OCCUPATIONAL RESPIRATORY DISEASES

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PSITTACOSIS

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DEFINITION

Psittacosis is an acute infectious disease of humans characterized by fever, pneumonia, cough, weakness, fatigue, chills, headaches, myalgia, and occasionally myocarditis and encephalitis.

ETIOLOGIC AGENT

The etiologic agent, *Chlamydia psittaci* is one of several microorganisms that comprise the single genus *Chlamydia*. Once considered to be viruses because they reproduced only within host cells, several properties clearly relate *chlamydia* to bacteria: 1) the presence of both DNA and RNA, 2) division by binary fission, 3) cell walls like those of free-living gram negative bacteria, and 4) susceptibility to antibiotics. *Chlamydia psittaci*, has its reservoir in various domestic and wild birds. The disease has been called psittacosis when it affects psittacine species (i.e., parrots and related birds) and ornithosis when it affects other avian species. Although these terms have been used interchangeably, perhaps the more general term "chlamydiosis" would be preferable.

OCCUPATIONS AND INDUSTRIES INVOLVED

Psittacosis is an occupational health hazard for a large and growing number of individuals employed in quarantine facilities, pet shops, breeding aviaries, veterinary clinics, diagnostic laboratories, and avian distribution networks including wholesale aviaries and air or surface freight companies. Psittacosis (ornithosis) in turkey flocks causes many sporadic human cases in the poultry processing industry. The total number of persons at risk of occupationally related psittacosis is uncertain but probably exceeds 20,000. Approximately 70 cases of psittacosis have been reported annually in the past decade, with about one-third being occupationally acquired or associated. In the period 1975-1977, 48 (20%) of 236 reported cases were associated with the patients' occupations: 22 with the pet bird industry and 26 with the poultry processing industry (Table IX-4) (2).

EPIDEMIOLOGY

Although psittacosis was rarely reported in the United States before 1929, in November of that year, cases of psittacosis began to be reported from various sections of the country. Within the next 6 months, nearly 200 cases (33 fatal) of psittacosis were reported. After these cases were shown to be associated with exposure to parrots imported for the 1929 Christmas trade, the commercial importation of parrots was prohibited in January 1930. Investigations in the period 1935-1950 revealed that psittacosis affected many or all avian species. When available effective antibiotic therapy had lowered the mortality rate, restrictions on importation and interstate shipment of psittacine birds were relaxed. Currently, psittacine birds are imported into domestically located quarantine stations supervised by the U.S. Department of Agriculture (USDA). Although the quarantined birds must be treated with chlortetracycline, adequate blood levels of antibiotics are not always achieved, as evidenced by the fact that psittacosis has been diagnosed in psittacine birds recently released from quarantine. Some employees and government inspectors at quarantine facilities have also had psittacosis.

In the past decade, 8 epidemics involving 142 cases have occurred at 7 turkey processing plants in Texas, Missouri, and Nebraska (Figure IX-2). In an investigation of one outbreak, inhalation of infectious aerosols was clearly implicated as the primary route of exposure (1). Employees in the kill and pick evisceration departments were at the greatest risk.

Although direct contact or inhalation of

Table IX-4

HUMAN PSITTACOSIS CASES BY TYPE OF EXPOSURE AND MOST PROBABLE SOURCE OF INFECTION, UNITED STATES, 1975-1977

SOURCE	*Non-Bird Owner*	*Pet Bird Owner*	*Bird Fancier*	*Pigeon Fancier*	*Pet Shop Employee*	*Other Commercial Trade*	*Poultry Production*	*Poultry Processing*	*Miscellaneous*	*Unknown*	*Total*	*Percentage of Total*
Budgerigars	2	28	3			1			1	1	36	15.2
Cockatiels	1	12	1								14	5.9
Other Psittacine sp.	3	19	3		7	1					33	14.0
Unspecified Psittacine sp.	3	3	2		5	2					15	6.4
Psittacine/Non-Psittacine	3	6	6		6				2		23	9.7
Canaries/Finches	1	3									4	1.7
Domestic Pigeons	4	1	1	17						1	24	10.2
Wild Pigeons	7	2							4	2	15	6.4
Miscellaneous Wild Birds	3	1									4	1.7
Turkeys							1	26	2		29	12.3
Chickens	1						3				4	1.7
Turkeys/Other Birds							1		1		2	0.8
Other Miscellaneous	4	1							2		7	3.0
Unknown	11									15	26	11.0
Total	43	76	16	17	18	4	5	26	12	19	236	100.0

aerosolized tissues has been implicated in disease transmission in turkey processing plants, infection can also be spread by aerosolized bird feces. Person-to-person transmission has been reported only rarely and probably is not important in the epidemiology of the disease.

ESTIMATE OF POPULATION AT RISK AND PREVALENCE OF DISEASE

See Table IX-4 above.

PATHOLOGY

Postmortem examination of persons who have died from psittacosis generally reveals focal or lobar consolidation of the lungs. The alveoli may be filled with exudate and alveolar septal cell hyperplasia may be marked; bronchioles are rarely involved. Splenomegaly is common, and normal splenic architecture may be altered by reticuloendotheliae hyperplasia and focal necrosis. Hepatic focal necrosis is also common. Cardiac involvement in psittacosis cases has been associated with hemorrhagic areas in the endocardium of the valves and evidence of pericarditis and myocarditis.

CLINICAL DESCRIPTION

Although psittacosis is primarily a respiratory disease, it can cause a wide variety of clinical manifestations. Generally, about 10 days (range 4 to 15 or more days) after infection occurs, the clinical illness begins abruptly with fever, chills, weakness, fatigue, myalgia, anorexia, nausea, vomiting, diaphoresis, dyspnea, headache, back-

PSITTACOSIS IN HUMANS, UNITED STATES, 1965-1977

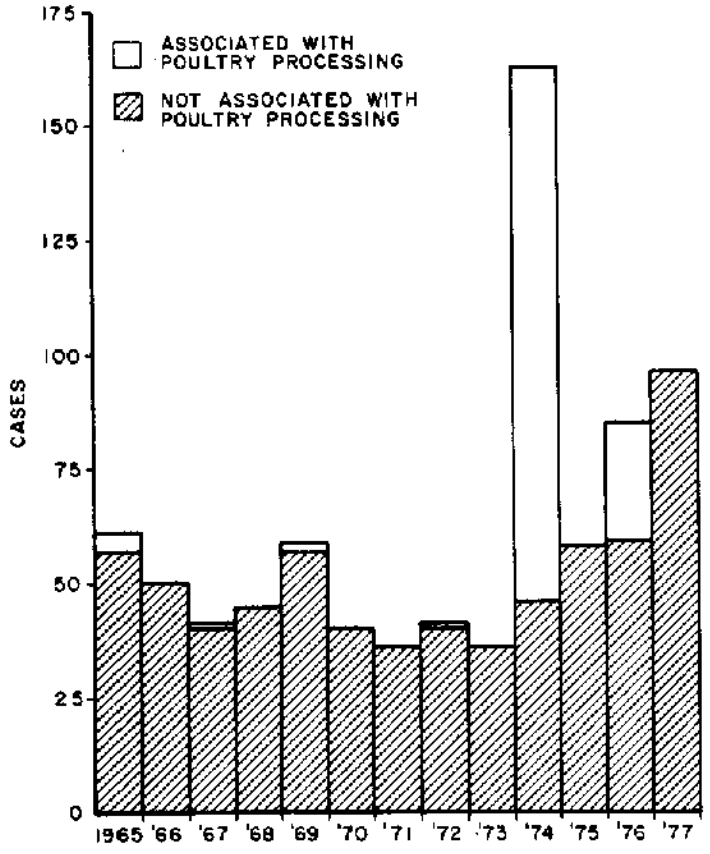

Figure IX-2. Psittacosis in humans, United States, 1965-1977

ache, and photophobia. Prominent clinical signs include pneumonia, weight loss, pleuritic chest pain, hepatomegaly, splenomegaly, and meningismus. Other than a nonproductive cough, signs and symptoms of pneumonia are often minimal, however, chest x-rays commonly reveal a surprising degree of pulmonary involvement. The patchy infiltrates caused by psittacosis frequently resemble those caused by a number of viral agents.

Psittacosis is a systemic disease and can involve multiple organs. Hepatitis, endocarditis, myocarditis, thrombophlebitis, meningoencephalitis, pericardial effusion, disseminated intravascular coagulation, and myositis have all been reported.

Tetracyclines are the drug of choice for treating patients with psittacosis. Chloramphenicol, erythromycin, gentamicin, penicillin, and ampicillin have also been used, but reports of their therapeutic efficacy are largely anecdotal. The dosage and duration for adequate tetracycline therapy are still in dispute. Some authorities recommend 2 grams daily by mouth for 7 days after defervescence (5); others recommend 1 gram daily by mouth for 21 days (7). Most authorities agree that inadequate therapy leads to a risk of relapse.

Although there is generally a dramatic response to tetracycline, the patient may continue to tire easily even after adequate therapy. The case-fatality rate of reported cases in the United States is approximately 1%.

DIAGNOSTIC CRITERIA

A diagnosis of psittacosis is based upon a history of exposure to birds, evidence of infection in the suspected avian source, signs and

symptoms, and laboratory findings.

The laboratory diagnosis of psittacosis relies on serologic test results or cultural isolation of *Chlamydia psittaci*. If possible, the etiologic agent should be isolated before antibiotics are given. Clinical specimens for culture include blood clots and throat washings, which should be shipped to the laboratory frozen on dry ice. Commonly used test systems involve inoculating patient specimens into tissue culture, mice, and eggs. Typical inclusions are then demonstrated with the Gimenez modification of Macchiavello's technique. Laboratory personnel should take special precautions in handling *Chlamydia psittaci* specimens; they are highly infectious.

The complement fixation test is the most widely used serologic procedure for diagnosing psittacosis. A fourfold change in titer (to at least 32) between 2 serum samples collected 2 or more weeks apart, and tested concurrently, is generally accepted as evidence of current infection. Inasmuch as a chlamydial group antigen is used in the serologic test for psittacosis, a history of other chlamydial infections such as lymphogranuloma venereum must be taken into account when results are interpreted.

PREVENTION

No effective vaccine has been developed for psittacosis. Whether naturally acquired infection confers immunity to humans is still not known; infected birds do not become immune.

Controlling exposure to psittacosis for employees in the pet bird trade would probably require banning the importation of psittacine birds, or tightly controlling individual bird identification, importation, and interstate shipment. Adequate controls may not be cost effective. The USDA has intermittently sponsored a program of screening and tetracycline treatment of turkeys to be slaughtered—in attempts to minimize the public health problem associated with poultry processing.

RESEARCH NEEDS

Improved techniques for the treatment of psittacosis in infected birds are needed because currently recommended tetracycline feeding procedures are not reliable. In the case of psittacine birds other than parakeets, the procedures are complicated and may cause adverse side effects in the birds.

Serologic methods with a high degree of sensitivity and specificity are needed for accurate diagnosis. Current complement fixation tests do not clearly differentiate psittacosis from other human chlamydial infections. Other chlamydial diseases are more common than psittascosis, and preexistent antibodies due to these diseases may lead to misdiagnosis of respiratory diseases due to nonchlamydial organisms such as psittacosis. In addition, the clinical spectrum of the various chlamydial diseases overlap, further complicating accurate diagnosis.

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