Second Hypersensitivity Pneumonitis in the Same Patient Caused by Chinchillas

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Hypersensitivity pneumonitis (HP) is a common form of interstitial lung disease caused by an immunological reaction resulting from repeated exposure to 1 or more antigenic substances of organic or chemical origin in previously sensitized individuals. The identification of the causal agent is sometimes difficult, especially when no obvious occupational or domestic exposure can be identified. We report an unusual case of a second episode of HP in the same patient caused by exposure to chinchillas.

A 53-year-old dairy farmer with no relevant past medical history presented for the first time in December 2014 with chronic cough and dyspnea of several months' duration. Pulmonary function tests (PFT) revealed decreased lung transfer for carbon monoxide (Table), and high-resolution computed tomography showed bilateral ground-glass opacities, predominantly in the lower lobes, and air trapping on expiratory slices. Bronchoalveolar lavage showed lymphocytic alveolitis. Precipitating antibodies were positive for *Saccharopolyspora rectivirgula* (4 arcs) and *Thermoactinomyces vulgaris* (4 arcs). A diagnosis of farmer's lung disease (FLD) was made, and the patient was instructed to avoid exposure to the farm environment by using a mask. Clinical symptoms and PFT results improved, with no additional medication (Table).

Around 2 years later (May 2017), the patient presented again with recurrence of similar symptoms, including dyspnea, asthenia, and, sometimes, fever with interstitial changes on chest x-ray and a restrictive pattern (Table). A relapse of FLD was suspected. However, his respiratory condition worsened gradually till December 2017 despite total avoidance of the farm environment and prescription of corticosteroid therapy (60 mg/d). PFT showed an increase in the restrictive pattern and marked desaturation (Table). High-resolution computed tomography showed an increase in ground-glass opacities and subpleural reticulations (Supplementary Material online).

Meticulous history taking revealed that the patient had acquired a pheasant and 2 chinchillas in the summer of 2016. Specific precipitating antibodies were made from extracts of fur and droppings from the chinchillas (total extract) and from the pheasant. Tests were positive for the total extract made from the chinchilla fur and dropping extract (Supplementary Material online), as well as for *S rectivirgula* and *T vulgaris* (as before) and were negative for total extracts from the pheasant.

A diagnosis of HP caused by the chinchillas was suspected, the patient was hospitalized to ensure total avoidance, and corticosteroid therapy (60 mg/d) was continued during hospitalization and then tapered. This resulted in a significant improvement in the patient's symptoms. The chinchillas were removed from his home. No other changes were made to his environment.

Two months after discharge from hospital, in February 2018, we noted a significant improvement in clinical, functional, and radiological parameters (Table).

In this report, we present a case of HP caused by chinchillas in a patient with a medical history of FLD. The diagnosis of HP is

Table. Patient's Characteristics Over Time

	12/12/14	15/06/15	12/05/17	18/12/17	23/02/18
mMRC (0-4)	Grade II	0	Grade III	Grade IV	Grade II
Cough	+	–	+	+	–
FVC, L (%)	3.95 (92%)	4.38 (102%)	3.20 (75%)	2.15 (50%)	3.32 (78%)
TLC, L (%)	5.62 (83%)	6.42 (95%)	–	–	6.34 (94%)
FEV_1, L (%)	3.29 (94%)	3.47 (100%)	2.67 (78%)	1.89 (55%)	2.92 (86%)
TLCO, mL/min/mmHg (%)	19 (64%)	23 (76%)	–	16.6 (57%)	18.70 (65%)
6MWT: SpO_2 at rest/at end of exercise	–	99%/97%	96%/79%	96%/82%	94%/88%
Exposure	Confirmed farmer's lung disease	After using individual prevention measure (mask)	Exposure to chinchilla		Chinchilla avoidance

Abbreviations: FEV_1, forced expiratory volume in 1 second; FVC, forced vital capacity; mMRC, modified Medical Research Council; SpO_2, oxygen saturation; TLC, total lung capacity; TLCO, carbon monoxide diffusion capacity; 6MWT, 6-minute walk test.

based on the combination of the clinical and radiological features, context, and immunological features (positive precipitating antibodies to the total extract made from chinchilla fur and droppings) [1]. The diagnosis was confirmed by the improvement observed after avoidance of exposure to the chinchillas.

This case is unusual in that the patient experienced 2 different episodes of HP with distinct causes. Only 1 similar case with 2 episodes of HP has been reported [2]. The occurrence of a second episode might not be surprising, as HP is thought to develop in genetically predisposed patients. Caution regarding the antigenic source is therefore warranted in a patient in whom a relapse of HP is suspected.

Our main differential diagnosis was FLD, as persistence of specific positive precipitating antibodies for FLD could suggest sustained exposure to the farm environment. However, precipitins can persist for several years, even when exposure has ceased [3,4]. Furthermore, in the case we present, total avoidance of the farm environment and corticosteroid therapy were inefficient. Only specific avoidance of the chinchillas led to a significant improvement in symptoms and PFT results over time, even after returning home (Table), thus supporting the diagnosis of HP caused by the chinchillas. The patient was also exposed to a pheasant, another potential offending antigen [5]. However, this cause seems unlikely, as serum precipitins for the total pheasant extracts were negative.

The present case emphasizes the need for a comprehensive survey (environmental and immunological), which should be performed by an expert team including both physicians and microbiologists. Indeed, an inspection of the patient's environment with collection of different substrates helped to establish the diagnosis and to produce specific antigens, namely, specific antigens resulting from the culture of each fungal or bacterial species and total extracts obtained by means of phenolic extraction from complex substrates (chinchilla fur and droppings). To the best of our knowledge, this is the first report of HP caused by exposure to chinchilla. Chinchillas are a species of crepuscular rodent with dense fur that are sometimes kept as pets. Animal allergens are a common cause of both acute and chronic allergic disease. One previous case of skin allergy to chinchilla has been reported [6]. Exceptional cases of HP caused by exposure to fur or droppings from mammals have also been reported. Pimentel et al [7] reported a case of HP caused by inhalation of hair dust (furrier's lung) in a woman who had worked as a furrier. However, lung inflammation secondary to hair dust inhalation rather than sensitization to a specific antigen was the mechanism confirmed. As far as we know, HP related to pets has only been reported in children. Olesen et al [8] reported a case of HP caused by cat hair, with no identification of a causal antigen, and Buchvald et al [9] reported 19 cases, of whom 9 had experienced reactions due to inhalation to specific dog or cat antigens. In addition, a case of HP caused by rat serum, pelt, and urine was reported in laboratory workers in 1975 by Caroll et al [10].

We report for the first time a case of HP caused by exposure to chinchilla in a patient with a past history of FLD.

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

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