against subsequent challenge with *M tuberculosis*, although their efficacy was in each instance less than BCG vaccine. *Mycobacterium kansasii* produced a greater degree of acquired immunity than an infection with *M intracellulare*. Palmer and Long, moreover, have shown that the effect of giving BCG vaccine after the atypical mycobacterial vaccine was to increase the efficacy to that of BCG vaccine alone. There is now overwhelming evidence that this also applies to man.

In his study of 122 patients, Runyon reported one patient who was known to have had long-lasting infection with *M kansasii* who subsequently underwent a lobectomy. Only *M kansasii* organisms were found in the resected tissue. Subsequently, the patient died of pulmonary tuberculosis. *Mycobacterium tuberculosis* was found at necropsy, but no *M kansasii*.

Since Runyon's report, there has been very little noted in the literature of a similar experience with patients who have had an infection with *M kansasii* which was successfully treated and who have subsequently developed classic pulmonary tuberculosis.

Infection with *M kansasii* is usually confined to the lungs. It is possible that in our patient, chemotherapy and resection of the localized pulmonary lesion due to *M kansasii* completely eliminated the organisms, so that the infection with *M kansasii* no longer was capable of conferring protection against a subsequent tuberculous infection. It has also been shown that immunity induced by BCG vaccine is greatest soon after vaccination when infection by inhaled *M tuberculosis* may completely be prevented. With waning immunity, infection may occur in the lungs, and rapid recall of prior immunity occurs and localizes the infection to the lungs.

Standard studies of the lymphocytic immune defense system in our patient failed to demonstrate any gross abnormalities that may have played a role in protecting him against any recurrence of his carcinoma of the scalp but apparently offered no protection against an infection with *M tuberculosis*.

In addition to the immunologic effect of mycobacteria other than *M tuberculosis* described here, there appeared to be other nonspecific immune factors deficient in our patient that may be responsible for the development of his tuberculosis.

The airways and the lung appear to have a remarkable capacity to cope with inhaled particles and microorganisms, so that the lower respiratory tract is virtually sterile. Said brought attention to the importance of the pulmonary defense mechanisms against bacteria, including *M tuberculosis*. He emphasized that the two important initial defenses are the highly specialized cells, the alveolar macrophages, and the action of the cilia. Hypoxia, starvation or malnutrition, cigarette smoke, and the administration of alcohol (ethanol) or cortisone adversely affect this self-cleaning mechanism. These harmful influences, which are clinically associated with a high increase of infection of the lung, have been demonstrated experimentally to limit the removal of bacteria from the lung.

Studies by Allison and by Thorn and associates have shown an incidence of tuberculosis as high as 10 percent following subtotal gastrectomy. The risk of developing pulmonary tuberculosis after partial gastrectomy is greater with gastric ulcers. Malnutrition appears to be the contributing factor.

In the case reported here, assuming *M kansasii* produced an immunity in a patient with a competent cell-mediated immune system, it is conceivable that malnutrition owing to gastrectomy, poor dietary habits associated with alcoholism, and excessive smoking contributed to the breakdown of his pulmonary defense mechanisms and to the development of tuberculous infection.

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REFERENCES


Allergic Bronchopulmonary Aspergillosis with Obstruction of the Upper Respiratory Tract*

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A case of allergic bronchopulmonary aspergillosis is presented. The only symptoms in this 24-year-old woman patient were those of recurrent nasal obstruction, including mucosal ulcerations, edema, and thick secretions within the nose.

Allergic pulmonary aspergillosis is characterized by symptoms referable to disease of the lower respiratory tract, such as asthma, hemoptysis, and recurrent pulmonary infiltration with eosinophilia. This report describes a young woman whose initial symptoms were related to disease of the upper respiratory tract and were characterized by intractable nasal obstruction and cast formation.

Case Report

A 24-year-old woman was referred to Saint Michael's Medical Center because of an unresolved infiltrate in the right upper lobe. Three months earlier, she had complained of rhinorrhea and the production of nasal casts which were hard and blood-tinged. The patient was found to have nasal polyps with severe mucosal edema. Radiographs of her sinuses demonstrated opacification. Therapy with 250 mg of tetracycline four times a day gave no response.

Because of the persistence of her symptoms, the patient underwent polypectomy and a left-sided Caldwell-Luc drainage procedure. The removed tissue demonstrated inflammatory polyps infiltrated with eosinophils and plasma cells, with no evidence of granulomatous changes. Cultures grew Aspergillus fumigatus.

The patient failed to improve following surgery and was readmitted for further evaluation. A chest x-ray film (Fig 1) revealed an ill-defined infiltrate in the right upper lobe. The findings from bronchoscopic examination with bronchial biopsy were negative. Bronchial washings failed to grow tuberculous organisms or Aspergillus sp. The patient denied any previous history of allergies or asthma and denied any family history of allergic disorders. She also denied hemoptysis, weight loss, and fever; and except for severe nasal congestion, she was in good health.

The findings from physical examination were unremarkable, except for mucosal ulcerations, edema, and thick secretions within the nose. The chest was free of wheezes or rales. Intradermal skin testing with five tuberculin units was negative at 72 hours. The hemoglobin level was 10.2 gm/100 ml, and the erythrocytic sedimentation rate was 30 mm/hr by the Westergren method. The white blood cell count was 10,500/ cu mm, with 12 percent eosinophils. An absolute eosinophil count was 1,650/cu mm. Nasal smears demonstrated many leukocytes, 80 percent of which were eosinophils.

Testing for allergies using commercially obtained antigens (Dome Laboratories) revealed a strongly positive reaction to extracts of A fumigatus. Intradermal challenge with protein extract of A fumigatus (0.1 mg/ml) gave a strong immediate reaction followed by a positive late reaction. Gel diffusion studies demonstrated precipitins against Aspergillus sp. Studies of pulmonary function demonstrated reversible airway obstruction.

Because of positive immediate and late skin reactions to protein extract of Aspergillus sp, the presence of serum precipitins to Aspergillus, and pulmonary infiltrations with eosinophilia, the patient was started on therapy with prednisone (30 mg). Her response was dramatic. Chest radiographs one week after initiating therapy showed marked clearing of the upper lobar infiltrates. The patient's nasal congestion decreased. Repeated chest radiographs obtained four weeks later showed total resolution of the infiltrate.

Six months later, the patient became pregnant, and therapy with prednisone was discontinued. She did well until three months after her delivery, at which time she again complained of rhinorrhea. A radiograph (Fig 2) at this time showed an infiltrate in the left upper lobe. The patient was started on oral therapy with prednisone, which resulted in dramatic improvement, both in her nasal symptoms and in the resolution of her pulmonary infiltrate.

Discussion

Pulmonary infiltration with eosinophilia and symptomatic asthma were common initial symptoms in pa-
Ruptured Chordae of the Tricuspid Valve*

The Consequence of Flow-Directed Swan-Ganz Catheterization

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Frederick L. Glauser, M.D., F.C.C.P.; and P. Jemison, R.N.

A case of autopsy-documented ruptured chordae tendineae of the tricuspid valve, secondary to flow-directed Swan-Ganz catheterization of the right side of the heart is presented. A possible mechanism is discussed and safeguards to prevent this complication are suggested.

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Since first introduced by Swan et al.,1 the flow-directed balloon-tipped catheter has become a valuable aid in management of critically ill patients.2-5 It has also been useful in the cardiac catheterization laboratory.6-9 Although the most frequent complication of Swan-Ganz right heart catheterization is minor arrhythmias,1-2 other complications have been reported.10-16 To our knowledge, ruptured chordae tendineae of the tricuspid valve has not been previously described.

CASE REPORTS

This 63-year-old woman had rheumatic fever in early childhood and known mitral insufficiency for 15 years. Approximately three days prior to transfer to Orange County Medical Center, she had an episode of severe precordial squeezing pain of two hours’ duration, with associated diaphoresis, nausea, and dyspnea. She was hospitalized at a local facility where pressor agents were used to maintain her blood pressure. Urinary output was less than 5 ml per hour. After two days, she was transferred to our facility.

Initial physical examination showed blood pressure of 80/64 mm Hg, pulse rate 120 per minute and regular, respirations 30 per minute, and oral temperature 37°C (98.6°F). She was moderately dyspneic. Cardiovascular evaluation revealed the point of maximal impulse to be hyperdynamic in the sixth intercostal space at the anterior axillary line. A grade 4/6 holosystolic regurgitant murmur was loudest at the apex, but well heard over the entire precordium and radiated to the axilla and left subscapular area. There was no increase in the intensity of the murmur during inspiration. A prominent third heart sound was also present. End inspiratory rales were heard throughout both lung fields. She had no urinary output.

Admitting laboratory data showed an ECG consistent with an extensive anterolateral infarction. Serum glutamic oxaloacetic transaminase (SGOT) was 1555 mU/ml (normal 8-40); BUN was 137 mg percent, creatinine 3.4 mg percent, serum potassium 6.8 mEq/L and white blood cell count 21,000/cu mm with a normal differential smear. Chest radiograph was compatible with cardiogenic pulmonary edema.

Hospital Course

Hypertonic peritoneal dialysis was begun to correct her fluid and electrolyte status and she was subsequently digitalized. Multiple arrhythmias, including recurrent episodes of ventricular tachycardia and ventricular fibrillation, responded poorly to antiarrhythmic agents. During the early hours of

### Table 1—Swan-Ganz Right Heart Pressures
(all pressures in mm Hg)

<table>
<thead>
<tr>
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<th>Before*</th>
<th>After**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Right atrium</td>
<td>mean 20</td>
<td>mean 32; CV/Y, 50/22</td>
</tr>
<tr>
<td>Right ventricle</td>
<td>80/20</td>
<td>80/20</td>
</tr>
<tr>
<td>Pulmonary artery</td>
<td>80/50</td>
<td>80/50</td>
</tr>
<tr>
<td>Pulmonary artery wedge</td>
<td>mean 24; CV/Y, 30/20</td>
<td>mean 24; CV/Y, 30/20</td>
</tr>
</tbody>
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*Before = pressures on entry of the Swan-Ganz catheter into the various right heart chambers
**After = pressures after Swan-Ganz catheter had been advanced and withdrawn several times with an inflated balloon

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