscript{8} Anonymous et al.\textsuperscript{2} Lorell et al.\textsuperscript{3} Suwan et al.\textsuperscript{9}</td>
</tr>
<tr>
<td>Cardiac tamponade</td>
<td></td>
</tr>
<tr>
<td>Fibrin strand/mass-like exudate</td>
<td></td>
</tr>
<tr>
<td>Thickened pericardium</td>
<td></td>
</tr>
<tr>
<td>Constrictive pericarditis</td>
<td></td>
</tr>
</tbody>
</table>