EDITORIALS

Pulmonary Mucormycosis: One Hundred Years Later

In the 100 years since pulmonary mucormycosis was first described, only six of approximately 70 reported patients with localized pulmonary involvement have survived. The most recent successfully treated case, reported in this issue of Chest (see page 92) serves as a timely and encouraging reminder that this, as well as other invasive fungal infections need not be fatal. Since mystery and misunderstanding still surround mucormycosis, the answers to the following questions should help clarify the present state of affairs.

Who is at risk for infection? Although the specific mechanisms of host resistance to mucormycosis have not been clearly elucidated, experimental and clinical observations have suggested multiple predisposing factors including: acidosis, diabetes, corticosteroid, cytotoxic, and antibiotic therapy, leukopenia, and depressed phagocytosis. The persistence of an uncontrolled underlying disorder, however, is probably the most important single predisposing cause. Thus, over 75 percent of patients with pulmonary mucormycosis have had leukemia or lymphoma. The remainder have suffered from diabetes (sometimes very mild), solid tumors, various chronic systemic disorders, and non-neoplastic diseases treated with immunosuppressive agents. Particularly unsettling is the occurrence of at least two fatal cases of pulmonary mucormycosis in healthy individuals.

When should pulmonary mucormycosis be suspected? The typical clinical setting consists of an immunologically compromised patient with “persistent fever and a progressive pulmonary infiltrate” for which no etiologic agent has been demonstrated and which remains unresponsive to antibacterial therapy. Unfortunately, this syndrome is characteristic of infection caused by other opportunistic pathogens (especially Aspergillus). Some patients may be afebrile. Although not specific for mucormycosis, signs and symptoms of pulmonary infarction are common because the organism has a curious propensity for vascular invasion and thrombosis. Indeed, in this clinical setting, pulmonary arteriography has been suggested as a possible diagnostic aid. Catastrophic hemoptysis may occur. Invasive aspergillosis and P aeruginosa infection, however, may also cause pulmonary infarction. Chest roentgenographic patterns are not helpful in suggesting mucormycosis because a variety of nonspecific abnormalities (single or multiple infiltrates, coin lesions, cavities, pleural effusions, fungus balls) may be observed. As with pulmonary aspergillosis, the chest film may even be normal. Routine laboratory tests provide little diagnostic information, and a positive sputum culture is remarkably rare. One might, then, reasonably simplify the answer to this question by stating that when any compromised patient develops a pulmonary lesion, mucormycosis should be suspected.

How is the diagnosis made? Recently, it has been appropriately emphasized that negative cultures are the rule with pulmonary mucormycosis. This experience has been almost universal even using histologically-positive postmortem specimens. Nevertheless, every attempt should be made to culture the organism from blood, sputum, pleural fluid, and biopsy material even though the chance of success is small. Definitive diagnosis is made by the demonstration of characteristic hyphae in lung tissue which requires one of several readily-available invasive biopsy procedures. There are few patients who are so ill that they cannot tolerate one of these procedures. Although the Mucoraceae may occasionally be cultured from the sputum of normal individuals, a positive culture in high-risk patients is sufficiently unusual and ominous that therapy should be initiated immediately while pursuing more definite evidence of infection. Unfortunately, postmortem examination still remains the principal method of diagnosis.

What treatment is available? Because diagnosis during life is exceptional, therapeutic experience is limited. Although in vitro sensitivities are variable, amphotericin B remains the drug of choice. The ability of this drug to penetrate infarcted lung tissue, however, has been questioned. 5-fluorocytosine does not appear to be effective. Surgical intervention, with or without prior administration of
amphotericin B, has eradicated and cured localized, nonpulmonary infections, and it is not surprising that five of the seven survivors of pulmonary mu
cormycosis underwent lobectomy or segmental re-
sction. Four of the five were diabetic; the fifth had chronic lymphocytic leukemia (CLL) and also re-
ceived amphotericin B therapy. It is therapeutically encourage-
ting that the other survivors, one with agammaglobulinemia and the other with CLL (see page 92), responded to amphotericin B alone. The decision whether to continue treating the underly-
ing disease with aggressive immunosuppressive-
cytotoxic therapy or to withdraw these agents in the face of an invasive fungal infection is difficult and has not been resolved. It would appear likely, however, that if the lesion cannot be surgically re-
sected, cure of pulmonary infection in patients with leukemia and lymphoma is not possible until re-
mission of the disease is achieved and maintained.

Why are there so few survivors? Mucormycosis is uncommon and the diagnosis is not usually seri-
ously considered until late in the disease. The very low yield of routine cultures and the reluctance either to initiate amphotericin B empirically or to subject patients to invasive diagnostic procedures delay diagnosis and therapy, thus allowing infection to progress to an irreversible stage. If multiple, pulmonary lesions are not amenable to resection, any abrupt clinical deterioration may preclude surgery. Furthermore, many patients with pulmo-

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