Case Report

Two fatal cases of psittacosis caused by *Chlamydophila psittaci*

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Two fatal cases of psittacosis are described in two poultry-processing-plant employees presenting with pneumonia and respiratory failure. Diagnosis was confirmed by serological and PCR methods. Psittacosis due to *Chlamydophila psittaci* infection usually has a good recovery rate, although diagnostic delay and mistreatment can lead to severe complications and even death. This report emphasizes the need for rapid differential diagnosis and management of suspected cases of atypical pneumonia to prevent fatal outcomes.

Introduction

Psittacosis is a zoonotic disease caused by the obligate intracellular bacterium *Chlamydophila psittaci*. Infections primarily occur in bird owners, pet shop employees, breeders, veterinarians, poultry workers and poultry-processing-plant employees, mainly through the inhalation of aerosols from faeces and secretions of infected birds (Heddema *et al.*, 2006; Jorgensen, 1997; Kaibu *et al.*, 2006; Kovacova *et al.*, 2007; Smith *et al.*, 2005). Close and continued contact between humans and infected fowl may also lead to outbreaks (Smith *et al.*, 2005). During 2005, in two major outbreaks, 140 cases were reported in Hungary, with a mortality rate of 1.4 % (Hungarian National Centre for Epidemiology, 2007). Psittacosis typically causes influenza-like symptoms, and the clinical presentation can range from mild respiratory infection to severe pneumonia and systemic illness. However, a recent study showed that less than 1 % of correctly treated patients died as a result of *C. psittaci* infection (Smith *et al.*, 2005). Here, we describe two unusually severe cases with fatal outcomes, which occurred at two different poultry processing plants in Hungary.

Case reports

Case 1

A 69-year-old woman was admitted to hospital with dyspnoea in December 2005. During the previous 5 days, she had suffered from symptoms of a bad cough, difficulty breathing and general malaise, followed 3 days prior to admission by fever (39 °C) and diarrhoea. Amoxicillin was prescribed by the family physician but her symptoms worsened. A chest radiograph revealed extensive pleuro-pneumonia in the left lung and right lower lobe infiltrates (Fig. 1). Her white blood cell count was 9.97×10^9 cells l^{-1},

comprising 86.2 % neutrophils, 8.9 % lymphocytes and 4.4 % monocytes. She received intranasal oxygen and ciprofloxacin (200 mg) intravenously (i.v.).

After consultation, the patient was transferred to the intensive care unit on the same day. The next day, her dyspnoea deteriorated and she required mechanical ventilation. The antibiotic treatment was continued with levofloxacin administered via a nasogastric tube (500 mg once daily). Preventative anticoagulant, corticosteroids and analgesic drugs were added. Her circulation remained stable, whilst her blood oxygenization improved markedly. She had no fever and no alteration of consciousness. In the evening, she became bradycardic and respiration stopped. She was in asystolia and, despite resuscitation attempts, the patient died. The autopsy findings showed extensive bronchopneumonia in the left lung and small disseminated pneumonic foci in the right lower lobe. The cause of death was declared as a massive pulmonary embolism originating from the thrombosis of pelvic veins. The patient had been working for the last 6 months at the plucking unit of a poultry processing plant in Békés county, Hungary. During this period, a psittacosis outbreak (72 cases) had been identified there (Hungarian National Centre for Epidemiology, 2007).

Post-mortem blood and lung tissue samples were sent to the National Centre for Epidemiology in Budapest, Hungary, for microbiological testing. The serum sample was tested using a microimmunofluorescence (MIF) assay (Focus Diagnostics). The serum had an IgM titre of 1 : 16, and elevated titres of IgG (1 : 512) and IgA (1 : 64), to *C. psittaci*, indicating an acute infection. *C. psittaci* DNA was detected in lung tissue using a touchdown nested PCR method targeting the *ompA* gene (Tong & Sillis, 1993).

Case 2

A 48-year-old woman was admitted to hospital with a 2 week history of fever (38 °C) and non-productive cough in

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Abbreviations: i.v., intravenously; MIF, microimmunofluorescence.

Fig. 1. Case 1: chest radiograph showing infiltrations in the left lobe and right lower lobe.

March 2007. She had not received any antibiotics before admission. A chest radiograph showed a homogeneous left lower lobe infiltrate and an inhomogeneous infiltrate in the whole of the right lobe (Fig. 2). The elevated white blood cell count was 1.193×10^{10} cells l^{-1}, comprising 93.2 % neutrophils, 5.4 % lymphocytes and 1.0 % monocytes. Antibiotic therapy was initiated with moxifloxacin (400 mg orally once daily) and co-amoxiclav (1 g i.v. three times daily). Intranasal oxygen, a bronchodilator and corticosteroids were also used. At 2 days after admission, she was transferred to the intensive care unit with the development of severe respiratory failure and hypoxia

Fig. 2. Case 2: chest radiograph showing left lower lobe infiltrate and inhomogeneous infiltrate in the right lobe.

(respiratory rate 50 breaths min^{-1}, oxygen saturation 26 %). She required mechanical ventilation. The antibiotic therapy was continued with moxifloxacin (400 mg i.v. once daily), rifampicin administered via nasogastric tube (300 mg twice daily), clindamycin (600 mg i.v. twice daily) and ceftriaxone (2 g i.v. twice daily). The patient had been working at the plucking unit of a poultry processing plant in Bács-Kiskun county, Hungary. Psittacosis was assumed, and therefore blood and bronchial fluid samples were sent to the Hungarian National Centre for Epidemiology. The serum had an IgG titre of 1 : 256 and an IgA titre of 1 : 32 to *C. psittaci*; however, no specific IgM was detected. A PCR performed on the bronchial fluid sample was positive for *C. psittaci* DNA. The clindamycin and ceftriaxone therapy was changed after 2 days to doxycycline (500 mg every 6 h) and clarithromycin (500 mg every 6 h) administered via nasogastric tube. Despite the broad-spectrum antibiotic treatment, her status worsened over the next 3 days. She had toxic symptoms, multi-organ failure, and finally extreme tachycardia and hypoxia, which could not be controlled and the patient died. The autopsy revealed confluent pneumonia, a septic spleen and kidneys, and an alcoholic fatty liver. Post-mortem tissue samples of brain, lung, heart, kidney, spleen and liver were examined; *C. psittaci* DNA was detected only in lung tissue.

Discussion

Poultry-processing-plant employees should be considered a high-risk group for human psittacosis infections because of the close contact with domestic fowl, followed by handling and processing of poultry plumage and meat (Smith *et al.*, 2005). In Hungary, the south-eastern counties are the most affected areas, as the majority of processing plants are traditionally located in this region. Infections usually develop in an epidemic form.

Pulmonary involvement is the common manifestation of the disease. The radiographic findings usually show infiltrates in the lungs and breathing difficulties may develop (Gherman *et al.*, 1995; Heddema *et al.*, 2003; Kovacova *et al.*, 2007; Soni *et al.*, 1999; Verweij *et al.*, 1995). In the first case, the family physician started an ineffective empiric therapy with amoxicillin; in the second case, no antibiotics were prescribed. As psittacosis can present influenza-like symptoms, it is often overlooked and underdiagnosed. In both cases, the illness progressed and hospitalization became necessary due to inappropriate diagnosis or a probable delay in seeking medical attention. The chest radiographs showed progressive pneumonia; however, the infection is often indistinguishable from other types of atypical pneumonia. Therefore, a history of exposure to birds is the most valuable diagnostic clue for obtaining correct diagnosis at the primary care level.

Psittacosis causing severe respiratory failure requiring mechanical ventilation is uncommon and fatal cases are rare (Kovacova *et al.*, 2007; Soni *et al.*, 1999; Verweij *et al.*, 1995). However, in both cases, mechanical ventilation

became necessary after progressive dyspnoea and hypoxia developed and, despite intensive care treatment, the patients died. The first patient's increased age and the second patient's chronic alcoholism could have been additional risk factors affecting the outcome.

Diagnosis is often based on clinical signs and serological evidence (Smith *et al.*, 2005). MIF tests are more sensitive and specific than complement fixation tests. The use of MIF assays can differentiate between human chlamydial species; however, cross-reactions may still occur due to antigenic homology (Wong *et al.*, 1994). Because of the dynamics of antibody responses, testing of convalescent sera is also often necessary. Thus, rapid and sensitive diagnostic assays are of great importance. Recently, PCR methods have proved to be good alternatives to confirm diagnosis by direct detection of the pathogen. In both cases, the diagnosis was confirmed using a nested PCR that distinguishes *C. psittaci* from *Chlamydophila pneumoniae* (Tong & Sillis, 1993).

Tetracyclines, particularly doxycycline, are considered to be the treatment of choice for psittacosis (Smith *et al.*, 2005). However, in both cases, fluoroquinolones had been chosen as the primary antibiotic for the empirical treatment of pneumonia. According to *in vitro* studies, recently developed fluoroquinolones (such as levofloxacin and moxifloxacin) have potent activity against atypical respiratory pathogens, including chlamydial species (Donati *et al.*, 2002; Hammerschlag, 2000). Nevertheless, they are still less potent *in vitro* than tetracyclines and macrolides, and it is important to consider the *in vivo* efficacy of fluoroquinolones in chlamydial infections (Hammerschlag, 2000).

In conclusion, the difficulty of recognizing psittacosis, diagnostic delays and inappropriate treatment may be important risk factors with respect to outcome. Therefore, psittacosis should be taken into account in the differential diagnosis of febrile respiratory infections, especially in rural areas where handling of domestic fowl is common.

Acknowledgements

References

Donati, M., Pollini, G. M., Sparacino, M., Fortugno, M. T., Laghi, E. & Cevenini, R. (2002). Comparative *in vitro* activity of garenoxacin against *Chlamydia* spp. *J Antimicrob Chemother* 50, 407–410.

Gherman, R. B., Leventis, L. L. & Miller, R. C. (1995). *Chlamydial psittacosis* during pregnancy: a case report. *Obstet Gynecol* 86, 648–650.

Hammerschlag, M. R. (2000). Activity of gemifloxacin and other new quinolones against *Chlamydia pneumoniae*: a review. *J Antimicrob Chemother* 45, 35–39.

Heddema, E. R., Kraan, M. C., Buys-Bergen, E. C., Smith, H. E. & Wertheim-van Dillen, P. M. (2003). A woman with a lobar infiltrate due to psittacosis detected by polymerase chain reaction. *Scand J Infect Dis* 35, 422–424.

Heddema, E. R., van Hannen, E. J., Duim, B., de Jongh, B. M., Kaan, J. A., van Kessel, R., Lumeij, J. T., Visser, C. E. & Vandenbroucke-Grauls, C. M. (2006). An outbreak of psittacosis due to *Chlamydophila psittaci* genotype A in a veterinary teaching hospital. *J Med Microbiol* 55, 1571–1575.

Jorgensen, D. M. (1997). Gestational psittacosis in a Montana sheep rancher. *Emerg Infect Dis* 3, 191–194.

Kaibu, H., Iida, K., Ueki, S., Ehara, H., Shimasaki, Y., Watanabe, S., Anzai, H., Takebu, W., Muta, T. & other authors (2006). Psittacosis in all four members of a family in Nagasaki, Japan. *Jpn J Infect Dis* 59, 349–350.

Kovacova, E., Majtan, J., Botek, R., Bokor, T., Blaskovicova, H., Solavova, M., Ondicova, M. & Kazar, J. (2007). A fatal case of psittacosis in Slovakia, January 2006. *Euro Surveill* 12, 3244.

Hungarian National Centre for Epidemiology (2007). Epidemiological status in Hungary 2005. *EPINFO* 14, 9–40 (in Hungarian).

Smith, K. A., Bradley, K. K., Stobierski, M. G. & Tengelsen, L. A. (2005). Compendium of measures to control *Chlamydophila psittaci* (formerly *Chlamydia psittaci*) infection among humans (psittacosis) and pet birds, 2005. *J Am Vet Med Assoc* 226, 532–539.

Soni, R., Seale, J. P. & Young, I. H. (1999). Fulminant psittacosis requiring mechanical ventilation and demonstrating serological cross-reactivity between *Legionella longbeachae* and *Chlamydia psittaci*. *Respirology* 4, 203–205.

Tong, C. Y. & Sillis, M. (1993). Detection of *Chlamydia pneumoniae* and *Chlamydia psittaci* in sputum samples by PCR. *J Clin Pathol* 46, 313–317.

Verweij, P. E., Meis, J. F., Eijk, R., Melchers, W. J. & Galama, J. M. (1995). Severe human psittacosis requiring artificial ventilation: case report and review. *Clin Infect Dis* 20, 440–442.

Wong, K. H., Skelton, S. K. & Daugharty, H. (1994). Utility of complement fixation and microimmunofluorescence assays for detecting serologic responses in patients with clinically diagnosed psittacosis. *J Clin Microbiol* 32, 2417–2421.