PSITTICOSIS

Also known as parrot fever and ornithosis, psittacosis is caused by Chlamyphila psittaci, an obligate intracellular bacterial infection of birds that can cause severe pneumonia and other serious disease in humans (on average 250 reported cases per year in the US). Most cases resulted from exposure to infected pet birds, (cockatiels, parakeets, parrots, and macaws). Infected birds shed bacteria through feces and ocular/nasal discharges. Disease in humans is called psitticosis, parrot fever, or ornithosis. In a survey conducted by this author of 100 households with infected birds, humans only suffered disease in two households. Apart from exposure to infected pet birds, other persons at risk include pigeon fanciers and employees in poultry slaughtering and processing plants; veterinarians and technicians; zoo, laboratory and avian quarantine employees; farmers; game-keepers; and wildlife rehabilitators. Humans can be infected from brief, passing exposure to infected birds or their excretions so infection can arise from brief contact with an infected bird, eg, in a shop, zoo, or restaurant, where contact was so short that the patient has forgotten it. This problem is compounded as patients are often 'confused.' Person-to-person transmission has been suggested but not proven. Onset of illness typically follows an incubation period of 5 to 14 days (longer periods have been reported). Disease ranges from subclinical to systemic illness with severe pneumonia. Disease is fatal in less than 1% of properly treated humans; however, where a diagnosis is not made and no appropriate antimicrobials are provided, fatality levels can reach 15% to 20%. Human patients demonstrate sudden onset fever, headache, malaise, and myalgia. They usually develop a non-productive cough that can be accompanied by breathing difficulty and chest tightness. Splenomegally, and a non-specific rash are sometimes observed and are suggestive of psittacosis in patients with community-acquired pneumonia. The differential diagnoses include Coxiella burnetii, Mycoplasma pneumoniae, Legionella spp. other Chlamydiaceae, and respiratory viruses, eg, influenza. Chlamyphila psittaci can also endocarditis, myocardiitis, hepatitis, arthritis, keratoconjunctivitis, and encephalitis. Severe illness with respiratory failure, thrombocytopenia, hepatitis, and fetal death has been reported among pregnant women.

Avian Chlamydiaceae Transmission

Chlamyphila psittaci is excreted in the feces and nasal discharges of infected birds. The organism is environmentally labile but remains infectious for months in organic debris. Latently infected birds appear healthy but shed the organism intermittently, for months to years. Shedding can be activated by stressors, such as relocation, shipping, crowding, chilling, owner absence (eg, vacation) and breeding.

Clinical Signs

Incubation ranges from 3 days to several weeks. However, a latently infected bird can present with active disease with no identifiable exposure. Whether the bird has acute or chronic signs of illness or dies, depends on the species of bird, virulence of the strain, infectious dose, stress factors, age, and extent of treatment or prophylaxis. Clinical signs include lethargy, anorexia, ruffled feathers, ocular or nasal discharge, diarrhoea, yellow-green urates, anorexia, emaciation, dehydration, and death.

Diagnosis

Confirmation is on the basis of at least one of four laboratory results, including isolation of C psittaci, identification of antigen by immunofluorescence of patient tissues, a ≥ 4-fold change in serologic titer in two samples, at least 2 weeks apart, assayed simultaneously at the same laboratory, or identification of Chlamydiaceae within macrophages in Gimenez or Macchiavello stained smears bird's tissues. A probable case is defined as compatible illness and at least one of two positive results, including a single high serologic titer in 1 or more samples obtained after the onset of signs or detection of Chlamydiaceae antigen (identified by use of ELISA, polymerase chain reaction [PCR], or fluorescent antibody) in feces, a cloacal swab specimen, or respiratory tract or ocular exudates.

Treatment

All birds with confirmed or probable avian chlamydiosis should be isolated and treated. Birds with suspected avian chlamydiosis or birds previously exposed to avian chlamydiosis (ie, have been housed in the same air space) should be isolated and retested or treated. As treated birds can be re-infected, they should not be exposed to untreated birds or other potential sources of infection. To prevent reinfection, contaminated aviaries should be thoroughly cleaned and disinfected several days before treatment ends. While birds are under treatment the following care should be provided. Treatment comprises a maintained minimum inhibitory concentration (MIC) with doxycycline for 45 days, by weekly injections or medication in food or water.

Responsibilities of Veterinarians to Bird Owners

All new bird owners seen at the clinic should be advised of the risks of Chlamyphila infection. All new birds should be tested and isolated pending results. Owners should be advised not to mix their tested birds, with other birds of unknown health status, or to go where other birds have been. In the event of a patient testing positive, a ‘written client advice sheet, detailing clinical signs in birds, clinical signs in humans, and action to be taken by concerned humans – visit your physician – take this piece of paper with you.’ Humans exposed to birds with avian chlamydiosis
should seek medical attention if they develop influenza-like symptoms or other respiratory tract illnesses. The physician should consider psittacosis in ill patients exposed to birds and collect specimens for laboratory analysis.

**SALMONELLOSIS**

Salmonellosis is the most common and most serious zoonosis of the developed world, with some 5 million Americans affected annually. Although *Salmonella* spp are sensitive to many disinfectants as well as cooking, they do survive for extended periods in stagnant water and even longer in soil. Salmonellosis is transmitted to humans by eating contaminated (incompletely cooked) food and drinks, although fomites (including poor personal hygiene), is also a major factor. Humans have been infected from poultry, but also free living birds. Feral birds living on and flying away from refuse tips can form a significant route of transmission. Salmonellosis in humans typically presents as a gastroenteritis, although any organ can become infected, eg, arthritis, bronchopneumonia, endocarditis, meningitis, osteomyelitis, and pyelonephritis. Antibiosis is generally contraindicated in humans, as it increases the chances of patients becoming carriers.

**CAMPYLOBACTERIOSIS**

Campylobacteriosis is an acute enteritis illness (with severe abdominal cramps) in humans with an incubation period of 2 to 5 days. Human infection is typically self-resolving in 7 to 10 days. Many infected birds become carriers (eg, 35% of migrating waterfowl and galliformes, although a very low rate in pet psittacines), creating a particular risk to humans. In the UK, birds opening foil milk bottle tops of door-step-delivered milk bottles has lead to significant outbreaks of infection.

**YERSINIOSIS (PSEUDOTUBERCULOSIS)**

Yersiniosis is a common bacterial infection of many groups of birds, but is less common in mammals. Zoonotic infection is most common in Europe and occurs only sporadically in the US. Pigeons and doves are the most common avian reservoir, resulting in zoonotic infection. Epizootics can occur in birds, leading to major mortalities, on occasions approaching 100%, in such cases massive environmental contamination can occur, resulting in human infection. In humans, incubation is typically 7 to 21 days, with the most common form being an acute mesenteric lymphadenitis with or without erythema nodosum. Severe enteritis can occur, with half of sufferers having hepatomegaly and jaundice.

**NEWCASTLE DISEASE**

This is a common and highly infectious disease of most species of birds. Humans working in close contact with birds (poultry farmers, slaughterers and veterinarians) can become infected from stock, or live vaccine. The incubation period in humans is 1 to 2 days. The most common clinical signs are unilateral or bilateral conjunctivitis, although fever, headache, lethargy, pharyngitis, encephalitis, and hemolytic anaemia can occur. Recovery is spontaneous after an illness of 3 days to 3 weeks duration.

**ALLERGIC ALVEOLOITIS**

This is a serious and underestimated disease that often affects pet bird owners after years of exposure to low-grade levels of avian feather antigen. It is an allergic alveolitis, resulting in hypersensitivity pneumonia, bronchiolitis, and interstitial pneumonia, which is classified as acute, subacute, or chronic. The acute form demonstrates 4 to 8 hours after large-scale exposure, resulting in coughing, dyspnea, and fever. The subacute form occurs after years of moderate exposure and is characterized by a dry cough and progressive dyspnea. Diagnosis is achieved on intradermal skin testing. If further exposure to avian antigen can be prevented, prognosis is good. The chronic form results from years of low-grade exposure to feather dander and is most common in the owners of pet birds. The disease is irreversible, causing dyspnea, nonproductive cough, weight loss, and respiratory rales. The lungs undergo chronic pulmonary fibrosis. To prevent further deterioration, the client must prevent exposure.

**WEST NILE VIRUS**

West Nile virus (WNV) is a flavivirus (‘arboviridae’) and is transmitted by arthropods (insects). The virus was first isolated in 1937 from a woman with pyrexia in the West Nile district of Uganda. WNV was first recognized as a cause of a human illness known as meningoencephalitis in Israel in 1957 and as a cause of horse disease in Egypt and France in the early 1960s. WNV is predominantly an infection of birds and mosquitoes. The virus circulates in the blood of the bird, then when mosquitoes take a blood meal from an infected bird they take up the virus as well. Other species infected (horses or humans) are incidental victims. Incubation in humans is 3 to 15 days. West Nile virus is not transmitted from “person-to-person.” Eighty percent of infected humans are asymptomatic, 20% show mild influenza-like illness. Less than 1% develop more severe disease (encephalitis, meningitis). Patients may suffer headaches, fever, stiff neck, sore eyes, disorientation, muscle weakness, convulsions and coma, with occasional fatalities. WNV has been identified in Africa, Europe, the Middle East, west and central Asia, and the Americas. WNV was found in US for the first time in 1999 and is considered endemic. In 2005, 3000 cases were reported in the US. In temperate zones WNV occurs in late summer or early autumn, while in the tropics the virus can be transmitted all year round. Most mosquitoes that carry the WNV are likely to bite around dusk and dawn.

**AVIAN INFLUENZA**

Avian influenza (AI) naturally circulates in wild waterfowl such as ducks and geese, often causing few or no signs. Many other bird species are susceptible to infection which may lead to severe disease and high mortality. Outbreaks associated with high bird mortality are called Highly Pathogenic Avian Influenza (HPAI)
(typically caused by H5 or 7), and are described according to properties of two surface proteins: hemagglutinin (H) and neuraminidase (N). In January 2004, avian influenza (HPAI) was confirmed in poultry in Vietnam. Subsequently, numerous outbreaks have occurred in a number of countries, sweeping from Southeast Asia, across Central Asia, and into western Europe. Very infrequently, AI viruses are transmissible to humans. Some 300 persons have become infected, of whom more than 50% have died. The World Health Organization comments that while avian HPAI has been very prevalent, it is reassuring that human infection has been so rare. However, increased infection of humans and human-to-human transmission remains a real threat, subsequent to viral antigen changes through ‘shift’ and ‘drift.’ The more virus is actively replicating (ie, active infection in birds), the greater the chance of this occurring. Outbreaks of influenza affecting many thousands and sometimes millions of people with high mortality occurred in 1918 (‘Spanish’), 1957 (Asian), 1968 (Hong Kong), and 1977 (Russian). New subtypes of influenza caused these pandemics. These were probably formed by combination of genes from both avian and human influenza viruses, this is most likely to occur when a mammal (eg, humans and pigs) is concurrently infected with mammalian and avian virus strains. Emergence of new highly pathogenic avian influenza with the capacity to infect humans is a concern because it may lead to circumstances where a new subtype of influenza can develop that both causes serious disease and can spread from person to person. Humans are usually infected through close contact with live infected birds. Birds shed influenza virus in their feces, so contact with feces (for example by visiting enclosures or markets where birds have been recently kept) is also a possible transmission route. Evidence to support limited human-to-human transmission has also been described; this presents the major concern for the future.

The Role of the Veterinarian in Controlling AI

As avian veterinarians, we are all in the front line. Clinicians should train staff in the recognition of clinical signs and actions to take when the public calls concerning possible cases. The factors to consider are national biosecurity; personal, staff and public health; and prevention of contamination of your business facilities. In the UK, DEFRA will only call out to investigate if more than 10 birds are found dead; during office hours, at other times, and in other situations, we are on the front line.

CRYPTOSPORIDIOSIS

Cryptosporidiosis is caused by a coccidian parasite that is commonly found in numerous bird species. In humans, clinical signs comprise persistent diarrhea, malabsorption, abdominal pain, fever, and vomiting. Although no avian strains have been incriminated as yet the cause of human disease, because birds can become infected by mammalian strains, which could then contaminate human water supplies, it seems only a matter of time.

CRYPTOCOCCOSIS

Cryptococcus is typically caused by Cryptococcus neoformans, a saprophytic fungus, commonly found in soil contaminated by bird (especially pigeon) feces. Disease is rare in birds, but has been reported as disseminated disease in a number of psittacine species. Disease may affect the respiratory, gastrointestinal, or nervous systems, causing necrotic, granulomatous lesions with characteristic pale gelatinous exudates. Sinusitis (even with beak deviations), blindness, or paralysis can occur. Diagnosis is based on histopathology combined with culture. Culture alone is insignificant as the infection can be carried symptomatically. Human infection generally occurs through contact with or handling or exudates or other infective material and can affect healthy as well as immunocompromised individuals. Clinicians must always be aware of this disease when treating atypical upper respiratory infections in birds.

MYCOBACTERIUM spp

This is worthy of note only in so far as human tuberculosis is commonly contracted by immunocompromised individuals from contaminated soil. Infection from infected birds is extremely rare.

Other rare zoonotic pathogens include erysipelas, listeria, rabies, toxoplasmosis, and Giardia.

FURTHER READING

1. CDC. Division of Public Health Surveillance and Informatics. Available at: www.cdc.gov/epo/dphsi/casedef/psittacossiscurrent.htm.
2. Resources available from the World Health Organization.