

A Case of Eosinophilic Pneumonia in a Tobacco Harvester

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ABSTRACT

Background: Eosinophilic pneumonia comprises a group of lung diseases in which eosinophils appear in increased numbers in the lungs. The distinct etiology of eosinophilic pneumonia is unknown, although the previous case series have indicated a relationship between acute eosinophilic pneumonia and the exposure to exogenous substances including the constituents of cigarettes.

Case Summary: A 60-year-old nonsmoking female, who had started to harvest and sort tobacco leaves two months before presentation, was admitted because of persistent coughing, breathlessness, and general malaise. Her laboratory findings revealed eosinophilia. Chest computed tomography showed nonsegmental airspace consolidations bilaterally. A bronchoalveolar lavage fluid analysis also revealed that the numbers of total cells and eosinophils had increased. Although the urine level of cotinine was within the normal range, positive findings were found in the skin scratch-patch tests using tobacco leaf and its extracts, and a biopsy specimen obtained from the positive site demonstrated infiltration of eosinophils in the dermis. The patient was successfully treated with corticosteroids.

Discussion: Green tobacco sickness, a type of nicotine poisoning caused by the dermal absorption of nicotine, is a well known occupational illness of tobacco harvesters. Although it is unclear whether the present case could be identified as a subtype of green tobacco sickness, this is the first report of eosinophilic pneumonia occurred in a tobacco harvester which was possibly induced by tobacco leaf exposure.

KEY WORDS

cotinine, eosinophilic pneumonia, green tobacco sickness, scratch-patch test, tobacco leaf

INTRODUCTION

Eosinophilic lung diseases are a diverse group of pulmonary disorders in association with an increase in circulating or tissue eosinophils.¹ The distinct etiologies of both acute and chronic eosinophilic pneumonia are unknown, although several studies have proposed a causal relationship between cigarette smoking and acute eosinophilic pneumonia.^{2,4} However, eosinophilic pneumonia due to the exposure to tobacco leaves has not been reported previously. We herein describe a rare case of eosinophilic pneumonia probably caused by exposure during the harvesting and sorting of tobacco leaves.

CLINICAL SUMMARY

A 60-year-old nonsmoking female had started to work harvesting and sorting green tobacco leaves two months before presentation. She occasionally felt mild dizziness. In the tobacco field, she always wore waterproof gloves, but only sometimes wore a mask during the harvesting process. While she sorted the dried tobacco leaves indoors, she always wore work gloves, but never a mask. However, she did not wear water-resistant clothes through the entire work process. She had no history of smoking, passive smoking or dust inhalation, ingesting any drugs or alternative medicines, and she also had no history of any chest abnormal shadows on medical check-ups or other appreciable diseases, including allergic diseases. She

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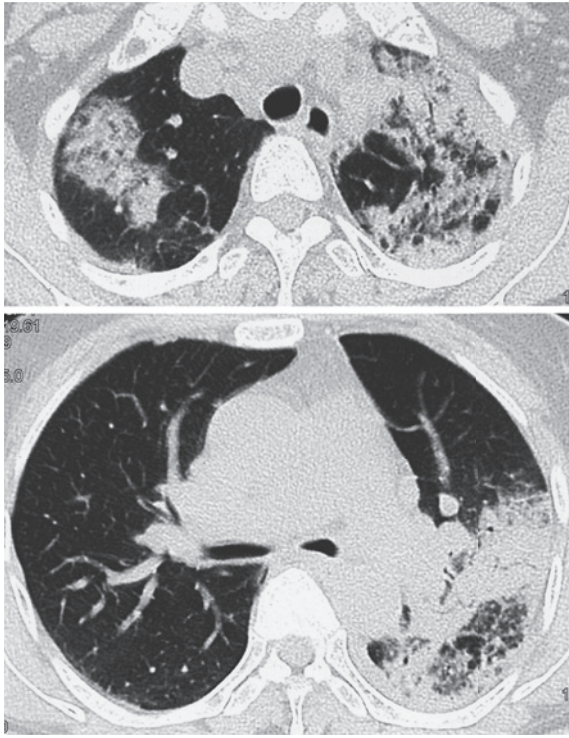


Fig. 1 Computed tomographic scans of the chest, showing areas of patchy nonsegmental airspace consolidation bilaterally.

visited another hospital because of a one month history of pyrexia, cough, breathlessness and general fatigue, and she was given a diagnosis of community acquired pneumonia according to the presence of pulmonary infiltrates. However, antimicrobial therapy did not improve her condition, so that she was referred to our hospital for further examination and treatment.

A physical examination on admission revealed a body temperature of 37.3°C and SpO₂ of 94%. Coarse crackles and rhonchi were bilaterally detected on chest auscultation. Laboratory findings revealed eosinophilia comprising 14.6% of the total peripheral white blood cell count (10,350/ μ L), and elevated serum levels of C-reactive protein (17.5 mg/dL), LDH (288 IU/mL), and IgE-RIST (821 IU/mL). Radioallergosorbent tests showed no specific allergy-related diseases. There were no positive serological or fecal findings of parasitic infection, and no clinical findings of systemic vasculitis, such as microhematuria, the presence of anti-neutrophil cytoplasmic autoantibodies, or cutaneous abnormality. Chest computed tomography showed patchy airspace consolidations bilaterally (Fig. 1). Bronchoalveolar lavage fluid obtained from the left upper lobe revealed a marked increase in the number of cells (17.2×10^5 /mL) with a high proportion of eosinophils (43.4%), lymphocytes (17.9%), and neutrophils (24.7%) without any evidence

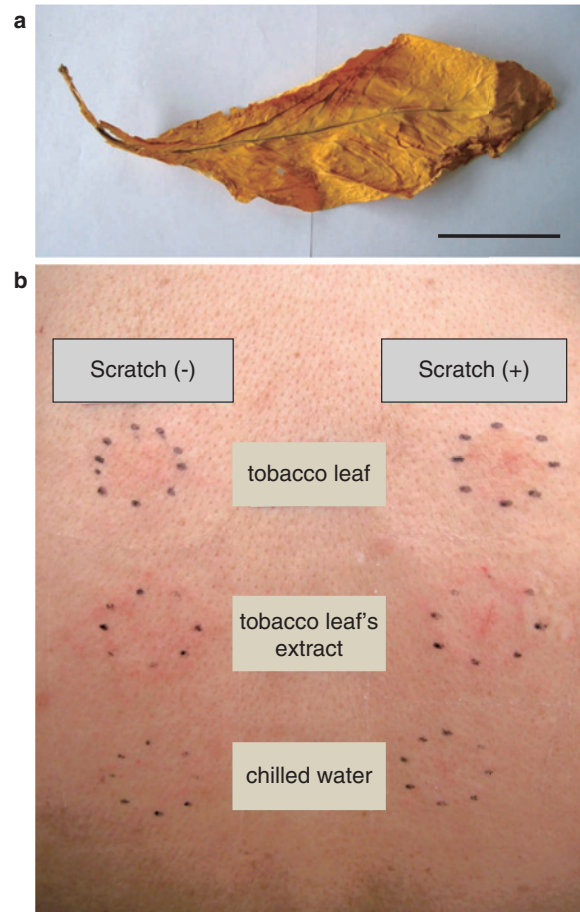


Fig. 2 (a) A tobacco leaf, harvested and sorted by the patient (scale bar: 10 cm). (b) The results of the patch test (left) and scratch-patch test (right) on the skin of the back, showing positive findings with flare reactions to the tobacco leaf and its extracts, but not to the control using chilled water.

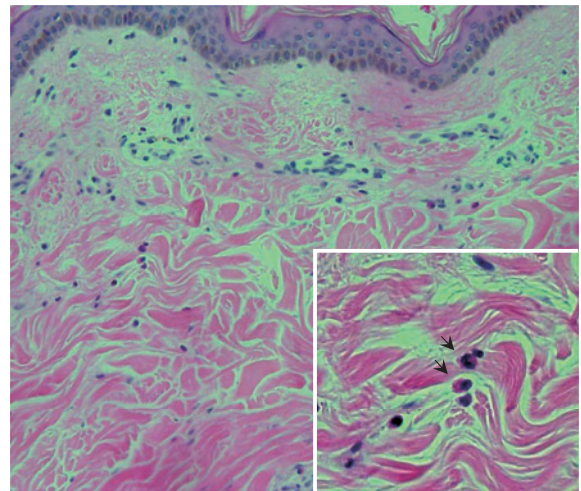


Fig. 3 A skin biopsy specimen obtained from the positive site of the scratch-patch test, showing infiltration of eosinophils (arrows) in the dermis [hematoxylin and eosin staining; original magnification $\times 200$ and $\times 400$ (insert)].

of bacterial pathogens.

Scratch-patch tests performed on her back skin using a dried tobacco leaf and the leaf's extracts were positive (Fig. 2). A biopsy specimen obtained from the positive site of the scratch-patch test demonstrated infiltration of eosinophils in the dermis (Fig. 3). These findings indicated that the diagnosis of this case was eosinophilic pneumonia due to the exposure to tobacco leaves, although her urine level of cotinine was within the normal range (0.017 µg/mL).

The patient stopped working and was subsequently treated with intravenous methylprednisolone at 1 g/day for three days followed by oral administration of prednisolone at 40 mg/day for three weeks. Based on the improvements of her symptoms and image findings, the prednisolone dosage was tapered and finally discontinued without a recurrence.

DISCUSSION

The previous case series suggest a strong association between starting smoking and the development of acute eosinophilic pneumonia, whereas there have been no previous reports of eosinophilic pneumonia that occurred in tobacco harvesters. Eosinophilic pneumonia is usually categorized as acute eosinophilic pneumonia and chronic eosinophilic pneumonia. An appropriate diagnosis for the present case may therefore be chronic eosinophilic pneumonia based on the relatively chronic onset during one month and the chest computed tomography findings of airspace consolidation without pleural effusion. In our patient, positive findings were observed in the skin scratch-patch tests using a tobacco leaf and its extracts. Suwaki *et al.* reported that a patch test for allergic contact dermatitis to cigarettes was positive in such patients, but was negative in all of 22 healthy volunteers.⁵ However, as there have been no data regarding the utility of patch tests for eosinophilic pneumonia, it is unknown whether the scratch-patch test we performed is a useful method for the diagnosis.

Green tobacco sickness (GTS) is a common occupational illness of tobacco harvesters.⁶ It is a type of nicotine poisoning caused by the dermal absorption of nicotine from the surface of wet and mature tobacco plants.⁷ Nicotine is a water-soluble alkaloid found in the leaves of the tobacco plant. The symptoms of GTS include headache, nausea, vomiting, dizziness, weakness, abdominal pain, shortness of breath and occasional fluctuations in either the blood pressure or heart rate.⁸ The illness is self-limiting and will resolve on its own within one to two days, but symptoms in some cases may be so severe as to require emergency medical treatment. Parikh *et al.*⁹ examined the acute and chronic health effects induced by green tobacco exposure in agricultural workers, and reported that the severity of illnesses depended on various factors, such as the strain or type of to-

bacco, humidity, and the type of work. Although there were descriptions about the presence of neither acute nor chronic eosinophilic pneumonia in their report, the present case may have been a variant of GTS, given the patient's work situation. The disease condition in this patient is thus considered to have been induced by exposure to tobacco leaves through both the airway and the skin, probably due to insufficient protection against the direct exposure to tobacco leaves.

Zielinska-Danch *et al.*¹⁰ have reported that cotinine, a metabolite of nicotine, is the most reliable and specific biomarker to determine the degree of exposure to cigarette smoke. In their report, the cut-off urine levels of cotinine were 0.05 µg/mL and 0.55 µg/mL, in order to separate nonsmokers, passive smokers, and current smokers. Although the patient had been away from the workplace for several days at the time of sample collection, the present case with a cotinine level of 0.017 µg/mL and she was thus classified as a nonsmoker. However, as there was a report¹¹ that salivary cotinine levels over the work season did not significantly increase in shade-tobacco workers when compared with nursery workers, the utility of the measurement of cotinine levels as an auxiliary method for diagnosing tobacco-related eosinophilic pneumonia should be evaluated in greater detail. In addition, Sulzberger *et al.*¹² reported that there were many positive patch tests to substances other than nicotine, and no definite reactions to the relatively toxic nicotine solution, in patients with occupational tobacco dermatitis. This indicates that the source of sensitization in eosinophilic pneumonia may not be only nicotine, the main pharmacological constituent of tobacco, but also other constituents.

In conclusion, we herein described a rare case of eosinophilic pneumonia in a tobacco harvester, which was likely caused by tobacco leaf exposure through the airway while the patient was harvesting and sorting the tobacco leaves. Clinicians should be aware of the possibility of eosinophilic pneumonia as an occupational illness of tobacco leaf harvesters.

CONFLICT OF INTEREST

The authors have reported to *Allergology International* that no potential conflicts of interest exist with any companies/organizations whose products or services may be discussed in this article.

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