Diagnosis of Psittacine Liver Disease

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Psittacine liver disease is common and presents the clinician with challenges to intervene, diagnose and manage clinical problems when resolution is still possible. A database survey from the author's laboratory demonstrated that approximately 34% of psittacines with histological liver disease were either cockatiels or Amazon parrots. Bacterial or chlamydial liver disease was found in approximately 39% of the selected cases, while hepatic lipidosis or hepatic vacuolation was found in approximately 39%.

Psittacine liver disease presents frequently in avian practice, manifesting a variety of clinical signs and etiologies. Advanced imaging and endoscopic techniques have increased our ability to make early effective diagnoses in some cases. This paper will concentrate on etiologies of psittacine liver disease.

Laboratory Diagnosis

Clinicians have long relied on plasma enzyme changes as a central indicator of avian liver disease. Enzyme profiles will typically detect only a narrow spectrum of actual liver disease. Hepatocellular damage and leakage must occur at sampling before enzyme abnormalities become apparent. Moreover, many enzymes are either non-specific or insensitive indicators of avian liver disease. LDH, AST (SGOT) are sensitive but frequently elevate due to muscle damage (skeletal, smooth, cardiac). Hemolysis will elevate LDH. GGT and ALT are insensitive indicators. GLDH is very specific but insensitive. CK elevation is primarily muscle and can be an aid to differentiate sources of elevation.

Bile Acids have become quite popular for laboratory assessment. The assay is measuring the ability of the liver to uptake specific or related bile salts. Reduced uptake suggests reduced function. The RIA method tends to show lower results because of assay specificity. The more popular photometric method shows higher results in normal birds, but is affected by lipemic and hemolytic artifacts. Studies performed in a variety of species have yielded inconsistent results with post-prandrial levels, regardless of whether the species is a gall-bladder containing bird.

Clinical signs, history, physical assessment, radiographic imaging, ultrasound, and endoscopic biopsy can all provide more information regarding liver status.

Early detection is valuable in a significant proportion of liver cases including metabolic/nutritional and inflammatory disorders, while such detection of neoplastic or viral disorders will usually not effect outcome.

The laboratory database was searched for recent psittacine histologic diagnoses where liver disease was a primary or contributing diagnosis. Most of the cases retrieved originated from necropsies. A select few represented biopsy samples.

Table 1- Psittacines With Liver Disease by species or genus; n=103

African Grey	8	Amazon	21
Budgerigar	11	Cockatiel	14
Cockatoo	9	Conure	6
Eclectus	3	Lory	5
Lovebird	3	Macaw	8
Quaker	3	Other psittacines	12

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Table 2- Histological Diagnoses of Psittacine Liver Disease

Bacterial cholangiohepatitis	7	Bacterial necrotizing hepatitis	18
Bile duct proliferation	3	Chlamydial cholangiohepatitis	5
Chlamydial hepatitis	9	Hepatic fibrosis	15
Hepatic lipidosis	14	Hemosiderosis/Hemochromatosis	4
Hepatocyte vacuolation	18	Herpesvirus	2
Lipofuschinosis	2	Neoplasia	6
		(Bile duct CA, lymphosarcoma, myeloproliferative, lymphohistiocytic)	
PDS associated	2	Polyomavirus	3
Protozoan hepatitis	2		

Other: tuberculosis, hepatic degeneration- aspergillosis, toxic, viral; fungal infarction

Approximately 34% of tabulated psittacines were either cockatiels or Amazon parrots, which are apparently over-represented in this sampling. Bacterial or chlamydial liver disease was found in approximately 39% of the selected cases, while hepatic lipidosis or hepatic vacuolation was found in approximately 39%. This was followed in prevalence by hepatic fibrosis and bile duct proliferation. A variety of other diagnoses are listed. These will be discussed further in the following paragraphs.

Over half of tabulated psittacines showed infectious disease as a contributing diagnosis. From the literature, infectious etiologies can be further divided into bacterial, chlamydial, fungal, and viral in origin. Bacterial infections most commonly originate from enteric or septicemic foci and can include opportunistic coliforms, obligate pathogens such as *Salmonella* spp, *Yersinia, Mycobacterium*, a variety of gram positive opportunists, and *Pseudomonas/Aeromonas*. Chlamydia infection most commonly begins through aerosol inhalation or ingestion. Egg transmission is possible. Acute disease may follow in days or weeks. Evidence of infection is suggested or confirmed sometimes months to years later through histopathology, clinical pathology or DNA probes. Cholangiohepatitis in the older psittacine will often clinically improve with doxycycline therapy, however no controlled studies have been performed to rule out other etiologies.

Viral etiologies associated with psittacine liver disease include herpesvirus, polyomavirus, adenovirus, and secondarily circovirus. Herpesvirus infections, mostly referred to as Pacheco's Disease, are characterized by a short clinical course or sudden death, accompanied by necrotizing hepatitis and eosinophilic or amphophilic intranuclear inclusions.

Fatal polyomavirus infections involving the liver occur primarily in neonates and weaning age psittacines exposed vertically or horizontally to the virus. Susceptible birds will show a short clinical course before death. Gross lesions are characterized by serosal hemorrhages, accompanied by basophilic intranuclear inclusions upon histopathologic examination. Adenovirus infections are frequently and, with confusion, referred to as "inclusion body disease." While not common in psittacines, histopathologic lesions include intranuclear basophilic or eosinophilic inclusions.

Fungal infections of the liver are uncommon are primarily would occur as a local extension of a invasive or septicemic organism.

Parasitism of the liver is uncommon in psittacines. Sarcocystis facatula provides a recurrent challenge to aviculturalists particularly in Florida and other southern areas of the US. The opposum is incriminated as the definitive host. Microsporidia and Toxoplasma have been occasionally incriminated as cause of death or illness in selected psittacines. Trematodes have been a problem in wild-caught cockatoos and in some rare cases with captive-bred birds.

Cholangiocarcinoma is the most commonly reported liver neoplasm in psittacines. A significant correlation with alimentary tract papillomatosis has been demonstrated, and a yet unproven viral etiology has been suggested. Lymphoma, adenoma, hemangioma, fibrosarcomea have also been reported.

Common hepatotoxic substances include mycotoxins, heavy metals, pesticides, certain drugs, and specific plants. Hepatic necrosis, due to hepatoxins, results in fatty change, fibrosis, and/or bile duct proliferation.

Metabolic/Nutritional disorders of the psittacine liver are common. Hepatic lipidosis and hepatic vacuolation probably occur primarily due to the lack of certain lipotrophic substances, coupled with the ingestion of excessive lipid calories. Hemochromatosis/hemosiderosis is best known in certain passeriforme birds, particularly mynahs and toucans. Abnormal accumulation of iron pigment can and does occur in psittacine species, particularly lorikeets and Amazons. Iron levels are not diagnostic; biopsy provides definitive information. An avian specific ferritin RIA may provide the diagnostic information we require.

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