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SMALL ANIMAL EDITION

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Integument

The uropygial gland is relatively large in aquatic birds.

Musculoskeletal System

Swans have 25 cervical vertebrae. The foot of waterfowl is anisodactylyous (P1 caudally oriented, P2-4 cranially oriented) and palmate (webbed). Some of the larger meat breeds and varieties of ducks and geese may be predisposed to excessively rapid growth, excessive weight, and musculoskeletal growth problems such as tibiotarsal rotation, perosis (slipped tendon). As fully grown birds, these same breeds are predisposed to degenerative joint disease and arthritis.

Gastrointestinal System

The crop of ducks and geese is a simple fusiform widening of the esophagus, which is often difficult to identify by palpation. Geese and swans have larger developed ceca, in order to help with digestion of plant and fibrous material, than do ducks or chickens.

Respiratory System

In swans, the trachea is peculiarly elongated into coils which lie within an excavation in the sternum. In many male ducks of the family anatidae, the syrinx is extensively modified to form an asymmetrical dilation of the left side, the syringeal bulla. The opening of the trachea is very distal at the base of the tongue. The tracheal rings of waterfowl are complete, and therefore, predispose to iatrogenic trauma should the cuff of an endotracheal tube be inflated excessively. Inspiration is accomplished by a combination of a lifting action of the sternum and lateral movement of the ribcage. Sternal movement may be difficult in heavy breeds and varieties or species when maintained in dorsal recumbency during restraint or anesthesia.

Reproductive System

Most waterfowl males will have a phallus, which rests on the ventral wall of the proctodeum. Careful eversion of the cloaca may allow easy visual identification of gender, even in newly hatched young. The female has a small elevation of the ventral proctodaeal wall, the urogenital mound.

Restraint

Physical restraint is generally not challenging or difficult with ducks. Some swans and geese may be capable of inflicting harm through the flapping of their wings. Unlike parrots, a painful bite is not a realistic concern. A calm and gentle approach will usually allow a full physical examination and some minor procedures to be performed, with the bird standing at rest on the exam table. Some birds will remain calmer if their head is lightly covered with a towel or hand, and many waterfowl will rest comfortably if their feet are held together and behind them as they lie in sternal recumbency.

Venipuncture

Blood samples can be easily obtained from the jugular vein (right is most convenient, but left can be used), the cutaneous ulnar vein, or the median metatarsal vein. Needle sizes that are used can range from 28 gauge to 22 gauge. Typically, a full biochemistry profile and CBC can be obtained from a sample volume of 0.5 ml; however, larger volumes of blood can be collected and serum saved for potential future use, if needed.

Anesthesia

Preoperative and perioperative analgesia principles are applied with waterfowl as would be with other avian species. Most often, general anesthesia can be induced in these birds with inhalational agents. In some circumstances, injectable products such as medatomadine, ketamine, diazepam, or others may be

INTRODUCTION

In this author’s practice, pet waterfowl species represent a significant and increasing number of avian patients presented per year, as well as a growing percentage of overall pet bird species seen and treated each year. Since 1995, pet waterfowl species and breeds represent 3% of overall avian patient accessions in this author’s avian-exclusive practice, and 190% of the average patient transaction charge. When clinically ill, these pet birds are being presented for veterinary evaluation, diagnosis, and appropriate therapy. As is seen with pet chickens, standard production-oriented poultry medical approaches will typically fall far short in addressing the individual pet waterfowl with a problem as it presents to the private practitioner. This discussion is intended to shed some light on diagnostic patterns that are commonly seen in pet waterfowl species with some selected common disease problems. It is hoped that the described diagnostic patterns in this article will provide assistance to the veterinary practitioner who may be presented with these patients. Where applicable, there will be a brief discussion of appropriate therapeutic protocols or principles.

Some of the more common domestic duck breeds that can be seen as companion birds include the Call, Campbell, Cayuga, Crested, Indian Runner, Muscovy, Orpington, Rouen, and Pekin. Native and non-native species that are more commonly seen in our practice include the mallard, wood duck, Mandarin, and some of the teal species. Domestic goose breeds may include the African, Chinese, Embden, Pilgrim, Sebastopol, and Toulouse. The Canada goose is a commonly kept native species of goose that is seen in our practice. Swan species may include the mute, black, black-necked, and trumpeter.

ANATOMY

Some unique or pertinent anatomic considerations of companion waterfowl are pointed out below. All anseriformes are birds of water and wetlands, and they are found on every continent except Antarctica.

ANESTHESIA

Preoperative and perioperative analgesia principles are applied with waterfowl as would be with other avian species. Most often, general anesthesia can be induced in these birds with inhalational agents. In some circumstances, injectable products such as medatomadine, ketamine, diazepam, or others may be

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used to aid in reducing induction time. Intubation, intermittent positive pressure ventilation, and temperature, pulse and ECG monitors are commonly utilized in this author’s practice. Particularly in diving duck species, the bills should not be taped together around the endotracheal tube, as apnea can be triggered through a diving reflex. Heavy bodied birds may be prone to hyperthermia, and may have difficulty ventilating if positioned in dorsal recumbency. Thermal support for the medium to small body weight birds may be accomplished by circulating heated air systems (Bair hugger, etc), a radiant overhead heat source, or a circulating hot water sources positioned beneath the birds.

**NUTRITION**

The diet of wild waterfowl consists of a wide variety of animals and plants, including fish, mollusks, crustaceans, insects and their larvae, and aquatic and terrestrial vegetation, such as leaves, stems, roots and seeds. In a pet bird setting, a primary diet of commercial poultry layer ration is desired for hens during active reproductive cycles. Maintenance poultry diets can be fed during periods of reproductive quiescence. There are commercial waterfowl maintenance diets that can be purchased by pet bird owners as well. Ducklings, goslings, and signets should be fed a starter or grower ration, with the duration of this diet depending on their age, species, and/or breed and desired rate of growth. Malnutrition is a common problem in companion waterfowl, most often manifested in laying hens, as opposed to their male counterparts. Diets heavy in grains, such as scratch or even dog foods, are commonly fed, predisposing to inadequate calcium availability for laying hens, and reproducively associated problems as a secondary event. Osteoporosis (layer fatigue) is also not uncommon. Some diets with added spinach or chard can also potentially augment calcium availability issues in chicks or adult hens, through the binding effects of their oxalates on calcium in the gut. Obesity is a commonly encountered problem in companion ducks and geese.

**INCUBATION**

The incubation period of mallard derivative ducks is 26 to 28 days. Muscovies may require 33 days or longer to hatch. Light and medium breeds of geese will have an incubation period of 28 to 30 days, and larger breeds of geese may take 30 days.

**REPRODUCTIVE TRACT DISEASE**

**Egg Yolk Coelomitis**

Egg yolk coelomitis is a fairly common clinical problem encountered in pet ducks and geese, as can be seen with pet chickens. Historically, these patients may have a past of known recent reproductive activity, but this history may not always be noted. Often, particularly with geese, an initial presentation focused on respiratory distress is a common complaint. Sometimes, a delayed molt may be seen, and a loss of water repellency to the feathers can be noted. Many waterfowl will demonstrate an enlarged abdomen, sometimes to such a large degree that their abdomens literally may drag on the ground between their legs.

**Physical Examination Findings.** At physical examination, birds may present with palpable abdominal distention of a considerable degree. Fluid may be appreciable by allotment of these distended abdomens. There may be mass effects noted at palpation, consistent with displacement of the ventriculus, soft-shelled or firm-shelled eggs in the oviduct, free and inspissated egg yolk, ectopic eggs, or even ovarian masses. The birds show varying degrees of mechanically induced respiratory difficulty due to the pressure and space occupying nature of the coelomic fluid present.

**Laboratory Findings: Complete Blood Count (CBC).** Normally, most hens will demonstrate a mild to moderate elevation to their total white cell count when ovulating, which resolves in approximately one week without treatment being necessary. It is not uncommon to see an acute elevation in absolute and relative eosinophil counts, which will be followed by a rise in absolute or relative basophil counts as the acute component of the normal postovulatory inflammatory process begins to resolve. There often is a slightly low hematocrit noted in hens during a period of active lay. Some hens with chronic yolk coelomitis may have a depression anemia present, with hematocrits as low as 30% or more, with minimal polychromatophilic red blood cells noted in peripheral smear to suggest active regeneration.

In birds with subclinical to mildly clinical reproductive tract disease, a relative or absolute heterophilia may be seen with or without a persistent basophilia. As is seen in the normal post ovulatory setting, when there is a mild yolk coelomitis noted in the immediate area around the infundibulum, a mild to moderate absolute or relative eosinophilia may be noted in the acute phase of the inflammatory process. As this resolves, basophils tend to increase in absolute and/or relative count, and then decline in number slowly over time. These patients typically will not require medical intervention to return to clinical and hematological normalcy.

Some forms of septic yolk coelomitis, particularly when in their acute phase, may demonstrate a relative and/or absolute leukopenia. Most confirmed yolk coelomitis diagnoses in avian patients in this author’s experience are non-septic, however.

In the chronic forms of yolk coelomitis, the hens more often appear hematologically normal, with the exception of a mild depression anemia. Although not specific for reproductive tract disease by any means, observation of a persistently low resting hematocrit and normal to decreased reticulocyte percentages should serve as a trigger for further diagnostic investigation and/or therapeutic intervention. In those birds with even a more severe and advanced state of chronic yolk coelomitis, more obvious and classically reported clinical signs including respiratory difficulty, abdominal distention or ascites may be seen.
Biochemistries. In the hen that has acute egg yolk coelomitis, hypercalcemia, elevated total serum protein and hypercholesterolemia may be seen on a standard biochemical profile, supporting the presence of reproductive activity in the bird. These changes are much less frequently seen in the chronic yolk coelomitis patient, however.

Diagnosis and Treatment. Definitive diagnosis of yolk coelomitis may require radiography, ultrasonography, laparoscopy or laparotomy. Mild, aseptic yolk coelomitis may not require specific therapy, other than time and rest. In this author’s experience, aseptic yolk coelomitis is significantly more common than the septic form. As such, antibiotic therapy is generally less indicated as a rule of thumb in empirical therapy of many confirmed or suspected patients with egg yolk coelomitis. More severe or chronic yolk coelomitis patients will often require surgical intervention as a part of successful and definitive resolution of the problem. A left flank laparotomy or mid ventral laparotomy can be used for surgical approach, with the left flank being the more commonly utilized in this author’s practice. It is particularly common for loops of small intestine to be adhered to the inner body wall, predisposing the surgeon to an inadvertent enterotomy. A partial or complete oophorectomy, salpingohysterectomy and removal of retained yolk from the coelom may be required individually or in combination in selected individual patients. Infectious oophoritis can include bacterial or fungal agents, once a clear diagnosis has been established, appropriate and aggressive therapy should be applied. Cystic ovarian disease may be primary or secondary to infectious or neoplastic ovarian disease, and seems in this author’s experience to be more common in waterfowl than in chickens. Early diagnosis is an important key in successful therapy in the majority of these patients.

Salpingitis/Oophoritis
Historically, birds with salpingitis or oophoritis commonly have no recognizable and easily attributable clinical signs by their owners to reproductive tract disease. A history of laying persistently infertile eggs in spite of being in the presence of a breeding male, episodic or progressive abdominal distention, laying soft-shelled eggs, or signs attributable to a secondary yolk coelomitis from these conditions may be told by the owners on careful questioning.

Physical Examination Findings. At physical examination, birds may present with palpable abdominal distention of a considerable degree. Fluid may be appreciable by ballottement of these distended abdomens, particularly where there are cystic ovarian changes present. The impacted oviduct may not necessarily be palpable during physical examination.

Laboratory Findings. Complete Blood Count (CBC). Overall, most forms of oviductal disease have not been seen to correlate with significant hematologic or biochemical abnormalities. Birds with cystic or early neoplastic ovarian disease, however, may be recognized similarly as seen in yolk coelomitis patients as secondary yolk coelomitis can often accompany neoplastic ovarian or oviductal disease, and these birds may initially present with a clinical manifestation characterized merely by yolk coelomitis. The laboratory findings in these patients will often reflect the combined effects of these disorders in the bird at that point in time, as well as the hen’s ability to sequester, localize and / or wall-off the inflammatory processes.

Biochemistries. Typically, most patients with salpingitis or oophoritis have few consistently reliable biochemical abnormalities identified.

Diagnosis and Treatment. As in yolk coelomitis, definitive diagnosis of salpingitis or oophoritis may require radiography, ultrasonography, laparoscopy or laparotomy. A partial or complete oophorectomy, salpingohysterectomy and removal of retained yolk from the coelom may be required individually or in combination in selected individual patients. Infectious oophoritis can include bacterial or fungal agents, once a clear diagnosis has been established, appropriate and aggressive therapy should be applied. Cystic ovarian disease may be primary or secondary to infectious or neoplastic ovarian disease, and seems in this author’s experience to be more common in waterfowl than in chickens. Early diagnosis is an important key in successful therapy in the majority of these patients.

UPPER RESPIRATORY DISEASE

History and Physical Examination Findings. Birds with upper respiratory diseases are typically presented with persistent nasal discharge, conjunctivitis, epiphora, coryza, swollen or distended sinuses, coughing or tracheal “clicks” or wheezes. More often than not, these birds will have a chronic history, rather than a history compatible with an acute onset.

Laboratory Findings: Complete Blood Count (CBC) and Biochemistries. Upper respiratory tract infections usually are not represented by any significant or consistent abnormalities in the peripheral hemogram or biochemical profile. Definitive diagnosis of the infecting agent(s) is accomplished by nasal, choanal, or sinus aspiration and microbiological assays to identify or isolate. The etiologic agent(s) of clinical tracheitis is often identified by a combination of deep tracheal culture, cytology and / or endoscopy.

Dacryocystitis may be identified by cannulation of the nasolacrimal ducts under general anesthesia, and obtaining a saline flush for cytology and/or culture. Pseudomonas aeruginosa and Aspergillus species are this author’s most frequently identified nasolacrimal infectants in waterfowl.

LOWER RESPIRATORY DISEASE (PNEUMONIA, AIR SACULITIS)

History and Physical Examination Findings. When afflicted with lower respiratory tract disease, most pet aquatic species will demonstrate fairly serious clinical signs, including increased respiratory difficulty, exercise intolerance, open mouthed breathing, weight loss, and anorexia. Abnormal air movement sounds are comparatively rarely ausculted in the lungs of diseased birds with pneumonia, although air sac “crackles.”

Laboratory Findings: Complete Blood Count (CBC) and Biochemistries. Infectious disease processes involving lung or air sac tissue are typically associated with a significant leukocytosis (>3X normal),
which is often accompanied by a relative and absolute heterophilia. Those patients that are more chronically afflicted may demonstrate a depression anemia, as seen with many chronic disease processes. Polycythemia secondary to chronic lower respiratory tract disease, as identified by an elevated hematocrit and total red blood cell count, is rarely seen. Typically, biochemical abnormalities are rarely noted as a consistent finding in birds with lower respiratory tract disease.

**Diagnosis and Treatment.** Definitive diagnosis of lower respiratory tract disease is established by use of serology, radiography, and/or endoscopy. Therapy is targeted to the specific etiologic agent identified, and is often comparatively long term, continuing up to and beyond one year in some cases. *Aspergillus fumigatus* is the most commonly identified lower respiratory tract infectant in waterfowl.

**HEAVY METAL TOXICOSIS**

**History and Physical Examination Findings.** Pet waterfowl may often be allowed to range freely in backyard collections, and as such, will often feed in puddles of water, potentially picking up and ingesting buried hardware, coins, or galvanized nails that may work up from the soil. Lead and zinc toxicosis, as a result, is not uncommonly encountered in private practice. Pennies minted after the year 1982 can be a toxic source of zinc to the birds that ingest them, and the zinc coating of galvanized metal can pose similar risk to these birds. Clinical signs noted by the owners at the time of presentation include anorexia, diarrhea, regurgitation or vomition, lethargy, and depression. There may be gastrointestinal stasis noted, and greenish tinged urine and/or urates. At physical examination, there are typically few specific findings noted, although the ventriculus may be palpably enlarged or more caudo-ventrally located than usual, due to the presence of the foreign material in the ventriculus.

**Laboratory Findings: Complete Blood Count (CBC) and Biochemistries.** Hematologically, these birds typically do not demonstrate many consistently reliable abnormalities. At times, particularly in those birds with a more chronic form of zinc toxicosis, depression anemia may be noted. Conversely, an anemia with a regenerative response may also be seen in some patients. In many cases of lead toxicosis, a regenerative anemia is seen. Biochemically, few consistent observations can be made, although elevations in CPK, uric acid, AST, amylase, and LDH may be seen.

**Diagnosis and Treatment.** Supportive diagnosis in most patients will require radiography and/or ultrasonography. Blood level determinations will help confirm lead toxicosis; however, blood zinc levels are less consistently correlated to true clinical toxicosis, alone. Treatment, depending on the nature of the foreign material consumed, may be medically supportive only, including chelation, fluids and psyllium to help remove the material, or may require surgery in some cases.

**RENAL DISEASE**

**Clinical History and Presentation.** Renal disease is somewhat commonly recognized in companion waterfowl. The history provided by the owners of these birds at presentation often will include either a gradual or sudden onset of partial anorexia, weight loss, or weakness in one or both legs. It is rare, in this author’s experience, for anseriform or galliform species with renal disease to manifest polyuria/polydipsia, as may be anticipated.

**Laboratory Findings: Complete Blood Count (CBC) and Biochemistries.** Hematologically, there are usually minimal consistent findings in birds with renal disease other than the presence of a relative or absolute heterophilia. Total white blood cell counts will typically be normal to slightly elevated, in most cases. In patients with more chronic renal disease, a depression anemia may be noted. Biochemically, the most consistent findings noted will include the presence of a persistent hyperuricemia (>10 µg/dl) and mild to moderate elevations in CPK (2–3x normal). Hyperamylasemia (>3000 µg/dl) is not an uncommon observation in many, but not all, renal disease patients.

**Definitive Diagnosis and Treatment.** The use of radiography and/or ultrasonography for imaging may be helpful in the identification of nephromegaly, nephrocalcinosis, or other radiographic abnormalities associated with renal disease. Surgical or endoscopic biopsy will establish the specific pathological diagnosis present, however, and is strongly recommended when renal disease is evidenced by laboratory support in individual patients with suggestive clinical signs. An accurate diagnosis, provided by renal biopsy, will lead to more accurate potential for therapeutic intervention. Amyloidosis, neoplasia, bacterial nephritis, toxic nephrosis, and glomerulonephritis all have been seen in this authors’ practice in individual birds, sometimes in multiple combinations in the same patient. These diagnoses carry very different prognoses and therapeutic plans or protocols. As such, definitive diagnosis will be a key consideration for the provision of the most definitive treatment options. Amyloidosis is most commonly seen secondary to chronic bumblefoot lesions in waterfowl, as a seeding source of antigenic exposure.

References available from the author upon request.