Common Avian Clinical Presentations: Bacterial, Fungal, and Viral Infections

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One of the natural defenses of birds is to mask clinical signs of illness until the late stages of disease. Advanced disease, combined with a high metabolic rate, may lead to oxygen deprivation and death during treatment or diagnostic sampling. Treatment and diagnostic procedures must be performed in a stepwise fashion, with constant reevaluation of the patient's ability to tolerate further procedures. Extensive client communication at the outset allows the owner to understand the potential severity of the situation and to grant permission for the necessary diagnostics to proceed in a specific treatment direction.

In the United States, birds are commonly purchased from pet stores by people without prior experience in avian care. Often, these birds are young and unweaned, are housed together in the store, and come from multiple sources, increasing the risk for exposure to infectious organisms, such as polyomavirus. Because nutritional deficiencies and poor feeding practices can predispose birds to many problems, including hand feeding–induced aspiration pneumonia, inadvertent starvation, and clinical signs of infectious disease, educating new bird owners on avian nutrition is also helpful.

**Bacterial Infections**

The circulatory system of birds contains a renal shunt that can drain venous blood from the caudal gastrointestinal tract and caudal extremities directly into the heart without hepatic filtration. Consequently, when cage or cage-mate trauma to the feet and legs or self-mutilation occurs, systemic bacterial infection often results. Nutritional deficiencies contribute to decreased hepatic function and immunosuppression in many birds, adding to the incidence of septicemia.

Rhinitis and sinusitis are seen frequently in *Amazona* spp, although they also occur in other parrot species. In these patients, chronic vitamin A deficiency and squamous metaplasia usually compromise the nasal mucosa. Desquamated cells and bacteria accumulate in the nares, occluding the openings to the opposite naris, lacrimal duct, and choanal slit. With time, deformation of the nares occurs and permanent changes in bony architecture can arise.

Flushing of the nares and infraorbital sinus can be both diagnostic and therapeutic. Samples obtained with this procedure can be submitted for cytology and bacterial/fungal culture and sensitivity testing. A Gram stain should be performed to give immediate preliminary results. Myriad microorganisms may be present, often as opportunistic invaders. In addition to treatment of the current infection, correction of the underlying pathology (often nutritional deficiencies and husbandry issues) should be initiated.

If the infraorbital sinus is impacted with inspissated material, lancing and debridement may be necessary. Care must be taken during this procedure to avoid the aspiration of pathogenic bacteria (or fungi), which can result in lower respiratory infection. A complete blood count (CBC) to check for systemic infection and preliminary treatment with antibiotics and/or antifungals (see below) are warranted.

Bacterial culture and sensitivity testing of samples taken from infected skin or soft tissue may not be reliable; contaminants are often isolated, and many organisms do not survive shipment for culture. Blood cultures are seldom performed on psittacines due to financial and blood volume constraints. Therefore, the choice of antibiotics is generally empirical. For systemic infections, enrofloxacin, trimethoprim-sulfamethoxazole, and doxycycline are common choices due to their broad spectrums of activity. Combinations of a broad-spectrum β-lactam, such as piperacillin or ceftazidime, with an aminoglycoside or fluoroquinolone are often used while the patient is hospitalized. Response to antibiotic therapy should be monitored closely, both by the condition of the patient and by serial CBCs.

**Key Points**

- Explain to the owner the myriad conditions that can cause the general “sick bird” presentation.
- Collect a thorough history to help direct diagnostic and therapeutic decisions.
- Gather diagnostic samples (e.g., blood samples, radiographs) as tolerated by the patient to narrow the differential diagnosis and direct preliminary therapy.
Chlamydia

Chlamydiosis, also referred to as psittacosis in people and parrot fever in birds, is caused by the organism Chlamydophila psittaci, formerly classified as Chlamydia psittaci. The ability to speciate strains of Chlamydia and Chlamydomophila has brought into question the assumed transmission of disease from parrots to humans. Chlamydiosis is much less prevalent in parrots now than when importation was common, but it is still seen with some frequency. Clinical signs are related to respiratory disease, with hepatic involvement and biliverdinuria common in Amazona and Ara spp (macaws). Treatment with doxycycline or chlortetracycline is the standard of care. Serum and cloacal swab polymerase chain reaction (PCR) Chlamydophila tests are now available and have greatly improved ante-mortem diagnosis. Research is ongoing in the attempt to develop a vaccine. A valuable aid in understanding Chlamydomophila testing, treatment, and legal issues is the Compendium of Measures to Control Chlamydomophila psittaci Infection Among Humans (Psittacosis) and Pet Birds (Avian Chlamydiosis), created and published by the National Association of State Public Health Veterinarians.

Fungal Infections

Fungal infections are most often caused by Aspergillus fumigatus, which is found in the same locations and under the same conditions as many secondary bacterial invaders (Figure 1). Malnutrition, especially vitamin A deficiency, is a predisposing factor. Poor hygiene and inadequate ventilation, especially in warm, humid climates, can increase the incidence of A. fumigatus infection.

Clinically, rhinitis with Aspergillus involvement is similar in appearance to bacterial rhinitis or sinusitis. A Gram stain or a modified Wright stain often demonstrates the fungal elements. To avoid confusion with fungal hyphae, the use of cotton-tipped applicators in obtaining samples for cytology should be avoided. Cytology brushes or the wooden end of a cotton-tipped applicator can be used instead. Antibody titers are of use in some species, such as raptors. Plasma electrophoresis, Aspergillus antigen, and galactomannan tests are combined with the antibody titer test in an Aspergillus panel provided by the University of Miami Avian and Wildlife Laboratory (http://pathology.med.miami.edu/x135.xml) and can aid in diagnosis. However, these tests can have false-negative and false-positive results. Syringeal granulomas, air sacculitis, and granulomas of the coelomic cavity are also caused by Aspergillus. Direct visualization of these lesions via endoscopy, in addition to cytology or histopathology and/or culture of lesions, is an excellent diagnostic tool.

The following agents can be used to treat aspergillosis; more detailed references providing dosage ranges and routes of administration have been published elsewhere.

- **Amphotericin B** is a fungicidal agent that is still used in nebulization, nasal flushes, and intratracheal and intravenous administration. Nebulization requires the use of sterile water as the diluent; saline will inactivate amphotericin.
- **Itraconazole** is an orally administered azole used for treating systemic Aspergillus spp infections. Dosages of 10 mg/kg PO q12h are used for most species. It should be noted that African grey parrots (Psittacus erithacus spp) are sensitive to itraconazole. In these species, itraconazole should be used at a reduced dose of 5 mg/kg q12–24h, or an alternate treatment should be employed.
- **Terbinafine** is used orally in conjunction with or in lieu of itraconazole for severe or resistant Aspergillus infections, with a reported dose of 10 mg/kg q24h.
- **Voriconazole**, although more expensive, is used in some instances when itraconazole is ineffective.

Viral Diseases

Viral diseases that are transmissible between birds are of financial, legal, and ethical concern. The following are the most common viral diseases in pet parrots.

Proventricular Dilatation Disease

Initially (in the late 1970s), proventricular dilatation disease (PDD) was termed macaw wasting disease and seemed to be limited to macaws. In the past 4 decades, however, it has occurred in more than 75 other species of birds. This disease affects peripheral nerves, primarily of the gastrointestinal tract. It may also affect the central nervous system, causing neurologic signs. It has been proposed that the virus may also cause pain or pruritus that leads to severe self-mutilation. Parrots of all species and ages can be infected.

The most common clinical signs of PDD include weight loss, a possible initial increase in appetite, regurgitation, weakness, and passage of undigested seeds or other food in the feces. Neurologic signs may include loss of balance, circling, partial paralysis, and seizures, although this presentation is somewhat less common and usually occurs in Old World species such as cockatoos and African grey parrots.
The etiology of PDD involves a Borna disease virus. Routine blood work will not conclusively diagnose this disease but is helpful in ruling out other diseases. Radiographs are the most immediately useful diagnostic tool and often demonstrate the classic severe dilation of the proventriculus (FIGURE 2). Specific tests, including several PCR tests for blood and fecal samples and antibody tests, have been developed and show promise. This is an area of intense research and is rapidly changing.

Biopsy samples of affected tissue can confirm the presence of this disease. However, many patients with PDD are debilitated, and the surgery needed for an internal biopsy can be risky. Also, healing is greatly impaired in many affected birds, due to chronic malabsorption and low total protein and albumin levels. If a biopsy is performed, the inlguives is often chosen as the sample site because the associated surgery and recovery are less debilitating to the patient than for a proventricular biopsy. A well-innervated area should be biopsied to increase the chances of detection.

PDD may occur in one bird or may affect multiple birds in an aviary or household. Most affected birds die within several months to a year after developing clinical signs, although earlier detection and treatment are improving the prognosis. Recent use of both modified diets and certain antiinflammatory medications (COX-2 inhibitors) has prolonged the life of many birds and the surgery needed for an internal biopsy can be risky. Also, healing is greatly impaired in many affected birds, due to chronic malabsorption and low total protein and albumin levels. If a biopsy is performed, the inlguives is often chosen as the sample site because the associated surgery and recovery are less debilitating to the patient than for a proventricular biopsy. A well-innervated area should be biopsied to increase the chances of detection.

If a bird in an aviary or multiple-bird household is diagnosed with this disease, physical separation and increased ventilation often prevent the spread to other birds.

Psittacine Beak and Feather Disease

Circovirus, the agent of psittacine beak and feather disease, is clinically significant in young birds of Old World species. It causes marked immunosuppression and premature involution of the bursa of Fabricius. The classic cockatoo beak and feather disease of previous decades often involved either severe feather dystrophy in juvenile cockatoos or a more chronic, progressive feather loss, accompanied by degradation of the beak and secondary infections. Both of these syndromes were eventually fatal. Due to current testing available for circovirus, there are fewer affected cockatoos than there were 20 to 30 years ago. Currently, the disease occurs commonly in African greys, eclectus parrots, and lovebirds. Although still generally fatal, the presentation in these species does not include beak involvement, and the presence and degree of feather pathology varies. A PCR test is available and is diagnostic in clinically affected birds or on repeat positive testing of asymptomatic birds.

Polyomavirus

Avian polyomavirus has taken a great toll on aviculture in the United States. The disease manifests as the acute death of well-fleshed fledgling birds, with classic necropsy findings of hemorrhage, pale breast musculature, petechiation and ecchymosis on the heart, pericardial effusion, and a swollen, pale liver. Adult birds may be as susceptible to polyomavirus as juveniles; however, they rarely develop clinical disease. This susceptibility means that adults may act as a reservoir in an aviary or pet store population. Antibody and PCR tests are currently available. A positive PCR test on a cloacal swab indicates that the bird is shedding the virus. The same test, when applied to serum, can show recent exposure to the virus, while portions of the viral DNA are still present in the circulation. This test does not indicate whether the bird will survive. The antibody test demonstrates previous exposure to the virus. A vaccine is available.

Other Diseases

Additional diseases of parrots caused by microorganisms include mycobacteriosis, mycoplasmosis, gram-negative enteritis, candidiasis, and diseases caused by herpesviruses. The resources listed in BOX 1 can provide more information on these diseases.

Conclusion

We must be vigilant in avian medicine to neither cause nor accelerate a bird’s demise with overly aggressive intervention. This is true in all presentations of clinically ill pet birds.

When faced with a disease outbreak in an aviary, however, necropsy and histopathology of one affected bird can provide
valuable information for treatment and disease prevention of the remaining individuals in the flock.

References