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Infection by *Chlamydophila avium* in an Elderly Couple Working in a Pet Shop

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Psittacosis infection is usually reported in adults aged around 30 to 60 years. We report here two cases of psittacosis in an elderly couple (76 and 77 years old) who jointly ran a pet shop. Psittacosis was diagnosed from a history of exposure to birds and from serological testing for *Chlamydophila avium*.

**CASE REPORTS**

**Case 1.** Case 1 was that of a 76-year-old Japanese man who owned a pet shop selling parrots, parakeets, and budgerigars. He was admitted to our hospital due to general malaise and fever without cough or sputum, with no past history of such symptoms. Physical examination revealed the following: height, 160 cm; weight, 45.5 kg; arterial blood pressure, 170/92 mmHg; heart rate, 90 beats/min; body temperature, 38.3°C. Coarse crepitations were not detected, and lymphadenopathy was not present. Laboratory findings showed a white blood cell count of 10.05 × 10⁹/liter (neutrophils, 90.8%; lymphocytes, 5.4%). Culture examination of sputum induced by 3% saline was negative. Blood culture examinations were likewise negative. Table 1 shows antibody titers against *Mycoplasma pneumoniae*, *Chlamydophila avium*, and *Chlamydophila pneumoniae*. Blood samples were submitted for examination of serum antibody titers to two Japanese commercial laboratories, SRL (Tokyo, Japan) and BML (Tokyo, Japan), and each serum antibody titer was measured. Complement fixation (CF) antibody titers against *C. avium* and *M. pneumoniae* were measured using a CF kit (Denka Seiken Co., Tokyo, Japan) according to the manufacturer’s instructions at SRL. Microimmunofluorescence (MIF) testing against *C. avium* and *C. pneumoniae* was performed by BML according to the manufacturer’s instructions (9). Enzyme-linked immunosorbent assay (ELISA) against *C. pneumoniae* was performed at SRL using a commercial kit (Hitachi Chemical Co., Tokyo, Japan) according to the manufacturer’s instructions. CF antibodies against *C. avium* were not found in serum from blood samples taken on admission but were present at a dilution of 1/16 in serum taken 14 days later. The serum titer detected by MIF rose more than 32-fold from <8 in 14 days. The *C. pneumoniae* antibody titer using ELISA rose from 0.31 to 1.18, but the titer according to MIF was not considered elevated at 64-fold. A chest X-ray revealed infiltration shadows in the left upper and right lower lung fields. Computed tomography showed air space consolidation and ground-glass attenuation in the left upper and right lower lungs (Fig. 1A). Liver dysfunction was identified as follows: glutamic oxalacetic transaminase, 243 IU/liter (normal, 0 to 42 IU/liter); glutamic pyruvic transaminase, 56 IU/liter (normal, 0 to 37 IU/liter); lactate dehydrogenase, 602 IU/liter (normal, 106 to 211 IU/liter). The patient did not consent to bronchofiberscopic examination. He was treated with intravenous minocycline and sulbactam-ampicillin until serological and bacteriological reports became available. His body temperature normalized within 72 h. On day 9, treatment was switched from intravenous to oral minocycline and sulbactam-ampicillin was discontinued. He was discharged 17 days after admission.

**Case 2.** Case 2 was that of a 77-year-old Japanese woman, the wife and coworker of the first patient, who was admitted to our hospital with fever 1 day after the first patient was admitted. She had no cough or sputum. The patient had a past history of hypertension. Physical examination revealed the following: height, 148 cm; weight, 45 kg; arterial blood pressure, 140/62 mmHg; heart rate, 130 beats/min; body temperature, 40.4°C. Coarse crepitations were not detected, and no lymphadenopathy was present. Laboratory findings showed a white blood cell count of 9.23 × 10⁹/liter (neutrophils, 83.6%; lymphocytes, 15.8%). Culture examination of sputum induced by 3% saline was negative. Blood culture examinations were likewise negative. Table 1 shows antibody titers against *M. pneumoniae*, *C. avium*, and *C. pneumoniae*. Blood samples were submitted for examination of serum antibody titers to two Japanese commercial laboratories, SRL (Tokyo, Japan) and BML (Tokyo, Japan), and each serum antibody titer was measured. Complement fixation (CF) antibody titers against *C. avium* and *M. pneumoniae* were measured using a CF kit (Denka Seiken Co., Tokyo, Japan) according to the manufacturer’s instructions at SRL. Microimmunofluorescence (MIF) testing against *C. avium* and *C. pneumoniae* was performed by BML according to the manufacturer’s instructions (9). Enzyme-linked immunosorbent assay (ELISA) against *C. pneumoniae* was performed at SRL using a commercial kit (Hitachi Chemical Co., Tokyo, Japan) according to the manufacturer’s instructions. CF antibodies against *C. avium* were not found in serum from blood samples taken on admission but were present at a dilution of 1/16 in serum taken 14 days later. The serum titer detected by MIF rose more than 32-fold from <8 in 14 days. The *C. pneumoniae* antibody titer using ELISA rose from 0.31 to 1.18, but the titer according to MIF was not considered elevated at 64-fold. A chest X-ray revealed infiltration shadows in the left upper and right lower lung fields. Computed tomography showed air space consolidation and ground-glass attenuation in the left upper and right lower lungs (Fig. 1A). Liver dysfunction was identified as follows: glutamic oxalacetic transaminase, 243 IU/liter (normal, 0 to 42 IU/liter); glutamic pyruvic transaminase, 56 IU/liter (normal, 0 to 37 IU/liter); lactate dehydrogenase, 602 IU/liter (normal, 106 to 211 IU/liter). The patient did not consent to bronchofiberscopic examination. He was treated with intravenous minocycline and sulbactam-ampicillin until serological and bacteriological reports became available. His body temperature normalized within 72 h. On day 9, treatment was switched from intravenous to oral minocycline and sulbactam-ampicillin was discontinued. He was discharged 17 days after admission.

<table>
<thead>
<tr>
<th>Organism and/or antibody (test)</th>
<th>Antibody titer</th>
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<tr>
<td><em>M. pneumoniae</em> (CF)</td>
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<tr>
<td><em>C. avium</em> (CF)</td>
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**TABLE 1. Antibody titers against *M. pneumoniae*, *C. avium*, and *C. pneumoniae***
FIG. 1. (A) Computed tomography of husband showing air space consolidation in the left upper lung. (B) Computed tomography of wife showing air space consolidation and ground-glass attenuation in the right upper lung.
blood cell count of \(6.69 \times 10^{10}/\text{liter}\) (neutrophils, 79.8%; lymphocytes, 10.5%). Culture examination of sputum induced by 3% saline was negative. Blood culture examinations were likewise negative. Table 1 shows antibody titers. CF antibodies against \(C. avium\) were not found in serum from the time of admission but were present at a dilution of 1/16 in serum taken 14 days later. The serum titer detected by MIF rose to 32-fold from <1/8 in 14 days. The \(C. pneumoniae\) antibody titer according to ELISA rose from 1.31 to 1.59, but the titer using MIF was not considered elevated at 128-fold. A chest X-ray revealed an infiltration shadow in the right upper lung field. Computed tomography showed air space consolidation and ground-glass attenuation in the right upper lung (Fig. 1B). Slight liver dysfunction was identified as follows: glutamic oxaloacetic transaminase, 47 IU/liter; glutamic pyruvic transaminase, 25 IU/liter; lactate dehydrogenase, 265 IU/liter. The patient did not consent to bronchofiberscopic examination. She was treated using intravenous minocycline and cefotiam (a second-generation cephalosporin) until serological and bacteriological reports became available. Her body temperature normalized within 120 h. On day 8, treatment was switched from intravenous to oral minocycline and cefotiam was discontinued. She was discharged 16 days after admission.

Discussion. Psittacosis may be considered an occupational disease among pet shop owners (2). In the present study, the husband and wife worked in the same pet shop, which sold birds. The couple may well have acquired the infections from infected birds; however, whether infected birds had been housed in their shop is unclear, as no dead birds were found at the time of our investigation. However, cases of person-to-person transmission of \(C. avium\) have also been reported recently (3, 4), representing another possible route of infection. Previous studies have reported \(C. avium\) infection mostly among 30- to 60-year-old adults (1, 5, 10). However, a small number of studies have reported cases of psittacosis among the elderly (1, 5, 10). For example, Coutts et al. (1) found that among 43 patients, 1 was >70 years old. Another study reported that among 135 patients, 10 were >70 years old (10). Similarly, Kuwabara et al. (5) reported that 2 of 36 patients were >70 years old. In our study, the husband and wife patients were 76 and 77 years old, respectively. Given the clinical findings of our study in addition to these earlier reports, physicians should be cognizant of the potential occurrence of psittacosis even in elderly persons.

A diagnosis of psittacosis can be confirmed only by isolation of the causative microorganisms or by serologic studies (8). Psittacosis is most readily diagnosed by demonstrating a rising titer of CF antibody in the serum of a patient with a compatible clinical syndrome (8). Both acute- and convalescent-phase specimens should always be tested (8). \(Chlamydia trachomatis\), \(C. avium\), and \(C. pneumoniae\) all share a genus-specific group antigen, which is the basis of the CF test (8). These three species display different major outer membrane proteins, which represent the principal antigens in the MIF test (7).

In our study, the results of CF and MIF testing were compared (Table 1). The \(C. avium\) antibody titer was found to be elevated using both CF and MIF tests. Conversely, the \(C. pneumoniae\) antibody titer was elevated using ELISA but not using MIF. \(C. avium\) infection reportedly displays positive \(C. pneumoniae\) antibody titers on ELISA due to cross-reaction at a frequency of around 25% (6). The elevated \(C. pneumoniae\) antibody titers using the ELISA method in the two present cases were thus attributed to cross-reactivity between \(C. pneumoniae\) and \(C. avium\).

Some limitations were present in the two present cases. We initially planned to diagnose psittacosis by direct demonstration of \(C. avium\) using PCR at BML (Tokyo, Japan), the only Japanese commercial laboratory that performs PCR assays for \(C. avium\). However, the PCR assay for \(C. avium\) has only been performed using sputum samples at the laboratory. Bronchofiberscopic examinations were also planned, but neither patient provided consent for bronchofiberscopy. As a result, we were unable to perform direct demonstration of \(C. avium\) using PCR. Secondly, the presence of \(C. avium\) in an avian host could not be assessed, although this was considered the most likely source of the suspected \(C. avium\) infection. Again, the patients did not consent to sampling of blood or droppings from the birds to investigate the presence of \(C. avium\).

Taken together, the results of previous reports and our present findings indicate that physicians should consider the possibility of psittacosis even among elderly patients, particularly when they have a history of contact with birds.

REFERENCES