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Outbreak of pulmonary histoplasmosis involving a group of four Polish travellers returning from Ecuador

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ABSTRACT

Exploring caves is, without doubt, a very exciting adventure; however, it carries some dangers. Three of four travellers were admitted to hospital with lung changes after returning from Ecuador, successively. Epidemiological studies revealed that the travellers visited caves infested by bats, and had contact with bats' guano. They gave a history of fever, fatigue, myalgia, dry cough, and chest pain during the stay or just after returning from Ecuador. In two patients, symptoms persisted in mild nature. Chest X-ray films showed diffuse nodules (coin-like lesions) in the lungs in each case. Histoplasmosis was taken into consideration. Differential diagnosis included paragonimiasis, pulmonary tuberculosis, and pulmonary infection of other causes. Direct examination of sputum was negative. Cultures were negative. Final diagnosis was made on epidemiological histories, as well as typical radiological changes, and was supported by positive tests for antibodies to Histoplasma capsulatum*. Immunodiffusion test (ID), complement fixation test (CFTs), and Western blot test were positive. In two cases antifungal treatment was established. Ketoconazole followed by Itraconazole were used. Persons who are going to explore caves should be equipped with anti-dusk masks to prevent pulmonary histoplasmosis. The threat of* Histoplasma capsulatum *infection in bat-inhabited caves should be emphasized to travellers and also to physicians.*

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Key words: *Histoplasma capsulatum,* pulmonary histoplasmosis, bat-inhabited caves, exposure, source of infection, outbreaks

INTRODUCTION

Infection with *Histoplasma capsulatum* has been encountered in many areas of the world but is much more frequent in certain parts of North and Latin America [1, 2]. This airborne fungal infection occurs when the microconidia of *H. capsulatum*, which flourish in soil fertilised by bird and bat droppings, are distributed and inhaled into the lungs. Confined spaces infested by bats, such as caves, are excellent conditions for luxuriant growth of *H. capsulatum* [3–6]. Cases of pulmonary histoplasmosis are associated with disturbance of bird and/or bat droppings while raking (farming, gardening), cleaning (e.g. chimney, dirt-floored chicken coops), construction, demolition, mining, excavation, archaeological exploration, roofing, repairing (e.g. attic), installing heating and air-conditioning systems, and recreational activities such as cave exploration. Anyone entering caves infested by bats in a histoplasma endemic area is in danger of pulmonary histoplasmosis [3, 6]. Acute pulmonary histoplasmosis is usually characterised by fever, dry, non-productive cough, chest pain, myalgia, headache,

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dyspnoea, malaise, fatigue, and lung changes in X-ray pictures. The severity of disease depends on the quantity of airborne infective inoculum, and the immune status of the host. The clinical spectrum of infection with *H. capsulatum* includes asymptomatic infection, mild, self-limited flu-like illness, acute or chronic pulmonary infection, and disseminated disease. In cases with heavy exposure to *H. capsulatum* or severe immunosuppression, symptomatic disease is common, including severe pneumonia, associated with adult respiratory distress syndrome (ARDS) and respiratory failure [2–4, 6].

CASE REPORT: OUTBREAK OF PULMONARY HISTOPLASMOSIS

Three of four travellers were hospitalized with lung changes after returning from Ecuador, successively. They came from different regions of Poland and they were not in direct contact after returning to the country. Preliminary diagnosis in the first patient (M.A., 43-year-old male) had nothing to do with suspicion of group infection. Diagnostics was difficult, because the patient did not inform anybody that he had visited caves during his stay in the tropics. Eventually, after contacting other participants of the trip and making chest X-ray films, changes in lungs were revealed in all cases.

Epidemiological studies disclosed that during the stay in Ecuador the travellers ate regional dishes including ceviche, which is a seafood with onion, tomatoes, and spicy paprika immersed in lime juice. Moreover, they penetrated caves infested by bats, near Tena, the capital of Napo province.

None of the travellers smoked and their age was under 44. They gave a two weeks' history of fever, malaise, myalgia, dry cough, and chest pain during the stay or just after returning from Ecuador. On admission, they were afebrile. In two patients (M.A., 43-year-old male and M.B., 23-year-old female), fatigue, myalgia, cough, and chest pain of mild nature still persisted. Chest X-ray films revealed disseminated bilateral nodular opacities (coin-like lesions) in the two above-mentioned patients, and single nodules in both lungs in the others (Figures 1, 2).

In persons with complaints, the enzymes of liver damage were slightly elevated (SGPT 130 IU/L and 98 IU/L, respectively), and eosinophilia in up to 12% of cells in circulatory blood smears was present.

Histoplasmosis and paragonimiasis were taken into consideration. Differential diagnosis also included pulmonary tuberculosis, pulmonary infection of other causes (e.g. *Mycoplasma*, *Legionella*, and *Chlamydia*), and initially in the first patient, primary and metastatic carcinoma. Direct examination of sputum was negative. Cultures were negative. Malaria and typhoid

Figure 1. M.B. 23-year-old female — before treatment. Disseminated bilateral rounded nodular opacities (coin-like lesions). The nodules are with a smooth surface. The size differs from one lesion to another: they range from 5 to 16 mm in diameter. The number of nodules is significantly higher in the lower lung fields and in the posterior aspect of the lower lobes (lateral view), and lager in diameter in the periphery of the lung adjacent to the pleura. Attenuation of the nodules is high

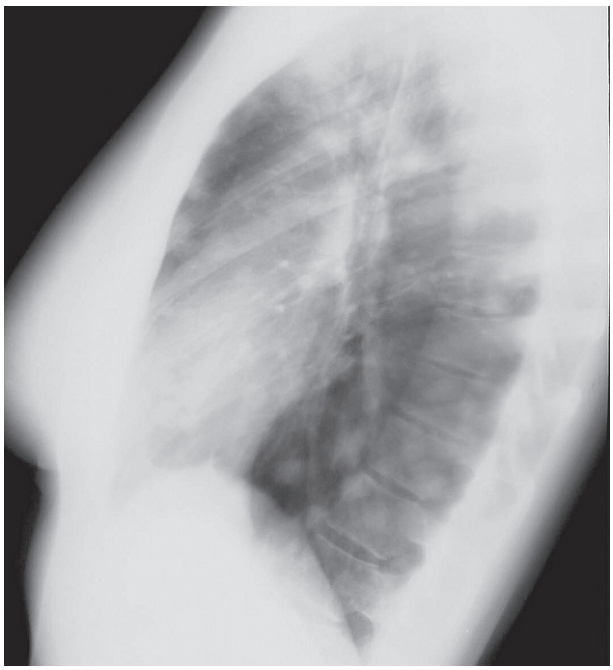

Figure 2. M.B. 23-year-old female (lateral view)

fever were also excluded. Final diagnosis was made on epidemiological histories, as well as typical radiological changes, and was supported by positive tests for antibodies to *Histoplasma capsulatum*. Immunodiffusion test (ID), complement fixation test (CFTs), and Western blot test were positive. Paragonimiasis was excluded by indirect hemagglutination test (IHA).

In two cases (M.A., 43-year-old male and M.B., 23-year-old female) antifungal agents were instituted. Initially, Ketoconazole in a dose of 400 mg/day for 4 weeks was used, and then Itraconazole at the same daily dose for next 8 weeks. Fatigue, myalgia, cough, and chest pain disappeared in both patients. In the 43-year-old male most of the nodules (visualised on chest X-ray films before treatment) have decreased in diameter or disappeared. In the 23-year-old female subsequent follow-up chest X-ray films revealed calcifications of nodules (calcific rings). Moreover, some of the nodules, especially in the lower lungs, have grown approximately 1–2 mm in diameter and some in the upper lungs have diminished. Figure 3. The remaining two persons did not require any treatment.

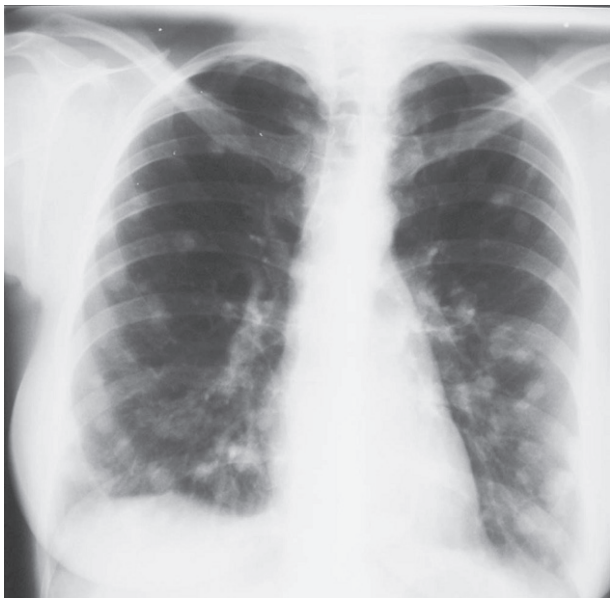

Figure 3. M.B. 23-year-old female — 4 months after treatment. After 4 months, in some nodules calcium is present within these lesions. They have laminated calcific rings, analogous to the growth rings of a tree. Identification of the benign pattern of calcification is important to distinguish from malignant. Some of the nodules, especially in the lower lungs, have grown approximately 1–2 mm in diameter and some in the upper lungs have diminished. The number of nodules is as before

DISCUSSION

Histoplasma capsulatum was first described in 1905 by Darling in an autopsy in Panama and was thought to have been a protozoan. Descriptions concerned lung changes (pulmonary histopathology) in construction workers building the Panama Canal, who died of acute histoplasmosis. In 1912 da Rocha-Lima suggested that the organism was a fungus and not a protozoan [4, 7]. The link between bats and human histoplasmosis was first described in 1949 by Ajello although in Mexican folklore it was known much earlier as "cave fever" [8]. Nasta and colleagues reported acute histoplasmosis in four Italian spelunkers returning from Mato Grosso in Peru. They visited caves with high humidity and reported frequent contact with bats' and birds' droppings [9]. Acute pulmonary histoplasmosis resulting in acute respiratory distress syndrome (ARDS) was described in a 30-year-old spelunker, who participated in a 2-week archaeological expedition to South America where he had been exploring caves [10]. Histoplasmosis presenting as acute respiratory distress syndrome after exposure to bat faeces in a home basement was reported by Pecanha Martins and colleagues [11]. An outbreak of acute pulmonary histoplasmosis among travellers to a bat-inhabited cave in Brazil was described by Suzaki and colleagues [12]. Cave-associated histoplasmosis has been reported in travellers returning from Costa Rica [13]. Hatakeyama and colleagues described cave-associated acute pulmonary histoplasmosis in two Japanese travellers returning from Mexico [14]. In the literature we can read about eight German bat researchers. They investigated bats in caves in Cuba. Six of them (those who did not wear masks) developed pulmonary histoplasmosis. Two scientists who wore their breathing masks continuously during their work in the caves did not fall ill [15]. We can also find information about a crew of five workers who took part in the demolition of an abandoned city hall building in Kentucky. At the time of demolition, a colony of bats had been observed in the vicinity of the building, and an approximately 2-food-deep pile of debris covered with bat guano had accumulated in the building. During the demolition, none of the workers wore personal protective equipment (i.e. gloves, masks, protective glasses). Within three weeks, all five workers required treatment for pulmonary histoplasmosis, and three had been hospitalised [16].

The vast majority of cases of acute pulmonary histoplasmosis do not require therapeutic intervention. Treatment should be instituted for those who have not improved after one month of illness or who exhibit hypoxemia [4]. Two of our patients recovered

spontaneously two weeks after onset of symptoms and they did not require therapeutic intervention. In two others, fatigue, myalgia, non-productive cough, and chest pain did not disappear and they were given antifungal agents.

CONCLUSIONS

Spelunkers and travellers who penetrate caves are highly exposed to pulmonary histoplasmosis, and to other dangers such as rabies, leptospirosis, haemorrhagic fever, biting by venomous animals (snakes, lizards, spiders), injuries, getting cold, getting stuck, and getting lost. Persons who are going to explore caves should be equipped with anti-dusk masks to prevent pulmonary histoplasmosis and should be vaccinated against rabies according to pre-exposure regimen. Pulmonary histoplasmosis in immunocompetent persons often passes undiagnosed. In case of flu-like pulmonary illness after penetrating caves, histoplasmosis should be considered. Travellers who have explored caves ought to have the chest X-ray pictures taken after their return. The threat of *Histoplasma capsulatum* infection in bat-inhabited caves should be emphasized to travellers and also to physicians.

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