*Journal of Avian Medicine and Surgery* 11(4):273–276, 1997


*Round Table Discussion*

# Endoscopic Renal Biopsy

Improved diagnostic techniques allow us to provide high-quality care for our patients. The use of endoscopic biopsy techniques, such as kidney biopsy, helps us in diagnosing and treating diseases in birds, even in small patients. In this forum, Brian Speer, DVM (Oakley Veterinary and Bird Hospital, Oakley, CA), Don Harris, DVM (Avian and Exotic Animal Medical Center, Miami, FL), and Michael Murray, DVM (Avian and Exotic Clinic of the Monterey Peninsula, Monterey, CA) share their clinical experiences in performing kidney biopsies. Gregory Bossart, VMD, PhD (University of Miami, Comparative Pathology Laboratory, Miami, FL) contributes views from a pathologist's perspective.

Susan L. Clubb, DVM
Associate Editor

*Question: How do you select patients for kidney biopsy?*

**Dr. Speer:**

Birds with persistent hyperuricemia, polyuria, or polydipsia or birds with radiographic or endoscopic evidence of renal disease are potential candidates for kidney biopsy. Educating the client and offering definitive options are also key to the process.

**Dr. Harris:**

Patients for kidney biopsy are from three primary sources. If exploratory endoscopy reveals gross pathologic lesions of the kidneys, a biopsy specimen is collected. If the uric acid concentration is persistently high, the bird's kidneys are examined by endoscopy, and ultimately, a biopsy is done. Lastly, a high β-globulin concentration warrants exploratory endoscopy and biopsy of the kidney, liver, and spleen.

**Dr. Murray:**

The indication for a kidney biopsy arises from a variety of diagnostic test results. For example, abnormalities in the radiographic appearance of the kidneys, lesions observed during a routine laparoscopic examination, and high concentrations of plasma uric acid are obvious indications. I also recommend examination and possible biopsy if abnormalities are observed in the urinalysis, either chemical or microscopic, especially if urinary casts are present. An increasing concentration of plasma uric acid over time, even if concentrations are within the reference range, is also an indication for biopsy.

*Question: What technique do you use? Have you used the percutaneous technique through the sacrum?*

**Dr. Speer:**

We obtain our samples by endoscopy with the Storz system and biopsy equipment. We've been very happy with the diagnostic accuracy, minimal surgical trauma, and bottom-line results obtained this way. I have not yet tried the percutaneous approach through the sacrum.

**Dr. Harris:**

We use a lateral approach through the last intercostal space, and we use the Storz endoscopy system exclusively.

**Dr. Murray:**

I obtain my biopsy specimen by using the standard avian set, including the Taylor sheath from Karl Storz Veterinary Endoscopy. I will generally approach the kidney (as seen in the abdominal air sac) by either a left or right lateral approach into the caudal thoracic air sac. In those birds requiring access to the caudal division of the kidney, the postpubic approach directly into the abdominal air sac may be more appropriate. I have not used the percutaneous approach through the sacrum. I prefer to actively select my biopsy site after examining the kidney completely.

*Question: How large is the sample you collect? Do you collect multiple samples?*

**Dr. Speer:**

The Storz biopsy cups are 1.67 mm. I ideally try to collect two or three samples. In some patients,

only one bite can be obtained for various reasons. Three samples provide options for histopathologic and cytologic examination and bacterial and fungal culture.

**Dr. Harris:**

The sample size is 1.67 mm, as dictated by the size of the Storz biopsy forceps. Pathologists report this sample size is adequate and is better than those obtained from dogs or cats by percutaneous methods.

**Dr. Murray:**

Sample size depends on patient size. In most cases, I collect samples with the 5-Fr elliptical biopsy forceps. The 3-Fr size (1.67 mm) is generally used in birds weighing less than 100 g. I have used the larger 5-Fr size in birds weighing as little as 27 g. If possible, I collect two samples.

*Question: Have you seen any adverse effects such as hematuria or bleeding at the biopsy site?*

**Dr. Speer:**

I haven't seen any real problems yet. When it occurs, hemorrhage has not been clinically significant.

**Dr. Harris:**

I have not observed hemorrhage, hematuria, or other clinical problems. No birds have died.

**Dr. Murray:**

I have not seen any significant hemorrhage. When it occurs, it appears to be self-limiting and of little consequence.

*Question: Have you monitored plasma biochemical values such as uric acid, creatine phosphokinase, etc, after biopsy, and if so, have you found any abnormalities?*

**Dr. Speer:**

Biochemical analyses, when done, have been for follow-up of abnormal results that were present at the time of biopsy. Most commonly, uric acid concentrations are assessed and complete blood counts performed. Uric acid values in most patients rapidly return to normal after diagnosis and treatment. We have not screened birds immediately after biopsy to monitor procedure-influenced biochemical changes. We have recommended repeat endoscopy, biopsy, or both, particularly in birds with bacterial nephritis, as follow-up procedures after treatment. (See case report with follow-up below).

**Dr. Harris:**

I typically monitor by repeating the biochemical analyses that were abnormal, and occasionally perform followup biopsy. In most cases, there is improvement; however, a few have persistent abnormalities.

**Dr. Murray:**

I have used this technique clinically, not as an investigational procedure. As such, typically some degree of serum biochemical abnormality exists before the biopsy is collected. I have seen no evidence to suggest that significant iatrogenic lesions occur.

*Question: What types of histopathologic changes are you seeing?*

**Dr. Speer:**

My findings include degenerative nephrosis of various types, renal mineralization in various locations, glomerulonephritis, bacterial granulomatous nephritis, viral nephritis, and renal adenocarcinoma.

**Dr. Harris:**

The primary changes I have seen are interstitial nephritis, glomerulonephritis, and occasional tubular nephrosis.

**Dr. Murray:**

I have been finding inflammatory, metabolic, and neoplastic diseases: bacterial nephritis, glomerulonephritis, nephrosis, renal mineralization, nephrotoxicity, adenocarcinoma, and lymphosarcoma.

*Question: How do you treat birds after making your diagnosis?*

**Dr. Speer:**

Treatments are tailored to meet the needs of the patient. We look for possible toxic causes and either rule these out or supportively treat the bird. Birds with inflammatory diseases are treated with antibiotics or other appropriate therapy; some are also treated with ibuprofen to help reduce inflammation. We have not recognized adverse renal effects with the use of ibuprofen. Some birds with hyperuricemia are treated with allopurinol or colchicine. All patients with renal disease are treated with supplemental fluids.

**Dr. Harris:**

When inflammatory changes are observed with hematologic abnormalities, we have used antibiotics. Otherwise, therapy is based on the specific

changes observed. Often dietary modification is helpful. Sources of toxins, etc, are explored and minimized.

**Dr. Murray:**

The treatment is based on the diagnosis; however, most seem to be palliative, as many diseases are quite advanced when biopsies are done. Most commonly I use antibiotics, anti-inflammatory drugs (ie, ibuprofen), colchicine, and supplemental fluids. Dietary manipulations are generally indicated.

*Question: What has been the response to therapy?*

**Dr. Speer:**

Response to treatment is contingent on the diagnosis. Patients with severe renal mineralization or nephrosis respond favorably to management changes oriented towards reducing protein intake, controlling hyperuricemia, and maintaining hydration. However, the cause of death in these birds is usually renal disease. Birds with bacterial nephritis respond well to treatment, although we are still not sure how to truly confirm "cures" without a follow-up biopsy. We have not yet attempted treatment of birds with renal tumors, despite diagnosis at quite early stages of disease.

**Dr. Harris:**

Apparent infectious problems have resolved readily. If infection is not a component of disease, response to diet change, avoidance of toxins, etc, have been sporadic, and improvement has taken months.

**Dr. Murray:**

The response has been directly related to the diagnosis and the stage of the disease progression when a diagnosis is made. I believe that our attempts at managing renal disease benefit the patient and its steward. Unfortunately, many diseases progress, albeit at a slower rate, until the bird dies from the renal disease. In those birds that cannot be cured, such as those with bacterial nephritis, a follow-up biopsy appears very important in "diagnosing a cure."

*Question: How frequently are kidney biopsy specimens sent to you?*

**Dr. Bossart:**

Of over 10,000 histopathologic submissions our laboratory receives each year, approximately 30% of these are from companion birds. Most of these are necropsy tissues. In the past 4 years, the number of avian biopsy samples has increased. Most are excisional biopsy specimens of skin and subcutaneous neoplasms. However, we have seen a small increase in hepatic, splenic, and, to a lesser extent, renal biopsy specimens. The number of organ biopsy samples has increased from none a few years ago to approximately twelve per month. Renal diseases diagnosed include membranoproliferative glomerulonephritis, lymphoma, nephrosis, amyloidosis and chronic interstitial nephritis.

*Question: What do you recommend to practitioners to improve the diagnostic quality of biopsy samples?*

**Dr. Bossart:**

As with any biopsy sample, it is imperative to follow proper techniques to minimize collection artifacts. Ideally biopsy samples should be directly placed in tissue cassettes with sponges to ensure that the tissue is properly processed. Cassettes should then be placed in 10% neutral buffered formalin and sent to the laboratory. Cassettes with sponges can be supplied by our laboratory. As always, a complete history should be submitted with any biopsy sample to facilitate an in-depth interpretation.

*Question: Can one of you illustrate the role of an endoscopic renal biopsy in the management of an actual case?*

**Dr. Speer:**

I think the following clinical case shows the importance of endoscopic renal biopsy as both a diagnostic and prognostic tool in avian medicine.

*Patient:* A 12-year-old female hyacinth macaw (*Anodorhynchus hyacinthinus*) maintained for breeding purposes.

*Clinical signs:* Rapid onset weight loss (the bird weighed 1,050 g at presentation); feather picking over the synsacral region; dehydration; and an acute, marked onset of weakness.

*Results of blood tests:*

Plasma biochemical analysis:

| | |
|---|---|
| AST | 301 U/L |
| CPK | 2,301 U/L |
| Albumin | 1.5 g/dl |
| Total protein | 3.5 g/dl |
| Glucose | 171 mg/dl |
| Calcium | 8.0 mg/dl |
| Uric acid | 44.1 mg/dl |

| | |
|---|---|
| Amylase | 1,151 mg/dl |
| Bile acids | 63.6 μmol/L |
| Total solids | 2.1 g/dl |

Protein electrophoresis:

| | |
|---|---|
| Globulins | |
| α-1 | 0.4 g/dl |
| α-2 | 0.5 g/dl |
| β | 0.4 g/dl |
| γ | 0.1 g/dl |
| Albumin | 1.6 g/dl |
| Prealbumin | 0.5 g/dl |

Complete blood count:

| | |
|---|---|
| White blood cells | $10.7 \times 10^3$ cells/μl |
| Heterophils | 89% |
| Lymphocytes | 8% |
| Eosinophils | 1% |
| Basophils | 2% |
| Packed cell volume | 47% |

*Endoscopic examination:* The ovary appeared atrophic and inactive. The kidneys were small and irregular at their surface; tophi or mineralized lesions were seen.

*Results of renal biopsy:* Multifocal tubulointerstitial nephritis and multifocal mineralization. The changes seen were consistent with possible toxic nephrosis causing a heterophilic response. The primary differential diagnosis was bacterial infection of hematogenous origin.

*Treatment:* Immediate supportive care included fluids given intraosseously. Once the patient was stabilized, ceftiofur, supplemental fluids, and supportive care were administered for 30 days.

*Follow-up evaluation:* Ten days after the bird was examined, the uric acid concentration was within reference ranges. At 45 days after examination, a second endoscopic examination was done to examine the kidneys and the ovary. The bird's weight had increased to 1,350 g. Feather picking over the synsacrum had decreased, although the bird was still not fully feathered in that area.

*Endoscopic examination:* The ovary, previously atrophic, showed evidence of follicular enlargement. The kidneys still appeared smaller than normal.

*Results of a second renal biopsy:* Mild tubular dilatation. No evidence of severe renal disease was present in the biopsy sections. Tubular dilatation indicated some degree of necrosis; however, some regeneration of tubular epithelial cells was apparent. Based on these sections, prognosis appeared better than at initial presentation. No inflammation or mineralization was seen.

*Outcome:* Based on the follow-up information provided in this case, the prognosis for return to breeding success was upgraded from poor to fair. Presently, this bird has yet to successfully breed, but it has been less than 6 months since the initial presentation and diagnosis.