

Typical Symptoms and Atypical Radiographic Findings in a Case of Chronic Eosinophilic Pneumonia

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Introduction

Chronic eosinophilic pneumonia is an idiopathic process marked by eosinophil infiltration of the lungs, which usually occurs in association with peripheral eosinophilia. The radiographic pattern typically seen in this disorder is bilateral peripheral infiltrates with hilar sparing, and it has been described as the “radiographic negative of pulmonary edema.” We describe the case of a 41-year-old woman who presented with typical symptoms and laboratory features of the disease, but a highly atypical radiographic pattern, marked by dense unilateral consolidation and shift of the mediastinal structures to the affected side.

Case Report

In December 2002, a 41-year-old woman with a childhood history of asthma presented to the emergency department with dyspnea. She was diagnosed with asthma and discharged with a prescription for steroids and antibiotics. Her symptoms did not improve, and 2 months later she presented to her primary-care provider, complaining of dyspnea, fevers, chills, and night sweats. A complete blood count obtained at that time showed a total white-blood-cell count of 17.9×10^9 cells/L, with 39% eosinophils. A thorough work-up did not reveal the etiology of the eosinophilia. A chest computed tomogram (CT) performed as part of this work-up showed evidence of bilateral, multifocal consolidation, in a peripheral distribution. A pulmonary consultation was obtained and, based on the peripheral eosinophilia and CT findings, the diagnosis was chronic eosinophilic pneumonia. Bronchoscopy was not performed. She was started on prednisone, 60 mg/d. Her

symptoms improved rapidly, and over 6 months the prednisone dose was tapered to 20 mg/d. After 1 year on that dose, she was slowly titrated off the medication by a new pulmonologist. One month after completing that therapy she returned to her physician, reporting intermittent episodes of shortness of breath and wheezing. Pulmonary function testing revealed an obstructive pattern and a bronchodilator response, so it was thought that she had underlying asthma. Fluticasone/salmeterol and albuterol metered-dose inhalers were initiated, with mild improvement in her symptoms.

Three months later she again presented to her primary-care provider, complaining of increasing dyspnea and progressive fatigue, 9-kg weight loss, fevers to 38.9°C, and night sweats. A complete blood count was performed, revealing a total white-blood-cell count of 15×10^9 cells/L, with 16% eosinophils. A chest radiograph revealed dense consolidation of the right hemithorax, with shift of the trachea and mediastinal structures to the right (Fig. 1). A follow-up chest CT showed extensive, dense interstitial and alveolar opacities of the right lung, with marked volume loss and shift of the mediastinal structures to the right (Fig. 2). Multifocal, peripheral opacities were also noted in the left lung, as well as multiple contrast-enhanced mediastinal lymph nodes in the right paratracheal, pre-carinal, sub-carinal, and hilar regions.

The patient was then referred to the pulmonary clinic. On presentation she noted the presence of cough productive of clear sputum, dyspnea from ascending one flight of stairs, myalgias, and sinus congestion with rhinorrhea. Her medications at that time included fluticasone/salmeterol, albuterol metered-dose inhaler, and fluticasone nasal spray. She was a former smoker, having quit 10 years prior, following a 20-pack-year history. She did not consume alcohol or use illicit drugs. Her most recent travel had been an 18-month-long trip to Arizona, 5 years prior to her current presentation. She was living in an apartment with her daughter, where she did not have any pets or exposure to farm animals. The remainder of her medical, social, and family history was unremarkable.

On physical examination, she was afebrile and had a room-air oxygen saturation of 94%. She was cachectic and

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Fig. 1. Posterior-anterior chest radiograph obtained at presentation to the pulmonary clinic. There is dense consolidation of the right lung and rightward shift of the trachea, heart, and other mediastinal structures.



Fig. 2. Single slice from the contrast chest computed tomogram performed to follow up the abnormal chest radiograph. There are dense areas of consolidation on the right, and smaller, peripheral opacities on the left.

had crackles throughout the right upper and lower lung zones. No lymphadenopathy or clubbing was present, and the remainder of her examination was unremarkable. Her total white-blood-cell count was 15.9×10^9 cells/L, with 24% eosinophils. The basic chemistry panel and liver panel were within normal limits. Arterial-blood-gas analysis showed a pH of 7.44, P_{aCO_2} of 37 mm Hg, P_{aO_2} of 69 mm Hg, and bicarbonate of 25 mg/dL. Stool examination for

ova and parasites was negative. *Aspergillus*, *strongyloides*, and *coccidioides* serologies were negative, as were P- and C-antineutrophil cytoplasmic antibodies. Immunoglobulin E level was within normal range (38 U/mL). Rheumatoid factor was mildly elevated (29 IU/mL).

Because bronchoscopy had not been performed at the time of her initial diagnosis, and because of the atypical pattern on her chest radiograph and CT, a decision was made to proceed with bronchoscopy. No abnormalities were noted on gross inspection, but the procedure had to be terminated at the conclusion of the bronchoalveolar lavage due to marked oxygen desaturation. The lavage fluid contained 675,000 white blood cells/mL, with a differential of 47% eosinophils, 22% polymorphonuclear leukocytes, and 18% lymphocytes. All the microbiology studies were negative, including bacterial and fungal cultures, acid-fast bacilli stain and culture, silver stain for pneumocystis, and *coccidioides immitis* cultures.

Based on the high percentage of eosinophils in the bronchoalveolar lavage fluid (BALF), a diagnosis of chronic eosinophilic pneumonia was made. The patient was started on prednisone, 60 mg/d, and, within 2 weeks she had improvement in her dyspnea and exercise tolerance, weight gain, and resolution of the night sweats and fevers. Repeat chest radiograph obtained 2 weeks after initiating steroid therapy revealed near-resolution of her right-sided lung infiltrates, but continued evidence of volume loss on the right (Fig. 3). After 4 months of therapy her chest radiograph showed that the volume loss had resolved, and spirometry revealed normalization of her forced vital capacity. Her prednisone dose was successfully tapered down over a period of months, with a plan to complete a 1-year course of therapy.

Discussion

Chronic eosinophilic pneumonia is an idiopathic disease marked by eosinophilic infiltration of the lungs, and the disease has been well characterized in several large case series.¹⁻³ More common in women than in men, it usually develops after the 4th decade of life, although cases have been described in patients between 15 and 80 years of age.²⁻⁴ Though many patients are healthy prior to disease onset, 50–62% of patients have preexisting asthma or atopy, with symptoms of these diseases being present from 3 months to 348 months before the onset of chronic eosinophilic pneumonia.^{2,3} Cases have also occurred in association with such diverse entities as rheumatoid arthritis,⁵ radiation therapy for breast cancer,⁶ and visceral larva migrans.⁷

The disease is insidious, and patients often have a long delay between symptom onset and diagnosis.¹⁻³ Cough is the most common symptom (present in up to 93% of cases), along with fever (77–87%), dyspnea (57–92%), weight



Fig. 3. Posterior-anterior chest radiograph obtained 2 weeks after the initiation of oral prednisone therapy. There is substantial improvement of the right-sided opacities seen on the initial chest radiograph (Fig. 1).

loss (57–75%), and night sweats (23%). Other symptoms, such as malaise, anorexia, chills, and chest pain are not as frequent as those noted above.^{2,3}

The most common laboratory abnormality is an elevated eosinophil count. Jelderlinic et al² reported that peripheral eosinophilia of $> 6\%$ was seen in 88% of cases, whereas Marchand et al³ reported total eosinophil counts $> 1.0 \times 10^9/L$ in 95.2% of patients. Other nonspecific laboratory abnormalities may include elevated platelet count,⁸ erythrocyte-sedimentation rate,^{2,4} serum immunoglobulin,⁴ rheumatoid factor, and circulating immune complexes.⁹ The most common abnormalities identified with pulmonary function testing include elevated alveolar-arterial oxygen difference and decreased diffusing capacity for carbon monoxide.² In mild cases, spirometry and lung volumes may be normal, but in more severe cases there are restrictive or obstructive defects.^{1–3}

A diagnosis of chronic eosinophilic pneumonia can usually be made on the basis of presenting symptoms, peripheral eosinophilia, and characteristic radiographic findings. Bronchoscopy and lung biopsy are often not required. If bronchoscopy is performed, the BALF will have an elevated eosinophil count. Marchand et al³ reported that eosinophils represented more than 40% of the BALF white-blood-cell differential in 81% of cases, whereas Matsuse et al¹⁰ reported a mean BALF eosinophil percentage of 37% in 43 cases of the disease. Pathology specimens typically

reveal interstitial and alveolar infiltrates containing predominantly eosinophils and histiocytes.^{2,3}

Corticosteroids are the mainstay of treatment. Patients are typically started on 60 mg/d of prednisone, although some reports document dose ranges of 0.3–3.0 mg/kg/d.³ Inhaled corticosteroids are not effective as monotherapy.¹¹ Response to therapy is usually noted within 1–2 weeks, but therapy must be continued for a long period, as relapse is common when corticosteroid therapy is discontinued or the dose is tapered.^{3,4} Death is an uncommon, but reported, outcome.¹

Though our patient's presentation was marked by many of the classic features of chronic eosinophilic pneumonia, the radiographic presentation was markedly different than the "classical" pattern commonly referred to in the literature. In their initial case series, Carrington et al¹ described the radiologic pattern of chronic eosinophilic pneumonia as the "photographic negative of pulmonary edema." Subsequent reports in the literature have continued to emphasize the bilateral and peripheral nature of the infiltrates. Gaensler and Carrington¹² found that 16 of 21 patients diagnosed with chronic eosinophilic pneumonia in one series had "typical" peripheral opacities, whereas their review of published chest radiographs from 81 patients with the disease found bilateral peripheral infiltrates in 65% of the cases. Matsuse et al¹⁰ reported bilateral infiltrates in 81% of the 43 patients in their series; 51% of their patients had infiltrates that were predominantly peripheral, and 34% were characterized as being the "photographic negative of pulmonary edema." These patterns, however, are not a constant feature of chronic eosinophilic pneumonia. Jelderlinic et al² found that only 25% of the 118 cases they reviewed demonstrated the "photographic negative" pattern on chest radiograph, and only 63% of patients had peripheral opacities. Studies of CT findings in chronic eosinophilic pneumonia have yielded findings similar to those that have focused on plain radiographs.¹³ Of note, even if peripheral consolidation is not seen on plain radiographs, it is often present on CT.¹³

Our patient's case is noteworthy for the atypical radiographic presentation. The plain radiograph showed dense consolidation of the right lung and near opacification of two thirds of the right chest. Although the left lung did not appear to be involved on plain radiographs, small left-sided infiltrates were present on the chest CT. Both the plain radiograph and the CT also revealed evidence of extensive volume loss on the right, with rightward shift of the trachea, heart, and other mediastinal structures. Follow-up chest radiograph performed 4 months after initiating therapy showed resolution of the findings related to the volume loss.

Other atypical radiographic patterns include cavitation,¹⁴ pleural effusions,^{3,8} nodular infiltrates, and atelectasis.² Our case, as well as these other reports, provide a useful re-

minder that in the presence of eosinophilia and characteristic symptoms, an atypical radiographic pattern should not dissuade the clinician from considering chronic eosinophilic pneumonia as part of the differential diagnosis.

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