Abstract

A case of pleuroperticarditis caused by Actinomyces israelli is described. The patient first underwent left upper lobectomy because of pulmonary actinomycosis. Seven months later, cardiac tamponade developed. Culture of the bloody pericardial effusion resulted in positive growth of Actinomyces israelli. He was successfully treated with penicillin G, ampicillin, and minocyclin. However, right pleural effusion appeared two months later. Cultures of the effusion again yielded positive growth of the same bacteria. However, the strain had gained resistance to any antibiotics that had been effective before. Accordingly, pleurodesis with minocyclin was undertaken, which was fortunately effective for controlling the pleural effusion.

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Key words: Actinomyces israelli, cardiac tamponade, thoracic actinomycosis, treatment

Introduction

Actinomyces israelli is a bacterium belonging to the normal flora of humans and thus, can be isolated from pharyngeal swab specimens in healthy men. However, it becomes pathogenic on rare occasions and can cause actinomycosis. In general, the majority of cases involve the cervicofacial area and thorax in 15%. Treatments usually include administration of antibiotics for long periods. In the present case, bloody pericardial effusion and pulmonary effusion developed several months after pulmonary actinomycosis. Actinomyces israelli was isolated from the pleural effusion. Even though various antibiotics were given for long periods, control of the pleural effusion was not successful. Finally, pleurodesis with minocyclin as nosotropic therapy was effective for controlling the pleural effusion.

Case Report

A 42-year-old man was first admitted to Hokkaido University Hospital for bloody sputum and abnormal shadows in the left lung on May 26, 1995 (Fig. 1). As noninvasive diagnostic approaches failed to identify the nature of his lung shadows, left upper lobectomy was performed (Fig. 2). Histological and bacteriological examinations revealed that he had pulmonary actinomycosis; however, the exact species of the isolated bacteria was not determined. The postoperative course was generally unremarkable until pitting edema in his lower extremities appeared in January 1996. He had gained body weight, and distention of the abdomen developed on the end of April 1996. He was initially admitted to a local hospital on May 30, 1996.

On his second admission to our hospital on June 19, 1996, his blood pressure was 104/64 mmHg and the heart rate was 76 beats/min. There was apparent pitting edema in his lower extremities. Laboratory studies on admission revealed the following values: erythrocyte sedimentation rate, 30 mm at 1 hour; CRP, 0.86 mg/dl; red blood cell count, 304x10^4/nl; hemoglobin, 9.5 g/dl. A chest radiograph (Fig. 3) showed cardiac enlargement. Results of extensive examinations suggested heart failure due to cardiac tamponade secondary to accumulation of pericardial fluid. Pericardiocentesis revealed grossly bloody fluid with red blood cell counts being 500x10^4/μl, hemoglobin 15.5 g/dl, and LDH 2,935 IU/l. There was no evidence of immunodeficiency in terms of serum immunoglobulin levels, results of lymphocyte transformation against phytohemagglutinin and tuberculin tests.

Cultures of pericardial effusion were negative for actinomyces and other pathogens. Pericardial biopsy by thoracotomy was done in July 1996. Histological examination of the pericardium showed constrictive pericarditis with fibrotic thickening and infiltration of lymphocytes around blood vessels. Bacterial bodies were not morphologically found. Convincing evidence was lacking for pericardial actinomycosis; however, the patient was started on 12 million units of penicillin G per day intravenously on July 18. Meanwhile, culture of pericardial effusion gave a positive growth of Actinomyces israelli on the blood agar in an anaerobic condition (Fig. 4), which was sensi-
Figure 1. Chest radiograph on the 1st admission showed an irregular mass in the upper lobe of the left lung (arrow).


Figure 3. Chest radiograph on the 2nd admission showed cardiac enlargement, and an operation scar in the upper lobe of the left lung.
Pleuropericardial Actinomycosis

Figure 4. Actinomyces israelii cultured from the pericardial effusion (HE stain, ×1,000) (arrow).

Figure 5. Chest radiograph on the 3rd admission showed a massive pleural effusion on the right side.

tive to penicillin G, ampicillin, and minocyclin hydrochloride. Accordingly the patient was then treated by intravenous injection of ampicillin and minocyclin hydrochloride. Though there was no adequate index for monitoring the activity of actinomycosis, penicillin G for six weeks, and a combination of ampicillin and minocyclin hydrochloride for four weeks seemed to be effective as an initial treatment. His regimen was changed to 1,500 mg of oral ampicillin per day on September 2, 1996, and he was discharged a week later.

The patient remained healthy for a while, but he was again admitted to our hospital because of dyspnea on effort on December 20, 1996 (Fig. 2). Chest X-ray films showed massive right pleural effusion (Fig. 5). The pleural effusion was a slightly bloody exudate. There were no signs suggesting exacerbation of heart failure as echocardiograms showed no change in cardiac function. Cultures of pleural effusion were negative for actinomyces and other pathogens. A thoracoscopic pleural biopsy revealed granulation tissue and hematoma with slight infiltration of lymphocytes. Frequent culture of pleural effusion again yielded positive culture of Actinomyces israelii. However, this strain was not sensitive to any antibiotics that had been used (penicillin G, ampicillin, panipenem/betamiprom, chloramphenicol, minocyclin hydrochloride, clindamycin). We thus conducted pleurodesis with 300 mg of minocyclin as a palliative measure. Though pleurodesis was not perfectly done, it could maintain the pleural effusion at a stable volume. He was discharged on August 7, 1997. Since then, he has been followed up for more than three years. His clinical course has remained unremarkable until February 2001 with the amounts of pleural effusion and cardiac effusion being unchanged.

Discussion

Actinomycosis is an infectious disease with granuloma formation due to Actinomyces species (1). Actinomyces species are members of the normal flora in the oral cavity (2, 3). Actinomyces israelii is the major human pathogen (2). Classically, actinomycosis is classified into cervicofacial (55%), abdominopelvic (20%), thoracic (15%), and mixed organ involvement (10%) including the skin, brain, pericardium and, extremities (4). Pulmonary lesions usually result from aspiration of material from the oropharynx and therefore, commonly affect the lower segments of the right lung. Most patients with pulmonary actinomycosis are not necessarily immunocompromised, but they may be predisposed to aspiration because of seizure disorders, episodes of unconsciousness, mental retardation, or alcohol consumption (5). Our patient had no such predisposing factors, including alcohol consumption. Fife et al (6) reviewed 19 cases of pericardial actinomycosis. Cardiac tamponade developed in 10 patients (53%). A primary thoracic focus of infection was identified in 15 subjects (79%). In the present case, there was no apparent continuity of pulmonary lesions of actinomycosis to the pericardium on upper lobectomy of the left lung. But it is most likely that the pulmonary lesions directly spread to the pericardium because they were located in close proximity and then spread to the right pleura.

Diagnosis of actinomycosis is generally hampered by the difficulty in isolation and culture of the organism. It must be cultured in strictly anaerobic conditions. In the review of Fife et al, purulent pericardial fluid was obtained from 10 (53%) of 19 cases. However, Actinomyces israelii was successfully cultured from the fluid in only two cases (6). Sulfur granules, long regarded as a histological hallmark of actinomycosis, are very strongly suggestive of the diagnosis. However, they are not entirely specific to actinomycosis, since these granules can also be found in nocardiosis, botryomycosis, aspergillosis, and coccidioidomycosis (2, 7).
to make a histological diagnosis of actinomycosis. There were no sulfur granules in the cardiac effusion or pleural effusion. Finally, culture of the pleural effusion under strictly anaerobic conditions resulted in positive growth of *Actinomyces israelli*.

Treatment of actinomycosis usually consists of 1 to 20 million units per day of intravenous penicillin G for four to six weeks (4, 7). In this case, we might have started treatment with antibiotics immediately after left upper lobectomy (4, 8), but we did not because the pulmonary lesion seemed to be completely removed. Consequently, he was started on 12 million units of intravenous penicillin G per day when we suspected pericardial actinomycosis. The isolated actinomyces strain was initially sensitive to penicillin G; however, pleural effusion in the right thorax was aggravated. Furthermore, control of the pleural effusion seemed to be even more difficult, because the isolated actinomyces lost sensitivity to all the antibiotics tested. Consequently, pleurodesis with minocyclin was chosen and proved to be effective for the pleural effusion. Thus, pleurodesis as a palliative therapy may be a choice for intractable pleural effusion, even when it is etiologically infectious.

In conclusion, we described a case of thoracic actinomycosis acquiring drug-resistance in the long-term clinical course. Finally pleurodesis was effective as nosotropic therapy. Careful follow-up is needed in the treatment of this rare infectious disease.

**References**