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Common Infectious Diseases of Psittacine Birds: Case Studies.

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Avian diseases commonly encountered by the avian veterinarian often depend upon location. For example, the five most common diseases managed by veterinarians at Loro Parque in Puerto de la Cruz, Tenerife, Spain, according to Dr. Nuhacet Fernandez Gallardo (personal communication), include chlamydophilosis, aspergillosis (primarily in the *Pionus* spp), bornavirus, zinc toxicity, and gout (primarily in the small Australian psittacines, such as *Neophema* spp). Uncommon diseases, that is, diseases rarely, if ever, encountered in Loro Parque, include circovirus, dystocia (including egg-related coelomitis), Pacheco's disease, mycobacterium, and polyomavirus (Dr. Nuhacet Fernandez Gallardo, personal communication). What is uncommon in one location may be common in another. The following case studies are used to present the common infectious diseases of psittacine patients encountered at Colorado State University, Veterinary Teaching Hospital in Fort Collins, Colorado.

Case 1

A two-year-old female Military macaw (*Ara militaris)* presented with a 10-day history of anorexia and weight loss. The bird was housed alone in a large commercial parrot cage; however, there were other psittacine birds in the household. The client rescues unwanted psittacine birds and tries to re-home them. The macaw was fed a commercial pelleted diet supplemented with fruits and vegetables. Two weeks prior to presentation, the macaw began to exhibit a reduction in appetite which prompted the client to begin supporting its nutritional intake by syringe feeding a commercial nestling formula. According to the owner, during the past ten days, the bird appeared to be painful while being fed using a rubber feeding tube. During the onset of the clinical signs of reduced food intake, the macaw was examined at the client's local veterinary hospital where whole body radiographs, a blood profile, and a crop biopsy were obtained. At that time, the complete blood cell count and plasma chemistries were within normal limits according to the veterinary records. However, based on the whole-body radiographic images, the veterinarian was concerned about an enlarged proventriculus and performed a biopsy of the ingluvies (crop) whereupon the tissue was submitted for histopathology to test for signs of proventricular dilatation syndrome (results later proved to be negative for that disease).

Physical examination findings:

The only significant finding on the physical exam revealed a 775 gm Military macaw with moderate reduction of the pectoral muscle mass (body score of 2.0 out of 5). The body weight was 40 gm less than ten days earlier according to the records. The diagnostic plan was to repeat the blood profile and radiographic examination. A blood sample was obtained via jugular venipuncture and submitted for a complete blood cell count and plasma biochemical profile. Whole body radiographs were obtained with and without contrast material in the gastrointestinal tract. The macaw was tube fed 12 ml of a 36% barium sulfate suspension. A faecal sample was also obtained for cytology.

Results of Blood Profile:

Complete Blood Count

		Reference[a]	Reference[b]
PCV (%)	32	47-55	25-55
Leucocytes			
WBC (x10^3/*u*l)	11.9	7.0-22.0	7.0-30.0
Heterophils (x10^3/µl)	9.5	---	---
(%)	80	40-60	37-75
Lymphocytes (x10^3/µl)	1.6	---	---
(%)	13	35-60	20-60
Monocytes (x10^3/µl)	0.5	---	---
(%)	4	0-2	1-10
Eosinophils (x10^3/µl)	0.2	---	---
(%)	2	0-1	0-1
Basophils (x10^3/µl)	0.1	---	---
(%)	1	0-1	0-3
Thrombocytes			
Estimated number	Adequate	1-5/1,000x field	
Morphology	Normal, clumped		
Plasma Protein (refractometry) (gm/dl)	1.9	3-5	

[a] Campbell TW, Ellis CK. 2007. Avian and Exotic Animal Hematology and Cytology 3rd ed. Ames, Iowa, Blackwell Publishing.

[b] Carpenter JW. 2005. Exotic Animal Formulary 3rd ed. St. Louis, Elsevier Saunders.

Plasma biochemistry results

		Reference[a]	Reference[b]
Glucose (mg/dl) mmol/L	284 15.8	145-345 8.0-19.1	225-330 12.5-18.3
BUN (mg/dl) mmol/L	2 0.71	3.0- 5.6 1.1-2.0	0-6 0-2.1
Uric acid (mg/dl) µmol/L	1.1 65.4	2.5-11 148.7-654.3	0.2-6.0 11.9-356.9
Total protein (biuret) (gm/dl) g/L	2.0 20.0	2.1-4.5 21-45	1.5-3.5 15-35
Albumin (gm/dl) g/L	0.7 7	1.2-3.1 12-31	0.6-1.7 6-17
Globulin (gm/dl) g/L	1.3 13	---	0.8-1.9 8-19
Aspartate aminotransferase (IU/L)	164	100-300	60-180
Creatine kinase (IU/L)	228	100-300	180-1,100
Calcium (mg/dl) mmol/L	8.0 2.0	8.5- 13 2.1-3.2	8.5-10.8 2.1-2.7
Phosphorus (mg/dl) mmol/L	4.5 1.5	2.0- 12.0 0.6-3.9	4.6-6.9 1.5-2.2
Sodium (mEq/L) (mmol/L)	144	140-165	135-156
Potassium (mEq/L) (mmol/L)	2.8	2.0-5.0	2.0-4.2
Chloride (mEq/L) (mmol/L)	107	---	96-118
Bicarbonate (mEq/L) (mmol/L)	21	14-25	---
Anion gap (calculated)	19	---	---
Cholesterol (mg/dl) (mmol/L)	89 2.3	100-390 2.6-10.1	75-300 1.9-7.8
Calculated osmolality	290	---	---

[a] Johnston-Delaney CA, Harrison LR (eds). 1996. Exotic Companion Medicine Handbook for Veterinarians. Winger's Publishing, Lake Worth, FL.

[b] Carpenter JW. 2005. Exotic Animal Formulary 3rd ed. St. Louis, Elsevier Saunders.

Interpretive discussion:

Interpretation of the complete blood cell count depended upon which published reference value was used. Reference values obtained from the laboratory doing the testing for a given species, if available, are preferred in the evaluation of CBC results. If that is not available, then an alternative is to use previous blood profiles obtained from the patient during times of health that can be used as a comparison during times of illness. Whenever these are not available, the clinician must rely on published reference values or use decision levels, threshold values of which the veterinarian responds. In this case, the macaw appeared to be slightly anemic based upon a PCV below 35% (a decision level used by the author). The total leukocyte count appeared to be within normal limits for macaws; however, there was a relative heterophilia and lymphocytosis.

Heterophils on the blood film showed increased cytoplasmic basophilia or slight toxicity (1+). Heterophil toxicity is indicative of an inflammatory response regardless of the cell count. The blood film also revealed a slight increase in polychromasia indicating a regenerative response to the erythrocytes. A regenerative anaemia can be seen with a hemolytic anaemia or recovery from blood loss or depression anaemia.

Although the plasma biochemical profile appeared normal, the total protein and calcium values were on the low end of the expected range. This was likely result from inadequate dietary intake.

The coelomic, thoracic, soft tissue, and osseous structures were within normal limits on the whole-body radiograph images. A focal accumulation of contrast was seen within the pharyngeal region, crop, proventriculus, ventriculus, and intestinal structures on the contrast radiographic images. The focal accumulation of contrast within the pharyngeal region likely represented reflux. An irregularly marginated focal area of contrast material was identified within the tissues adjacent to the left scapulohumeral joint. This was likely in the subcutaneous space and suggestive of leakage from an esophageal or crop perforation that led to this accumulation.

The faecal cytology revealed a marked number of yeast, many of which revealed narrow-based budding. The yeast had the morphology of *Candida albicans*, a common inhabitant of the gastrointestinal tract of psittacine birds and opportunistic pathogen.

Summary of initial visit:

Cytologic examination of the tube feeding formula failed to reveal the food as being the source of the yeast. The cause of the yeast overgrowth, as often occurs with most fungal diseases, was likely associated with immunosuppression. The cause of the immunosuppression in this case was not known. The yeast overgrowth could also be associated with a dysbiosis resulting from gastrointestinal disease. The candidiasis can result in decreased gastrointestinal motility as well as malabsorption and maldigestion resulting in weight loss. The macaw was treated with itraconazole (10 mg/kg, orally daily for 10 days). Thirty-six hours following the introduction of the itraconazole, a faecal sample was negative for yeast.

Because the radiographs revealed leakage of barium out of the crop, surgical exploration of the ingluvies was performed. The macaw was given 0.23 mg midazolam, 0.015 mg atropine, and 0.76 mg butorphanol intramuscularly as a pre-anesthetic treatment ten minutes prior to induction with sevoflurane. An opening in the crop was discovered at the biopsy site, which was cleaned and closed. An attempt to remove the barium from the surrounding tissue failed owing to the adherence of the material. The opening in the crop was closed using a 4-0 absorbable suture in a simple continuous pattern. The skin was closed using simple interrupted 4-0 nylon suture. Recovery from the anesthesia was uneventful. The bird was placed on meloxicam (0.3 mg/kg orally daily) for five days post-operatively.

The bird began eating a mix of nuts and fruits on her own the day following surgery, and continued to eat on her own during the next two days. During this time, she exhibited an increase in faecal output with normal appearing droppings.

The bird continued to do well at home and made a complete recovery. Skin sutures were removed by the local veterinarian two weeks after the surgery and the bird was reported to have returned to normal at that time.

However, one month later, the macaw returned with the complaint of having oedema around the eyes and yellow urates. She was still eating well and gaining weight (840 grams) at that time, but had a mild leukocytosis (14,300/µl), elevated plasma AST activity (1,058 IU/L), and bile acid of 40 µmol/L. Although her titer for *Chlamydophila* was negative at that time, she was treated with doxycycline for the possibility of a false negative titer. After two weeks of doxycycline treatment, her AST decreased to 540 IU/L and her bile acid was 16 µmol/L; however, she continued to do poorly, exhibiting weight loss (805 gm) and lethargy and had developed a significant leukocytosis (26,900/µl) and hypoproteinemia (1.7 gm/dl). Repeat radiographs revealed an enlarged cardiohepatic silhouette suggestive of hepatomegaly, cardiomegaly, or both. A liver biopsy was performed for histopathology that revealed bile duct hyperplasia and hepatocellular necrosis with intranuclear inclusions suggestive of herpesvirus infection. The bird was given a poor prognosis for survival and died two days later. Necropsy revealed cardiomegaly with hydropericardium and hepatomegaly. The likely etiology was psittacine herpesvirus infection (Pacheco's disease).

The infectious diseases considered in this case included proventricular dilatation disease, chlamydophilosis, and Pacheco's disease. The case represented an atypical presentation for Pacheco's disease.

Case 2

During a telephone call from an owner of a breeding aviary, it is discovered that the aviary had recently lost two Green-winged macaw chicks (*Ara chloropterus*) that were near fledgling age. The owner of the aviary was instructed to seek medical advice for the aviary by the pathologist who examined the birds and found them to have died of psittacosis.

According to the owner, the chicks came from an aviary of 65 birds represented by three species of macaws, nine species of parrots, three species of conures, three species of cockatoos, cockatiels, and lovebirds. The aviary was housed in the back of a building that contained an antiques and collectibles shop in the front. The aviary part of the building included a large room where the breeders were housed and a smaller room used as a nursery for hand-raising baby birds. According to the owner, the birds were fed a seed-based diet with supplements.

Further investigation revealed that people were free to visit the aviary and bring their birds to the store. The owners frequently took their birds to bird shows and followed no quarantine practices. It was also noted that no other birds in the aviary were sick.

The two macaw chicks had been removed from the parent birds and were being hand-raised on a commercial hand-raising formula for psittacine chicks. Four days prior to their death, the chicks developed crop stasis and were taken to a local veterinarian who treated them with Nystatin and Trimethoprim-sulfa. Both birds died and their bodies were sent for a necropsy. The initial pathology diagnosis of psittacosis was later revised to polyomavirus.

Case 3

An eight-year old female Eclectus parrot (*Eclectus roratus*) was presented for severe feather loss. The client had recently "rescued" the bird from a neighbor who told her "I plucked the feathers to get them to grow better."

The physical examination revealed a bird with a body score of $^{3}/_{5}$ and a body weight of 340 gm. The bird was bright, alert, and responsive, but was suffering from generalized feather loss over 90% of the body. Feather loss was evident on the wings and tail with multifocal patches of just feather shafts (rachis). The feather loss on the body was both on the dorsum and ventrum. The rostral tips of rhinotheca and gnathotheca were fractured and multiple digits revealed hemorrhage and crusting at skin-nail junction.

Based upon the clinical presentation, a blood sample was submitted for testing for suspected Psittacine Beak and Feather Disease. The results revealed the DNA probe 1 was positive for that disease and the bird was euthanized and submitted for necropsy.

The necropsy revealed an acute, moderate, heterophilic, lymphocytic, histiocytic perifollicular dermatitis with random individual basal cell necrosis. The beak (rhamphotheca) revealed an acute, severe, heterophilic, multifocal dermatitis with intralesional bacteria.

Conclusion

The most common medical conditions of psittacine patients encountered at Colorado State University, Veterinary Teaching Hospital in Fort Collins, Colorado include dystocia (egg-binding and egg-related coelomitis), traumatic injury, lead toxicity, candidiasis, and bacterial infections (e.g. abscesses). Whereas, infections with *Chlamydia psittaci*, psittacine beak and feather disease virus (family Circoviridae), avian bornavirus (avian bornaviral ganglioneuritis), psittacine herpesvirus (PsHV1, Pacheco's disease virus), aves polyomavirus 1, *Mycobacterium* sp. and *Aspergillus* sp. are seen but not commonly. These lists differ, somewhat, from the common medical disorders of psittacine birds treated at the veterinary hospital in Loro Parque in the Canary Islands which include chlamydiosis, aspergillosis (primarily in Pionus parrots), avian bornavirus, zinc toxicity, and gout as common problems. Dystocia, psittacine herpesvirus 1, mycobacteriosis, and polyomaviral infections are rarely, if ever, encountered.

These two veterinary facilities treat different psittacine populations; one (CSU-VTH) treats pet birds that represent a wide variety of husbandry practices, while the other (Loro Parque) treats birds with a common husbandry protocol and is a large breeding facility. Dystocia, a common disorder of pet birds, was a rare occurrence at Loro Parque's large breeding facility (La Vera, Loro Parque Fundación) and is likely a reflection of the quality of husbandry in the prevention of that condition in birds. Chlamydiosis may be a persistent problem in Loro Parque because it is an open-air facility with wild birds contributing to the continued exposure, whereas the incidence of that disease in the United States has decreases significantly with the ban on the importation of psittacine birds with the passage of the Wild Bird Conservation Act of 1992 and most birds are housed indoors. Traumatic injuries and bacterial infections were more common in the pet birds treated at CSU-VTH compared to birds at Loro Parque, which places great emphasis on the importance of husbandry in the management of captive birds.