Granulomatous *Pneumocystis carinii* Myositis Presenting as an Intramuscular Mass

*Pneumocystis carinii* pneumonia (PCP) is the most common opportunistic infection in patients with AIDS, whereas extrapulmonary *P. carinii* infection remains a relatively unusual occurrence [1–4]. When extrapulmonary infection does occur, the organisms are most commonly seen in the liver, lymph nodes, spleen, and bone marrow; less frequently, the pleurae, kidneys, adrenal glands, gastrointestinal tract, thymus, heart, pancreas, thyroid, eye, middle ear, brain, pituitary, parathyroid glands, and skin are involved [1–7]. We report what we believe to be the first case in which *P. carinii* infection presented in an intramuscular site in a patient with AIDS.

A 30-year-old homosexual man presented with a history of HIV infection and severe molluscum contagiosum; his CD4 lymphocyte count was 49/mm$^3$. Treatment with zidovudine (500 mg/d) and aerosolized pentamidine (as prophylaxis for PCP pneumonia) were initiated. One year later, he reported loss of vision, photophobia, and eye irritation. The results of ophthalmoscopic examination were normal, and his sputum was negative for *P. carinii,* and the immunoperoxidase reaction for CMV was negative as well.

Although originally seen as a pulmonary pathogen, *P. carinii* infection is being recovered with increasing frequency from extrapulmonary sites in patients with AIDS [1–7]. In many of these cases, there has been no concomitant pulmonary involvement [1–4, 6]. The findings on chest roentgenograms and sputum examinations were normal for our patient, and no further evidence of *P. carinii* infection developed during the last 1.5 years of his life; these circumstances mitigate against additional sites of involvement in our patient.

Extrapulmonary *P. carinii* infection presents histopathologically as a foamy, eosinophilic exudate, occasionally with a granulomatous component, with cysts identified in appropriate stains; this pathology is similar to that of PCP pneumonia [1, 2, 4–8]. In our case this pathology was present, in a previously unreported site. In light of this finding, *P. carinii* myositis should be considered

Figure 1. A foamy, eosinophilic exudate in the thigh muscle of a patient with *Pneumocystis carinii* myositis and HIV infection separates proliferating capillaries with surrounding granulomatous inflammation. Rare residual skeletal muscle fibers (arrowheads), including some with reactive changes, are present (stain, hematoxylin–eosin). Inset: *P. carinii* cysts (arrowheads) are seen within the exudate (stain, Gomori’s methenamine silver; bar in figure = 75 μm; bar in inset = 25 μm).
in the differential diagnosis of granulomatous myositis or painful intramuscular swelling in a patient with AIDS.

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**References**


**Diffuse Pneumonia Associated with Infectious Mononucleosis: Detection of Epstein-Barr Virus in Lung Tissue by In Situ Hybridization**

In adults pulmonary involvement during acute infectious mononucleosis is rare, and the primary cause of pneumonitis is not always clear. A 34-year-old man presented with a 2-week history of fever, sore throat, and malaise. He had had a dry cough with breathlessness during physical exertion in the second week of his illness, and amoxicillin was prescribed by his family doctor; after this therapy was started, a macular rash developed across the upper trunk. The patient was febrile and had widespread lymphadenopathy, exudative tonsillitis, and a palpable spleen. Oxygen saturation while the patient was breathing room air was only 93%. A chest radiograph revealed airspace shadowing in both lower zones. Laboratory studies disclosed the following values: hemoglobin, 14.3 g/dL; leukocytes, 6,800/mm$^3$ (72% lymphocytes, most of which were atypical on examination of a smear); alkaline phosphatase, 194 U/L; and aspartate aminotransferase, 188 U/L. A Paul-Bunnell test for heterophil antibodies was positive.

Five days later a chest radiograph demonstrated denser consolidation at the left base, and the patient underwent bronchoscopy and transbronchial biopsy. The bronchoalveolar lavage fluid was negative for an extensive range of respiratory pathogens. Histologic examination of a biopsy specimen revealed thickening of the pulmonary interstitium and a marked increase in activated CD45$^+$ lymphocytes in interstitial tissue. Four weeks after presentation, the patient’s respiratory symptoms abated completely, and by 3 months after presentation, a chest radiograph did not reveal any abnormalities. Acute infection with Epstein-Barr virus (EBV) was confirmed by the following results of serological tests: IgM to EBV capsid antigen, positive; IgG to EBV capsid antigen, positive (1:320); IgG to EBV early antigen, positive (1:40); and antibodies to EBV nuclear antigen, negative. Serological tests for other respiratory pathogens were negative.

In situ hybridization was performed on tissue sections obtained during the transbronchial biopsy. Riboprobes were generated with the EBER-1 (EBV-encoded small RNAs) fragment of the EBV sequence [1], which was kindly donated by Dr. Richard F. Ambinder (Johns Hopkins Hospital, Baltimore), and hybridization was performed as previously described [2, 3]. The specificity of in situ hybridization with these probes has been established. EBV-positive cells were detected in the pulmonary interstitium; the morphological origin of these cells was the lymphoid system (figure 1).

To our knowledge, this is the first case demonstrating that EBV-infected lymphocytes can infiltrate the lung during acute infectious mononucleosis and lead to pneumonic illness. Previous surveys showed that interstitial lung involvement during adult infectious mononucleosis is rare [4]. Moreover, in these older studies, the exact cause of any such lung involvement was unknown [5]. In children pulmonary infiltrates associated with infectious mononucleosis are much more common [6]. A few cases of pneumonitis associated with infectious mononucleosis have been described in patients treated with aerosolized pentamidine prophylaxis [7].

**Figure 1.** Tissue section from a patient with diffuse pneumonia associated with infectious mononucleosis that was obtained during a transbronchial biopsy. The tissue section was hybridized with the EBER-1 (Epstein-Barr virus [EBV]-encoded small RNAs) probe. Dark cells contain DNA from EBV (bar = 25 μm).