

Proventricular Dilatation Disease Review 2005

This avian disease has affected bird species from macaws to conures to lorries.

By Rebecca Sweat

Proventricular Dilatation Disease (PDD) was first recognized in the late 1970s. Back then it was known as “macaw fading syndrome” or “macaw wasting disease,” because it seemed to be limited to macaws. By the early 1980s, however, it became apparent that the condition was also infecting other psittacines, including African greys, Amazons, budgerigars, cockatiels, cockatoos, conures and Eclectus parrots. In recent years, PDD has also been reported in geese, spoonbills, toucans, lorries, weavers and hawks.

“PDD is a fairly common condition in pet birds,” said David Phalen, DVM, DVM, Dip., ABVP — Avian Practice, an avian researcher and Associate Professor in Zoological Medical Section in the Department of Large Animal Medicine and Surgery at Texas A & M University. “A busy avian practitioner will see this disease at least several times a year. I don’t think there’s a large breeding aviary of collections that have come from multiple sources that hasn’t had a case of this.”

When a bird gets PDD, usually what happens is the nerves in its gastrointestinal tract become inflamed. The primary parts of the digestive tract that are affected are the proventriculus, which is the upper glandular portion of a bird’s stomach (where acid is secreted to start the digestion process), and the ventriculus or gizzard, which is the lower, muscular section of a bird’s stomach. In a healthy bird, food collects and softens in the proventriculus before being pushed down into the ventriculus where the food is then ground up and digested.

However, when a bird has PDD, “the disease causes white blood cells to come into the ganglia (a mass of nerve cells) inside the stomach and causes damage in there, so those nerves don’t work anymore,” explained Jeffrey Jenkins, DVM, DVM, Dip., ABVP — Avian Practice, an avian veterinarian in San Diego, California. “These nerves control the unconscious contraction and movement in the stomach. When the nerves stop working, the bird loses the ability for the muscles in its stomach to push food down through the digestive tract.”

Unable to do its “job,” the proventriculus becomes a place where packed, undigested food accumulates and rots, Jenkins said. All this accumulated food causes the proventriculus to dilate and become stretched out of shape. Digestion basically comes to a halt and the bird, in effect, starves to death. There can also be bacterial infections from the undigested food that accumulates in the proventriculus.

PDD Symptoms

The most common clinical signs of PDD include chronic or intermittent regurgitation, passage of undigested seeds in the bird’s droppings, weight loss, lack of appetite, diarrhea, muscle weakness, depression and lethargy.

PDD can also damage nerves in the brain and spinal cord. When that happens, the bird may have seizures, abnormal head movements, poor grasp, unsteadiness, clumsiness and lack of balance. The bird may not seem to know where to put its feet, may not seem to be fully aware of what’s going on in its environment, or it may have a difficult time flying. Birds can exhibit just GI signs, only neurological signs or both.

“Some species, like cockatoos, are more likely to develop neurologic signs rather than gastrointestinal abnormalities,” noted Karen Rosenthal, DVM, DVM, Dip., ABVP — Avian Practice, Associate Professor of Special Species Medicine at the University of Pennsylvania School of Veterinary Medicine. “Other birds, like macaws, tend to have the GI problems first and then take a long time before they show neurologic signs, if at all.” In many cases, PDD starts in the digestive tract, and the bird succumbs to gastrointestinal problems before the disease has the chance to spread to the central nervous system, Rosenthal added.

How To Diagnose PDD

Because there is no screening test for PDD, it is usually not apparent that a bird has the disease until the bird appears sick. Even then, confirming that a bird has PDD can be extremely difficult.

One diagnostic tool that can be used is to biopsy the proventriculus or ventriculus to look for microscopic changes in the tissue. However, obtaining a biopsy sample from these organs requires major surgery and can be risky, so many veterinarians are reluctant to do this. "If you have a bird with PDD and you make an incision into the proventriculus or the ventriculus, you can destroy these organs. You can't sew it back up because the walls are so thin from dilating," Rosenthal said.

In some birds, biopsy of the crop can be used to diagnose the disease. This is a little safer than biopsying the stomach, but there is still some risk associated with it. "The majority of birds that have PDD have legions in their crop, but not 100 percent of them do, Jenkins said, "so if we don't find the changes there that we expect microscopically, it doesn't mean that the bird doesn't have PDD, which means we get some false negatives. If it's negative, we really don't know for sure."

As an alternative, some veterinarians may also use fluoroscopy (real-time radiographs or X-rays) for their diagnosis. This requires special equipment, which not all veterinarians have, but when they do, it can be helpful. "The bird is given some barium or other contrast material orally, and then the bird just stands in a box while the veterinarian watches how fast it moves through the digestive tract. If the bird has PDD, the movement is going to be slow, and the stomach will look dilated and enlarged," Phalen explained.

If biopsies are considered too risky and the veterinarian does not have the equipment to do the fluoroscopy, diagnosis is made by ruling everything else out. "You do a CBC [complete blood count], biochemistry profile, electrophoreses and all the tests you can do for other diseases — conditions that may have the same signs as PDD," Rosenthal said. "If the bird tests negative for all these other diseases, and all you're left with is PDD, there's your answer."

Prognosis For PDD

What can be done for a bird that is diagnosed for PDD? Up until a few years ago, all a veterinarian could offer was supportive care — put the bird on a liquid diet, etc. — to try to make its remaining time alive more comfortable. Today, however, many veterinarians are treating birds diagnosed with PDD with a special type of non-steroidal anti-inflammatory drugs (NSAIDs) called COX-2 inhibitors. This is a treatment developed a few years ago by Robert Dahlhausen, DVM, an avian researcher and co-founder of Research Associates Laboratory in Milford, Ohio. These drugs, however, are still relatively new treatments, so whether they are or aren't helpful in the long-term remains to be seen.

Dahlhausen has had a lot of success with a particular NSAID called Celebrex™. "In the past, there was really a very poor prognosis for a bird with PDD," Dahlhausen said. "Now, with the majority of the birds we see, we can turn the situation around and save them." He's had avian patients that he treated with Celebrex three and four years ago for PDD that are still alive and doing well.

Jenkins, too, has been treating his patients with Celebrex. "With several of them, we just treated them for six weeks back in 1999, and their symptoms have not come back," he said.

Rosenthal also had success with another COX-2 NSAID, Moloxycam (Medicam). It's not a cure-all, however, for all birds, she said. "Some pet birds do very well on Medicam treatments and can actually be weaned off it. Other birds do OK for a while and then become resistant to it, and some pet birds are not affected at all by the Medicam and go downhill," she said. "All I can say is the sooner we catch them in this disease, the better the chance of Medicam working well for them."

Other veterinarians are not as optimistic about the COX-2 drugs. "These drugs may be helpful and improve the quality of life for a period of time, but they are not a cure," Taylor maintained.

Ritchie concurred. "The drug can slow down the inflammatory response, but that doesn't cure the infection," he said. "It's no different than taking Celebrex for arthritis; if you go off the drug, you still have arthritis. The same is true with PDD. You can't cure an infectious disease with an anti-inflammatory drug."

The bottom line is to be proactive. "We live in a world where there are lots of things to be afraid of," Taylor said. "Certainly with PDD, there are a lot of unknowns and, that can be frightening. The key with PDD is taking whatever steps you can to minimize the odds that your birds will become sick with it. Practice good hygiene, good biosecurity and good husbandry. You don't have to feel like a 'sitting duck' just waiting for PDD to strike your birds."

What Causes PDD

Beyond being able to identify the signs of the disease and what it does to birds, not much else is known about PDD. The

causative agent for this disease is unknown as well as how it is spread or whether PDD is truly contagious. With so many unknowns, there is no vaccine to prevent PDD, no screening test to detect birds that are carrying it and no real “cure” for birds that have developed clinical signs of the disease.

There is, however, a lot of speculation regarding what causes PDD. Many avian veterinarians believe it is a virus. Others speculate that PDD could be caused by another type of pathogen, an allergic reaction to something in the environment, an immune reaction to a protein that’s been ingested, or there could be a genetic link that predisposes some birds to the disease.

Two researchers in North America are currently conducting PDD research. One is avian medical researcher Branson Ritchie, DVM, Dip., ABVP — Avian Practice, the head of the Emerging Diseases Research Group and professor of avian and exotic animal medicine at The University of Georgia College of Veterinary Medicine., and the other is Michael Taylor, DVM, Dip., ABVP — Avian Practice, Clinical Service Chief at the Avian and Exotic Clinic at the University of Guelph at the Ontario Veterinary College. Both believe PDD probably has a viral cause.

Ritchie’s team at the University of Georgia has been able to isolate a virus that they believe may be the causative agent of PDD. “We suspect that PDD is caused by a virus, but, at this stage, I still can’t say that without a doubt it is. It does, however, meet a lot of the criteria that are classically reserved for viruses,” Ritchie said.

As of yet, the organism still has not been identified or classified into a scientific family, and no one has been able to grow it in a laboratory for further study. At present, Ritchie and his colleagues are looking at pieces of the organism’s genetic material to better understand it. “We continue to pick up clues about what it is, who it is, and how it behaves and work off that clue to the next clue. When we’ve got enough clues, we can then think about developing a screening test and a vaccine,” he said.

Taylor and his associates are conducting similar research at the University of Guelph. They are looking at the same organism as those at the University of Georgia. Taylor, like Ritchie, believes a lot of laboratory work still needs to be done in order to better understand how the organism operates and to prove, without a doubt, that it is the cause of PDD. But, he said, even anecdotal evidence seems to indicate a viral cause. “Most of the larger outbreaks of PDD have happened in the large indoor aviaries in Canada and the Northeastern United States, where the birds are all cooped up together and there’s not a lot of air circulation. This indicates that there’s an infectious agent involved, most likely a virus.”

Others in the field are still skeptical that a virus is the root cause or the only cause. “There may be multiple causes leading to the same lesions,” Rosenthal speculated. “In some birds, could it be a virus, but in other birds could it be an autoimmune disease or an environmental cause?” Even if a virus is implicated, it may not be that simple, she added. “There are viruses that can attack the body early on in life, and then the virus is long gone but causes an autoimmune reaction so the antibodies actually attack the body thinking they’re attacking the virus,” Rosenthal said. “By the time we see these cases, the virus is long gone, and so it doesn’t make any sense to look for it.”

Those who believe a virus is the cause, theorize about how the disease is transmitted. Is it passed from bird to bird, spread via the droppings or in the air, or is there a vector organism involved? It appears that some birds can be exposed to PDD and not become sick themselves, but still pass the pathogen to others. Why? These are questions researchers still need to answer.

“This particular contagion is arising as a real headache for aviculture, because it’s very easy for people to buy chronically-infected birds that could be the source of new infections in their aviary,” Taylor stated. “There’s [currently] no way to screen these birds for what we believe is likely a chronically-infected state. So, a bird could look normal outwardly, but in fact be a ‘Trojan horse,’ because it can come into an aviary and be shedding the agent and the owners don’t suspect a thing.”