malignant neoplasm, in contrast, has a relatively poor long-term outlook despite complete resection. All patients in the Okike et al.1 series with a localized malignant tumor eventually developed a lethal local recurrence or distant metastasis. In a collected series of 82 localized malignant mesotheliomas, 40 percent were cured by excision alone.9 Treatment of 17 percent of the patients with this tumor with radiotherapy, chemotherapy (various agents), or both, either as primary therapy or in combination with surgery, however, resulted in no cures and no apparent benefit over surgery alone. Recurrence of the benign or the malignant tumor is a real possibility that deserves careful monitoring in the long run with annual chest radiographs that could permit control or cure of the tumor with reoperation.

ACKNOWLEDGMENT. The contribution of John R. Dobson, M.D., in providing the photomicrograph of the pathology specimen is greatly appreciated.

REFERENCES
15 Mengeot PM, Gailly C. Spontaneous detachment of benign mesothelioma into the pleural space and removal during pleuroscopy. Eur J Respir Dis 1986; 68:141-45

Pleural Effusion as the Major Manifestation of Actinomycosis*

Eugene L. Coodley, M.D.; and Rody Yoshinaka, M.D.

Pleural effusion represents an unusual but significant manifestation of actinomycosis, as illustrated in this case presentation. The diagnosis was made after bronchoscopy and examination of bronchoalveolar fluid and culture. No parenchymal abnormality was noted on the chest film.

(Ches 994; 106:1615-17)

Actinomycosis is a progressive granulomatous disease with local or systemic manifestations and a tendency to produce single or multiple draining sinuses. The variable clinical picture and relative infrequency of the disease make the diagnosis difficult. Clinical manifestations vary from indurated subcutaneous masses in the submandibular area to draining sinuses in the chest wall with accompanying cough and purulent sputum and also involvement of the gastrointestinal tract, usually in the ileocecal area. Our case is rather unique in that a pleural effusion without accompanying symptoms was the only manifestation of the disease.

CASE REPORT

The patient is a 69-year-old white man with a medical history significant for bladder cancer, prostate cancer, chronic obstructive pulmonary disease, and hypertension. He was admitted to the hospital with a chief complaint of shortness of breath. The patient first noted becoming short of breath 2 months ago. His shortness of breath gradually worsened and 2 weeks before admittance he began coughing up a greenish sputum. Consequently, 10 days ago, he consulted a physician who prescribed a 5-day course of sulfamethoxazole and trimethoprim (Bactrim) without any relief of symptoms. Next he tried a 5-day course of cefuroxime axetil (Ceftin), again without relief of symptoms. The patient denied any fevers or chills. He had been previously exposed to asbestos.

Medical History

The patient had a history of bladder cancer. His pathology report showed transitional cell carcinoma, stage II-III, and he was diagnosed by transurethral resection of bladder tumor 1 year ago. He also had a history of prostate cancer, stage AII, that was diagnosed 5 months ago. At that time, the patient was status post-transurethral resection of the prostate. He had a normal bone scan. He had a chest radiograph that did not show any metastatic disease. His prostate specific antigen (PSA) was 1.7 initially and after transurethral resection of his prostate it was only 0.4. He also had a history of chronic obstructive pulmonary disease. One year ago, his FEV₁ and FVC were 1.0/2.3.

Physical Examination

Upon examination his temperature was 36.7°C, pulse was 96 bpm, respirations were 18 breaths/min, and blood pressure was 110/80 mm Hg. In general, he was an obese white man in no acute distress. He had no lymphadenopathy. His lungs were noted to have decreased breath sounds in the left base; he was also noted

*From the General Medicine Section, University of California, Irvine, and the Department of Veterans Affairs Medical Center, Long Beach, California.
to have decreased tactile fremitus over the left lower base and dullness to percussion over the left lower base. Results of the remainder of the examination were entirely normal.

**Laboratory Data at Time of Hospital Admission**

The WBC count was 7.7 X 10⁹/L (7,700/mm³), hemoglobin was 134 g/L (13.4 g/dl), hematocrit was 0.38 (38 percent), platelet count was 297 X 10⁹ (297 X 10⁹/mm³), alkaline phosphatase was 52 U/L, SGOT was 27 U/L, SGPT was 39 U/L, and LDH (ekta) was 498 U/L.

His chest radiograph showed a left pleural effusion (Fig 1). No parenchymal infiltrate was visualized. A left lateral decubitus radiograph was obtained and showed that the patient had free-flowing fluid on the left side. No infiltrate was seen on the decubitus radiograph.

**Hospital Course**

At the time of hospital admission, the patient had a left thoracentesis performed. Total fluid analysis showed that the fluid was straw color and revealed a total protein level of 53 g/L (5.3 g/dl), LDH of 459 U/L, amylase <30 U/L, and WBC count of 2.0 X 10⁹/L (2,000/mm³). The differential cell count on the WBC count was 0.95 (95 percent) lymphocytes and 0.05 (5 percent) polymorphonuclear leukocytes. The pH was 7.43 and RBCs measured 100 X 10⁶ (100/mm³). The fluid was consistent with an exudative fluid. Cytologic study of pleural fluid showed no malignant cells.

The PPD skin test was negative and the control was positive. Blood cultures were negative. Sputum Gram stain showed that the patient had 4+ WBC, 2+ Gram-positive rods, 2+ Gram-positive cocci in pairs, and 1+ Gram-negative diplococci. Sputum culture grew *Haemophilus parainfluenzae* and *Moraxella catarrhalis*. Sputum for acid-fast bacteria was negative. Pleural biopsy specimen showed only chronic inflammation. A CT scan of the chest showed that the patient had a left pleural effusion, a fluid collection in the major fissure, and parenchymal changes consistent with an infiltrative process in the left lower lung base. There was no evidence of pulmonary nodules or masses. The CT scan showed multiple mediastinal lymph nodes, all <1 cm. The patient underwent bronchoscopy; no endobronchial lesion was seen and washings from the left lower segment showed that the patient had sulfur granules present. These contained filamentous non-acid-fast, Gram-positive organisms on Gram stain. These could be differentiated from the broad hyphae of empyeuma and the cocci without filaments of botryomycosis. Culture of bronchial fluid was positive and a diagnosis of actinomycosis was made. The patient was empirically treated with penicillin. After 4 days of penicillin treatment, the patient had a decrease in sputum production. His shortness of breath improved and sputum, which was initially green, became white. A Hickman catheter was placed and the patient was discharged from the hospital on a home intravenous antibiotic regimen of penicillin with 4 million U every 6 h for a 4-week period as is usually recommended and will be continued on a regimen of oral penicillin later.

**Discussion**

Agents of actinomycosis are commensals in the mouth or gastrointestinal tract. The portal of entry is usually a break in the integrity of the mucosa or pulmonary aspiration. Poor dental hygiene predisposes to cervical facial lesions. The infection spreads by direct extension and by hematogenous spread with resulting chronic draining sinuses. Cough and purulent sputum are common presentations with early development of tumor-like masses in the bases of the lungs. Thickening of the pleura with or without diffusion also occurs. Pulmonary actinomycosis is characterized by pulmonary consolidation, frequently with cavititation, and spreads to contiguous tissues without regard for normal anatomic barriers. The appearance is often confused with that of bronchogenic carcinoma or other granulomatous infections such as tuberculosis or pulmonary nocardiosis. Other diseases to be considered in differential diagnosis include botryomycosis, blastomycosis, histoplasmosis, coccidioidomycosis, cryptococcosis, and geotrichosis. Most of these can be separated by geographic localization or appearance of the organism on staining.

Massive hemoptysis, secondary to thoracic actinomycosis, is a rare complication.² Pulmonary actinomycosis complicated by pericarditis has been reported by O'Sullivan et al³ and by us in an earlier publication.⁴ A review of 19 cases of actinomycosis involving the pericardium was reported by Fife and coworkers⁵ and they describe risk factors as including aspiration pneumonia, alcohol abuse, and periodontal disease. Many such cases required histologic examination of material obtained by biopsy, since cultures were frequently negative and sulfur granules were only infrequently present.

Ariel et al⁶ described several cases of endobronchial actinomycosis simulating bronchogenic carcinoma. The diagnosis was made by bronchial biopsy specimen or bronchial washings.

Severo et al⁷ described cases of actinomycotic intracavitary lung colonization and indicated that there were a number of similarities between this condition and formation of fungus balls—most of these cases occurring in diabetic patients.

Klapholz et al⁸ described a case of pulmonary actinomycosis in a patient with underlying HIV infection. The diagnosis was made on histologic examination of a transbronchial biopsy specimen with the finding of granules.

Jensen et al⁹ described nine cases of thoracic actinomycosis during a 21-year period from 1966 to 1987. Three of the patients presented with a clinical picture of empyema.
and none had their conditions diagnosed preoperatively. The final diagnosis was based on direct microscopy or histologic examination of resected tissue.

George et al19 indicated that granulomatous pleuritis comprised approximately 10 percent of pleural effusions and that a differential between mycobacteria, fungi, and nocardia was usually required for differentiation. They emphasized the value of pleural biopsy and serologic techniques.

In the case we are presenting, the patient had a productive cough and shortness of breath with subsequent finding of a pleural effusion. While the effusion was clearly an exudate, no organism was isolated from pleural fluid by smear or culture and pleural biopsy specimens were non-specific. Bronchoscopy subsequently demonstrated the presence of sulfur granules and demonstration of the organism on Gram stain. Culture was subsequently positive. No granules were seen in the oral cavity and there was no evidence of contamination as a source.

This case is unique in that the patient had been ill for many weeks with only pleural effusion and no formation of the expected sinuses or abscesses that are usually noted by this time in the course of actinomycosis involving the chest. Symptoms resolved quickly following institution of penicillin therapy. The purulent sputum also cleared with the penicillin therapy.

Recommended therapy includes penicillin G, 10 to 20 million U/d intravenously for 4 to 6 weeks, followed by penicillin V, 2 to 4 g/d orally for 6 to 12 months, or ampicillin, 50 mg/kg/d intravenously for 4 to 6 weeks, then 0.5 g of amoxicillin orally three times a day for 6 months.

References

Video-Assisted Thoracic Surgery for Delayed Pericardial Effusion Post-CABG*

John P. Hurley, M.D.;! Konda Subarreddy, M.D.; Jim McCarthy, M.D.; and Alfred E. Wood, M.D.

Delayed-onset pericardial effusion following coronary artery bypass grafts can give rise to significant morbidity in its presentation and in its management by traditional surgical techniques. A video-assisted thoracoscopic technique to create a pericardial window, with the advantage of a minimally invasive approach combined with excellent visualization in such a patient is described. (Chest 1994; 106:1617-19)

CABG=coronary artery bypass graft; LIMA=left internal mammary artery; VATS=video-assisted thoracic surgery

Thoracoscopy was initially developed as a diagnostic tool for intrathoracic disease; however, recent technical advances in video camera technology have led to a resurgence of interest in thoracoscopy for both diagnostic and therapeutic uses. Video-assisted thoracic surgery (VATS) allows intrathoracic operations to be performed without formal thoracotomy.1 It allows visualization and assessment of the pericardium. While surgical approaches to drainage of pericardial effusions have been described since 1829,2 the ideal surgical management of pericardial effusions remains controversial in both approach and extent of resection. VATS may become another technique to deal with this condition of diverse etiology.3

Case Report

A 58-year-old man was admitted to the hospital with unstable angina. He was a nonsmoker but had a strong family history of coronary artery disease and a moderately raised cholesterol level. Coronary angiography demonstrated significant three-vessel coronary artery disease with minor dyskinesia of the inferior surface and the anterior free wall of the left ventricle. The patient was referred for coronary artery bypass graft (CABG) surgery.

At operation the left internal mammary artery (LIMA) was harvested and both pleura were opened. The patient had a saphenous vein graft placed to the posterior descending branch of the right coronary artery and another to the first marginal branch of the circumflex system. The LIMA was used to bypass the critical proximal lesion in the left anterior descending artery. The pericardium, which had been opened through a vertical midline pericardiectomy, was not closed prior to closure of the sternum. Three chest drains were used, one in the pericardium and one in each of the pleural cavities.

Postoperatively, the patient did well, remaining 1 day in intensive care; his chest drains were removed on the first postop-

*From the Department of Cardiothoracic Surgery, Mater Hospital, Dublin, Ireland.
†Currently at Dept. of Thoracic and Cardiovascular Surgery, The Cleveland Clinic Foundation.
Reprint requests: Dr. Hurley, Department of Thoracic and Cardiovascular Surgery (Desk F25), The Cleveland Clinic Foundation, 4500 Euclid Avenue, Cleveland, OH 44195

CHEST / 106 / 5 / NOVEMBER, 1994 1617