Avian Medicine
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Introduction

With over 10,000 species of birds, it is nearly impossible to know the peculiarities of each species. However, there are several species that are overrepresented in the pet trade and veterinarians can focus their efforts in becoming familiar with those they will most likely encounter in practice. Cockatiels, lovebirds, budgerigars, Quaker parrots, African grey, cockatoos, macaws, and amazons are some of the most common species in the pet trade. Besides the species of bird, there are two main types of owners, pet bird owners and breeders. Some breeders are in it for the business aspect of it and may not have a strong human animal bond with their birds. Others will do this both as a hobby and a business and are indeed very much attached to their birds and very proud of their offspring's. From a veterinary aspect you should always establish what the relationship between the birds and the owners is to decide on the diagnostic approach. For example, when dealing with breeders, you may have to recommend necropsy of a few healthy/affected birds to help diagnose a problem in the flock. This of course is not an appropriate recommendation for an individual bird owner, and even some breeders will be horrified at your suggestion. Therefore, get to know your clients before you know their pets.

Preventive Medicine

Routine health maintenance visits should be an integral part of an avian practice. Besides a physical exam and weight, it is recommended to obtain a yearly complete blood count (CBC) and a chemistry panel to establish a record of the bird's blood work when it is healthy and have it serve as its own control reference range. There are very limited reference ranges for avian species, and most are not very accurate. Therefore, the best approach is to have each bird serve as its own control. A fecal exam is also recommended in birds housed outdoors but not a necessary for strictly indoors birds. Other yearly procedures include wing, nail and beak trims as needed or requested by the owner. Frequency of nail and beak trims will vary with species, diet, perching surfaces, and lifestyle. This is also an excellent opportunity to revisit the diet and husbandry of the bird and recommend any changes if necessary. An avian polyomavirus vaccine (Psittimune® APV, Creative Science) is available to be used in birds with the first injection at 35 days old followed by a second injection in 2-3 weeks and annual boosters. In most instances, the bird breeders are administering the vaccine themselves but often don't have any proof of vaccination.

Restraint

Restraint is one of the very basic skills of avian medicine, yet one of the most challenging for those will less experience. The main approach to the restraint of birds is to know their "weapons". Adequate restraint is important for your safety as well as the safety of the patient. A bird's main weapon is its beak. Therefore, you must control their heads first and then control their legs and wings. A common mistake when attempting to restrain a bird is being too aggressive with your approach. This will scare them even more and make your job more difficult. Spend a few minutes looking at the bird in its cage. This is an excellent opportunity to also assess some areas of the physical exam. Evaluate the feathers and see if they appear ruffled. Look at their posture when perching. Are they standing straight with their legs extended or are they hunched down against the perch? Look for any evidence of discharge from the eyes or nostrils. Also assess how they react to their environment. Are they pacing nervously or are they preening without much concern about their surroundings? The feces color and consistency should also be noted. This will allow you to get a general assessment of the bird and give them some time to assess you and become familiar with the surroundings of the clinic. The next step is to determine how friendly the bird is. Most bird owners will be fairly accurate about whether their bird will bite or not. Be sure to have the bird in an enclosed room so that if its wings are not clipped, they can not fly out of that room. Then open the door of the cage and allow them some time to get comfortable with this. You can then proceed to assess how friendly the bird really is by

approaching the feet with the back part of your hand while giving a “step up” command. It is normal behavior of birds to reach over with their beaks as they try to step on a new surface. Some people will interpret this as a bite response and withdraw their hands immediately. If you show fear and take your hand away, your job will become more difficult. To some birds this will become a game and they will enjoy they playful motion of your hand as you approach them. To others, this will be a sure sign that they are in control of the situation and that you are afraid of them. So, take a deep breath, keep your heart steady and approach gently but with confidence. If they reach over with their beak, determine whether they are trying to find support or are they coming at you biting while their pupils constrict and dilate very quickly. The latter is a sign of aggression. Even then you must show who is in control of the situation. If the bird perches on your hand you can then take it out of the cage and place them on the scale to obtain a weight. Then you will have to restraint the bird to perform your physical exam. The most common approach to this is by using a towel. Some birds will be familiar with this technique and know what’s coming. There are even some that do not particularly care for a specific color of towel. The towel serves the purpose of concealing your hand, so they don’t know where it is as well as helping in holding the wings together as you wrap them with it. Your approach should be slow and steady. Remember most of these birds are prey species and their main thought is that you will try to hurt them. Distract them with your free hand while you slowly approach them from the other side with the towel. As you get close to the head, you can grasp them around the neck region and support their body with your other hand. Some birds will allow you to do this while they are perching on your hand. In these cases, you can bring them against your body and slowly put the towel over their heads as you get a hold of the neck region. Once you have the neck, it is important to keep the head stretched out. You can use your thumb and index finger to stretch and extend the head. This will let them know that you have control at that time. If you relax on holding their heads, they will attempt to escape and may bite. This approach does not work equally for all birds, especially for breeder birds. These birds are usually kept outside with minimal human contact, and they will be far more defensive. In this situation, you can use the towel to approach them inside the cage and gain control of their head immediately. The main thing to remember is that restraint is a stressful event for the birds, and you should be gentle but firm with your approach.

Physical Exam

Once you have the bird restrained, you can proceed with your physical exam. The approach is no different than with other species, but you need to be aware of their anatomy. In addition, birds, especially sick ones, can become very stressed during a physical exam. Open mouth breathing and tachypnea are the primary indication of stress due to handling. If a bird becomes stress during the exam, you should place them back in their cage and mist them with water to help dissipate heat. You may have to stage the physical exam in these birds and handle them for short periods of time only. Another option is the use of intranasal tranquilization with 1 mg/kg midazolam and 1 mg/kg butorphanol. Cockatoos seem to be more sensitive to this protocol and may become sedated so half the dosing can be used to begin with. This will tranquilize the bird and allow for a lower stress experience. If a bird presents in respiratory distress, you should ruleout an obstruction of the glottis and immediately place the bird on oxygen. These birds can die under the stress of a physical exam. You should also make the owners familiar with the pros and cons of doing a physical exam in a sick bird. We routinely explain to them that the physical exam may have to be staged and that there is a risk that the bird may get too stressed and die in the worst cases. The following is a list of the anatomy that you should examine as part of your physical exam:

Eyes, Nostrils, Ears

The ear canal can be found underneath the feathers caudo-ventral to the eye at about the five o’clock position on the left side and seven o’clock position on the right side. Look for any exudate or evidence of mites.

External beak and cere

The cere is located at the base of the beak and is the area in which the nostrils are located.

Oral cavity: choanae, tongue, glottis, mucous membrane
The choanae is a slit found in the roof of the oral cavity. This slit connects with the glottis when the mouth is closed and allows passage of air from the nostrils into the trachea. There should be sharp, elongated papillae protruding form each side of the choanae. Absence or blunting of these can be related to poor nutrition or upper respiratory disease.

Skeleton: Humerus, radius, ulna, elbow and carpal joints, major and minor metacarpals Femur, tibiotarsus, tarsometatarsus, phalanges, plantar surface
One of the differences in avian anatomy is the fact that the ulna is bigger than the radius. Also, birds have pneumatic or air-filled bones that connect with their respiratory system as part of their adaptation for flight. The humerus and femur are pneumatic in most species and should not be used for intraosseous catheters. The plantar surface of a bird will normally have a rough appearance. A common problem associated to husbandry is pododermatitis or bumblefoot. Although typically seen in raptors, it can also occur in psittacines. Pododermatitis usually occurs because of smoothening of the plantar surface leading to pressure necrosis that will then allow bacteria to penetrate the skin barrier.

Keel bone
Palpation of the keel bone is essential for assessing body condition in birds. A scale of either 1-5 or 1-9 can be used with one being emaciated and 5 or 9 being obese. The ideal body condition score is 3/5 or 5/9. At this score you can feel the tip of the keel bone but if you attempt to hold on to it, it slips away from your fingers.

Coelomic Cavity
Birds do not have a diaphragm therefore they have a coelomic cavity rather than an abdominal cavity. The coelom can be palpated as an empty space from the distal aspect of the keel to the pelvis. A palpable mass in the cavity maybe explained by a recent meal (the ventriculus is full and protrudes into the cavity), an egg, or a true mass (neoplasia).

Vent/cloaca
The vent is the external common opening of the cloaca, which is composed by the coprodeum, urodeum and proctodeum. The colon empties into the coprodeum cranially, then the ureters and reproductive tract empty into the urodeum and the proctodeum is the most caudal common chamber into which the feces and urine pass before exiting the body through the vent. The area around the vent should have clean feathers. Stained feathers are indicative of diarrhea, lack of preening or both.

Uropygial gland
The uropygial gland or preen gland provides essential oils and some vitamins to birds. This gland is located on the dorsal aspect at the base of the tail. It can have tuft of feathers on its tip and should be symmetrical with a light-yellow color. Abscesses, impactions and tumors (squamous cell carcinomas) of the gland are more common in smaller birds such as cockatiels and budgies. Amazon parrots (*Amazona* spp.) and Hyacinth macaws (*Anodorhynchus hyacinthinus*) lack a uropygial gland

Feather quality
Feather quality is an important part of the physical exam. Poor nutrition, improper housing, behavioral and systemic disease can all be manifested in poor feather quality.

Presentations

Found at bottom of the cage

This is probably one of the most common presentations in avian practice. Unfortunately, by the time some birds are ill enough to go to the bottom of the cage it's too late to turn them around. This is a very nonspecific sign that the bird is not feeling well. One alternative to illness may be a female bird that has reached her reproductive period and is getting ready to lay an egg. Determining the sex of the bird is not possible in most species. To rule out egg laying, you can palpate the coelomic cavity for the presence of an egg and obtain radiographs for confirmation.

Feather Destructive Behavior (FDB)
This is probably the most frustrating presentation that you will see in practice. The first thing to do is differentiate feather loss vs. picking vs. plucking. Feather loss is less common and occurs without the bird physically removing the feathers. True loss may be indicative of infectious diseases (viruses > bacteria) affecting the feather growth. Feather picking is when the bird is physically biting the feathers but not pulling them, which would be plucking. Feather picking and plucking can occur independently or together as part of the same presentation. The edge of the feathers can be examined for evidence of trauma as well as asking the owner if they see the bird over grooming or actively plucking its feathers. It must be made clear that FDB is not a disease but rather a clinical sign or manifestation of a disease. It is also very difficult at times to identify the underlying etiology (-ies). Some differentials for this manifestation include behavioral problems, infectious diseases (bacteria, viruses, parasites, fungi), noninfectious diseases (neoplasia, trauma, endocrinopathies, etc.). Obtaining a detailed history of the bird's husbandry and environment is critical for managing these cases. We first attempt to determine if the husbandry and diet have been appropriate and the length of the FDB. This will help determine if a behavioral cause is at least in part a contributing factor. Then we take a "shotgun approach" to get an idea of the bird's overall health status. As part of this we may recommend a CBC, chemistry panel, fecal exam, choanal, crop and cloacal smears and or cultures and in some cases radiographs. Depending on the results of these tests we will either pursue further testing or concentrate on behavior modification techniques. We do not recommend the use of e-collars or psychotropic drugs before exploring all the possibilities. An exception to this would be birds that are self-mutilating. These usually require at a minimum an e-collar to prevent further soft tissue damage. All cases of FDB require a lot of commitment on part of the veterinarian but most importantly the owner. If either party is not willing to cooperate, chances are the bird will never stop the behavior. In some cases what may have started as a response to trauma, or an underlying infectious disease may turn into a compulsive like behavior that the bird will continue to experience even after resolution of the inciting etiology. These cases require extensive behavior modification therapy and may benefit form psychotropic agents, however the response to these drugs may be erratic across birds.

Regurgitation
This is a common presentation for psittacine birds and is often associated with bacterial or yeast overgrowth of the crop. Some birds may also experience behavioral regurgitation during the reproductive season. Psittacine birds (parrots, cockatiels, etc.) should have a predominance of Gram-positive bacteria (>80%) with a lower amount (<20%) of Gram-negative organisms in their gastrointestinal tract. Cytology followed by aerobic culture and sensitivity are the starting diagnostics for a regurgitating bird. An overrepresentation of a single bacterial type, abundance of Gram-positive diplococci (Strep spp.), and abundance of yeast on cytology should all prompt additional investigation via culture and consideration for treatment. *Macrorhabdus ornithogaster* also known as avian gastric yeast is also an important differential to consider in these cases. For diagnosis, the macro suspension technique described by Baron et. al. was shown to be most efficacious (Baron 2021). In short, 0.5g of feces are mixed with 0.3 ml of 0.9% saline in a sample vial. The tube is then mixed well for 20 seconds after which the tube is left to sit until particulate matter settles. Then a drop of the fluid is placed on a slide for microscopic examination. Even with this technique, ante-mortem diagnosis can be challenging. Most birds with *M. ornithogaster* will present in poor body condition despite owners' perception that they are still eating well.

In young birds being hand fed, it is very important to make the formula fresh on every feeding or store formula in the refrigerator for no more than 12 hours to prevent bacterial and yeast

overgrowth in the food which could the affect the bird. Most cases of bacterial/yeast overgrowth respond well to therapy unless dealing with multi resistant bacteria. Less commonly, regurgitation can be an indication of disease in the lower intestinal tract such as gastric neoplasia. Proventricular dilatation disease should also be a differential.

Respiratory Distress

Respiratory distress (dyspnea and/or tachypnea) is one of the most critical presentations for the avian patient. Handling of these birds should be minimal, and the physical exam, diagnostics, and therapeutics should be staged at different intervals with very short restraint periods. Differentials for this presentation include primary respiratory disease (bacterial, fungal, etc.), neoplasia creating a space occupying mass, and egg binding (to be discussed in a separate section). These birds should be placed on oxygen upon presentation and monitored to determine if the respiratory distress is responsive to oxygen therapy. If the bird does not improve with oxygen therapy, then a space occupying mass is more likely, however this does not rule out primary respiratory disease. When handling these birds, it is important to avoid placing them on their backs as this will create additional strain on respiration. Be thorough but quick when performing the physical exam. It may be advisable to palpate the coelomic cavity first to determine if a mass is present. One of the main challenges in working with these cases is that performing diagnostics and providing therapeutics can worsen the bird's condition and lead to their death. Radiographs are indicated in these cases to identify a coelomic mass, egg, air sac or lung pathology. This will require general anesthesia. Alternatively, an ultrasound and aspirate of the coelomic cavity can be performed to determine if there is any fluid, possibly from a cyst. If this is the case, aspiration may improve the bird's condition and allow stabilization for further workup. In cases of cysts, the birds may survive with routine aspiration to decrease fluid content. If the mass is not a cyst, neoplasia should be a top differential. Neoplasia of the internal organs carry a grave prognosis for these patients due to the difficulties in obtaining a diagnosis and carrying out a treatment plan.

If the respiratory distress is not associated with a coelomic mass, bacterial and fungal disease should be considered. Aspergillosis is a common respiratory fungal disease of birds, with African grey parrots being over-represented. A CBC can help support a differential of Aspergillosis if the total white cell count is greater than 45.0×10^3, but not all cases present with an inflammatory response. Itraconazole, voriconazole, terbinafine, and amphotericin B (nebulized) are some of the antifungal drugs used for treating Aspergillosis in birds. In our practice we have had excellent success with itraconazole orally and nebulization of amphotericin B or terbinafine. Mycobacteriosis and chlamydiosis are also differentials in birds with that severe elevation of the CBC. Other bacterial pathogens may also affect the respiratory tract. Tetracyclines, fluoroquinolones, and potentiated sulfa drugs are useful for treating respiratory disease of bacterial origin.

Neoplasias

Psittacine birds are susceptible to a wide range of neoplastic diseases but squamous cell carcinoma (SCC), lymphoma, lipoma or liposarcoma, fibrosarcoma, and gastric carcinomas are some of the more common. Leukemias are also a common occurrence in birds. Another common tumor in birds is xanthomas, which are not truly neoplastic but behave in a similar manner. Xanthomas present as pale to bright yellow subcutaneous masses, especially in featherless areas, that can grow over time and spread locally. Presentations can vary from non-specific weight loss with gastric tumors and lymphoma to obvious external, cutaneous masses. Ante-mortem diagnosis requires biopsy of the lesion/organ affected. Treatment of most neoplastic diseases except for leukemia and xanthomas carry a grave prognosis. Uropygial tumors, even SCC, may have a good prognosis if able to be treated with a combination of surgery and radiation therapy. Strontium probe therapy, when available, is an effective treatment for uropygial tumors. For all other neoplasias, treatment should be aggressive to maximize the probability of success.

Baron HR, Stevenson BD, Phalen DN. 2021. Comparison of in-clinic diagnostic testing methods for *Macrorhabdus ornithogaster*. J Avian Med Surg, 35(1):37-44.