Bacterial diseases in Birds

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Skills, medications and protocols used in domestic carnivores medicine and surgery are applicable to exotics. Thus, thorough physical examination should be followed by several clinical tests. Because most of the birds are close depend on their environmental conditions, husbandry records are more than important. Review information on apparently healthy animals and the sick individual is part of the diagnostic process. Before any therapy is instituted, the clinician must carefully consider questions on husbandry situation of the patient, especially its nutritional status. There is no sense for instance to institute an antimicrobial therapy without correcting zootechnical deficits.

General considerations
Microbial diseases are common in companion and aviary birds. If bacterial infections may be primary, secondary infections due to bad husbandry conditions, stress, nutritional deficiencies, viral process or parasitic burden are the most common. Besides, many secondary invaders are able to maintain a disease process independent of other infectious agents or predisposing conditions. Thus, in front of a suspicion of bacterial infection, the clinician should always try to find the predisposing causes and should employ all practical diagnostic techniques to direct primary care before initiating any therapy.

The status of certain patients highly supposes either an existing infection or the potential for one (birds presented with wounds, purulent sinus discharge, odiferous feces, increased warmth of the feet or beak...). However, the differentiation between primary or secondary may be challenging since laboratory examinations (biochemical or serologic) are rarely of any help in this differentiation. Again, historical data and husbandry records are essential. Blood work may at least suggest the presence of an infectious process. Elevated white cell counts accompanied by a heterophilia or monocytosis support this hypothesis. Further diagnosis will be based on haematology, cytology, Gram's stains and specific stains (like Ziehl-Neelsen staining for mycobacteriosis diagnostic), culture and sensitivity testing.

It is important to underline here that there is not an obvious relation between the symptoms observed in the patient and the microbiological isolate obtained through standard culture techniques. Obtaining mixed cultures of different bacterial isolates suggests secondary infections are occurring and that the primary pathogen and/or the predisposing conditions still needed to be identified. Just as isolating a bacteria that is part of the autochthonous flora may suppose an opportunistic overgrowth. For this kind of interpretation, it is highly advantageous for the clinician to have databases or good literature on specific normal flora, from which bacterial results may be discussed with consistency. Finding virus or other known pathogenic agents that play a significant role in the cause of illness in pet avian species (like Chlamydophila or Mycoplasma) assume also that the bacterium may be a secondary pathogen. Yet organisms such as Chlamydia or Mycoplasma are not easily detected through routine in-house screening... Isolation of an almost pure culture may indicate that the bacterium is an important or even the main component in the disease process. Just as having a positive bacterial culture with (only) fungi and protozoa assume its prominent pathogenic role.

In necropsy or living biopsy, isolating small to moderate numbers of bacteria from the liver or kidney is not pathognomonic. These organs should be expected to contain autochthonous flora (because of the bird hepatic and renal portal circulations and the lack lymph nodes that filter blood before it drains into the liver and kidney).

The most common causes of primary and secondary bacterial infections in psittacine birds are gram-negative bacteria (Escherichia coli, Klebsiella, Pseudomonas) and Chlamydophila psittaci. Gram-negative bacteria are frequently resistant to routine antibiotics however most isolates are susceptible to enrofloxacin. Enterobacteriaceae (Salmonella, Citrobacter, Proteus, Serratia), Enterococcus faecalis (canaries) are common as well. Less common infectious agents of psittacine birds are Staphylococcus aureus and Streptococcus spp., Mycoplasma, Bordetella, Mycobacterium and Pasteurella multocida. The causative organisms of mycobacteriosis are Mycobacterium avium ssp. avium, M. intracellulare and M. genavense. The disease may be asymptomatic for long periods and the main clinical symptoms are chronic wasting, weakness, labored respiration, diarrhea, skin granulomas, lameness, and death. There is a zoonotic potential, particularly immunocompromised individuals. M. genavense is of greatest zoonotic concern. Thus, therapeutic management must be considered with caution or even not recommended except for valuable and endangered species. M. avium is resistant to common antituberculosis drugs, however combination therapy (isoniazid, ethambutol and rifampicin) for extended periods (up to 18 months) has resulted in clinical remission in some exotic birds.

Once the antimicrobial therapy is decided, it is important to make the antibiotic reach therapeutic levels in all target sites. For instance, direct flushing or nebulization is needed to bring effective concentrations of antibiotics in the upper respiratory tract. Avian abscesses are usually presented with solid pus and are completely unavailable to antibiotic penetration. Surgical excision or debridement follow by topical medication are often essential parts of the therapy. In all case, antibiotic therapy is one part of the therapeutic process. Correcting husbandry and nutritional deficiencies,
giving supportive care (placing the animal in its optimal thermal zone, fluid therapy and gavage if needed) are also essential.

**Antimicrobial therapy in birds**
The ideal antibiotic to use in birds is bactericidal, readily absorbed and widely distributed with therapeutic concentrations in tissues, easily administered, and does not cause adverse effects. Because of the high basal metabolism of birds, it is important to make sure of the availability of these therapeutic concentrations. Thus, medicated water traditionally favored routes for poultry won’t be adapted in companion and aviary birds and would be chosen in the last choice (multiple-bird flocks). Serious microbial infections and critically ill birds should be treated with parenteral (or PO by gavage) medications to establish effective drug concentrations quickly. It’s important not to give a too low dosage and institute a twice (or even a three time) a day administrations.

Enrofloxacin is widely used to treat bacterial infections in companion birds. Enrofloxacin is readily absorbed and widely distributed, partially metabolized to an active metabolite, ciprofloxacin, in many species, including psittacine birds. Enrofloxacin is bactericidal for many gram negative bacteria and species of *Staphylococcus* and *Mycoplasma*. Enrofloxacin is highly active against most Enterobacteriaceae recovered from psittacine birds. A recent study has compared the efficacy of enrofloxacin, oxytetracycline, and sulfadimethoxine for the control of morbidity and mortality caused by *Escherichia coli* in broiler chickens. Chickens that received enrofloxacin had significantly less mortality (P < 0.01), lower average gross patholgy (colibacillosis) scores (P < 0.01), and better feed-conversion ratios (P < 0.05) than did chickens that received either oxytetracycline or no medication. Chickens that received enrofloxacin had significantly less mortality and lower pathology scores than those that received sulfadimethoxine and numerically lower feed conversion than the sulfadimethoxine group. Results from the study showed that enrofloxacin was superior to oxytetracycline and sulfadimethoxine for the control of morbidity and mortality caused by *E. coli* in broiler chickens.

Selecting the route of drug administration in birds requires careful consideration. Available routes include medicated water, medicated food, oral, intramuscular, intravenous, subcutaneous, intraosseous, intratracheal, inhalation and topical. Water-based drug administration is easiest and less stressful route of administration. However consumption is erratic and therapeutic serum concentrations are rarely achieved, especially during the night when less water is consumed. Several studies have measured the plasma concentrations of enrofloxacin achieved by offering drinking water medicated with an injectable enrofloxacin formulation. However, practical applications of these results must be taken with caution as the animal models were healthy animals. A debilitated patient would have a different behaviour and wouldn’t have the water consumption.

**References**


