

Case Study

First Report of Coccidiosis and Gizzard Erosion in a Zebra Finch (*Taeniopygia guttata*) of Iran

Nouri*, M., Azarabad, H., Moini, M.

Department of Pathobiology, Faculty of Veterinary Medicine, university of Tehran, Tehran, Iran

Received 16 May 2011; accepted 24 Jul 2011

ABSTRACT

Coccidiosis and gizzard erosion are rare conditions in cage bird. A male zebra finch was presented with a history of watery diarrhea, anorexia, ruffled feathers, weight loss, and lethargy and died finally. Gross necropsy revealed small areas of erosions and hemorrhages on the gizzard wall. The intestine was oedematous. The spleen appeared pale and small. The testes were asymmetric. Histologically, necrosis of mucosal layer with infiltration of inflammatory cells observed in cecum. *Eimeria* stages were detected in the enterocytes. In Gizzard, hemorrhage and ulceration of mucosal layer with infiltration of polymorphonuclear cells in to the underlying mucosa were seen. In hepatic tissue, mild focal necrosis with mononuclear cells infiltration was seen. The disease was diagnosed as coccidiosis and gizzard erosion.

Keywords: *Eimeria*, Zebra finch, Gizzard erosion, *Taeniopygia guttata*

INTRODUCTION

Coccidiosis has long been known as an important disease in poultry, and even today, control requires significant financial expenditure (McDougald & Fitz-Coy 2008). Coccidian parasites have a characteristic apical complex of organelles in the infective stages that enable the parasites to enter host cells. These intracellular organisms cause a myriad of diseases in avian species by destroying the cells they invade (Page & Haddad 1995). These parasites are not commonly seen in caged birds because transmission is via the

ingestion of sporulated oocysts, which require warm, moist environments in which to sporulate and become infective (Macwhirter 1994, Clyde & Patton 1996; Scott 1996, Madill 2000). Coccidia, primarily belonging to the *Isospora* and *Eimeria* genera, have been found in many passerines, although the exact species found in Gouldian finches has not been recorded (Bauck & Brash 1999).

Gizzard erosions and ulcers in chickens have been associated with diets that are deficient in vitamin B₆ (Daghir 1981) or with the ingestion of histamine (Harry EG and Tucker 1976), gizzerosine (Okazaki *et al* 1983), and mycotoxins (Hoerr *et al* 1982). Gizzard erosion is a rare condition in caged bird. There is thus

* Author for correspondence. Email: mnouri2@yahoo.com

insufficient information on the occurrence of gizzard and other organ lesions in avian affected by this parasite. The objective of this investigation was to report coccidiosis and gizzard lesion in a zebra finch in Iran.

CASE HISTORY

In September 2009, a male zebra finch was presented to a private veterinary practitioner with a history of watery diarrhea, loss of beak pigmentation, anorexia, ruffled feathers, weight loss and lethargy. The bird died shortly after presentation and necropsy was performed. Gross necropsy revealed small erosions and hemorrhages on the koilin and mucosa of the gizzard wall (Figure 1). The intestine was oedematous and spleen appeared to be pale and small. The testes were asymmetric.



Figure 1. Small areas of erosions and hemorrhages on the koilin and mucosa of the gizzard.

Non-sporulated oocysts with micropyle cap and two-layer wall were observed in direct smear of fresh feces. Internal organs were fixed in 7.2 % buffered formalin and transferred to Baharan Pathology Laboratory at Tehran. Thin histologic tissue sections were prepared and stained separately using hematoxylin and eosin (HE) and Gimsa methods.

Microscopically, mucosal necrosis and inflammatory cells infiltration observed in cecum. *Eimeria* life stages in the enterocytes were detected (Figure 3). In Gizzard, hemorrhage and ulceration of

mucosal layer with infiltration of polymorphonuclear (PMN) cells in the underlying mucosa were observed (Figure 2). There was no evident of mycotic ventriculitis. In hepatic tissue, mild focal necrosis with mononuclear cells infiltration was seen. Renal tissue was normal, but mild congestion was seen, as well.

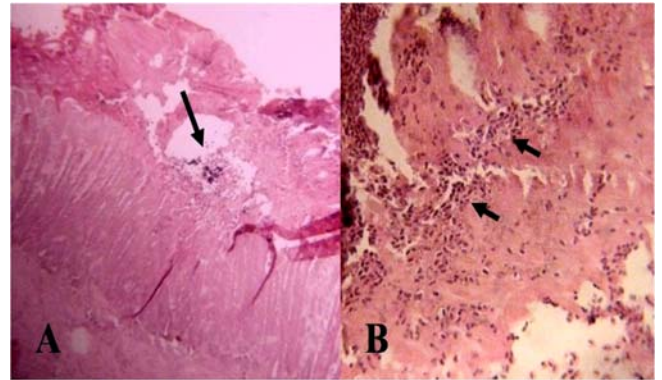


Figure 2. Ulceration of mucosal layer with infiltration of PMN cells in to the underlying mucosa. (H&E stains. 10×, 40×).

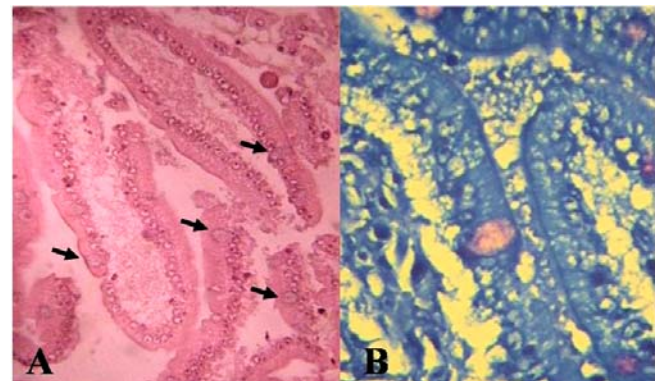


Figure 3. A: Coccidial organisms in the enterocytes (H&E stains, 40×) **B:** That same section which showing the coccidial organisms with Gimsa staining (100×).

DISCUSSION

Coccidiosis is a disease with universal importance in poultry production (McDougald & itz-Coy 2008) and is a problem in aviary birds (Gill 1987, page & Haddad 1995). *Eimeria* spp. infection is not commonly prevalent in caged birds. Because transmission occurred through the ingestion of sporulated oocysts, which require warm, moist environments in which to sporulate and become infective (Macwhirter 1994, Clyde & Patton 1996, Scott 1996, Madill 2000).

Oocysts may survive for many weeks in soil, but survival in cage is limited to a few days because of the heat and the action of molds and bacteria (McDougald & Fitz-Coy 2008) and individual sanitary measures. This case was with a history of enteric disease caused by *Eimeria* Infection. Epithelial cells were destroyed as result of shizogony, causing mild to severe diarrhea. Intestinal villous atrophy and subsequent malabsorption could be occurred (Schmidt & Roberts 1989, Patton 1993, Greiner & Ritchie 1994).

On necropsy, the intestine was edematous. Histologically organisms were presented in enterocytes. Different species of coccidia have different trophisms for different portions of the intestinal tracts (Schmidt *et al* 2003, McDougald & Fitz-Coy 2008). On the other hand, the host specificity of *Eimeria* in birds and mammals is very strict, so that parasites from different species of birds or animals can be considered different species, even though they may have similar-appearing oocysts (McDougald & Fitz-Coy 2008). In some cases, finding organisms in the enterocytes may be the only change (Schmidt *et al* 2003) but in this case, there was a variable nonsuppurative inflammatory response and necrosis.

Isospora and *Eimeria* genera have been found in many passerines, although the exact species found in Gouldian finches has not been recorded (Bauck & Brash 1999, Gelis 2003). Furthermore, taxonomic difficulties are encountered in identification of species with morphologically similar oocysts which are found with overlapping tissue specificity. Because of the overlapping size, area parasitized, and lack of distinct lesions, it has been difficult to separate *Eimeria* spp from each other in the duodenum with small oocysts (Oluleye 1982). The predisposing causes in birds were suggested cooler damp weather, immunosuppressive diseases, insects, contaminated equipment, wild birds, dust, prolonged coccidiostats therapy and disinfectants, social needs, neoplastic diseases, over-crowded environment and stocking with compatible species (Gill 1987, Clyde & Patton 1996, Joseph 2003, McDougald & Fitz-Coy 2008). In Gizzard, hemorrhage and

ulceration of mucosal layer with infiltration of PMN cells in to the underlying mucosa were seen. There was no evident of mycotic ventriculitis. Gizzard erosions and ulcers in chickens have been associated with diets that are deficient in vitamin B₆ (Daghir 1981) or with the ingestion of histamine (Harry EG & Tucker 1976), gizzerosine (Okazaki *et al* 1983), and mycotoxins (Hoerr *et al* 1982). Gizzard erosions also have been observed at a high rate in the embryos and chicks of broilers (Shibata *et al* 1988). There is thus insufficient information on the occurrence of gizzard and other organ lesions in chickens affected by this disease.

In caged bird, possible nutritional causes and foreign bodies; Erosion and necrosis of the koilin layer can be a sign of gizzard worms in waterfowl and excessive ingestion of very sharp, fine sand in Psittaciformes and also a sign of megabacteriosis in budgerigars (Pettrak 1969, Coles 2007, Samour 2008). This condition is commonest in debilitated, aged parrots (Keymer 1958). Keymer (1958) stated that erosion or ulceration of the gizzard lining cause regurgitation. But, there was not any sign of regurgitation in this case. Erosion of the koilin layer, especially at the proventricular junction, may be caused by hypovitaminosis A or by eating highly polyunsaturated fatty acids, such as those present in cod liver oil, when these are not protected by an adequate dietary level of vitamin E (Samour 2008). Adenovirus infections are typically multisystemic, but ventricular lesions are the only lesions noted in some birds (Pettrak 1969, Schmidt *et al* 2003). There were no adenoviral intranuclear inclusion bodies in the gizzard lesions. Fowl adenovirus is associated with naturally occurring outbreaks of inclusion body hepatitis, hydropericardium syndrome, respiratory disease, necrotizing pancreatitis, and gizzard erosion (Ono *et al* 2003). The cause of gizzard erosions in this study was not conclusively identified.

Acknowledgment

We are grateful to the owner of finch for allowing us to handle it. Mr. Reza Aghaebrahimi Samani, the Chief Technician in the Department of Parasitology, is

acknowledged for his input in the identification of the parasites.

References

- Bauck, L., Brash, M. (1999). Survey of diseases of the lady Gouldian finch. *Proceeding of Association of Avian Veterinarians*, New Orleans, LA, Pp: 204-212.
- Bowman, D.D., (1995). Protozoans, in georgis' parasitology for veterinarians (ed 6). Philadelphia, PA, Saunders.
- Clyde, V.L., Patton, S. (1996). Diagnosis, treatment, and control of common parasites in companion and Aviary Birds, *Seminars in Avian Exotic and Pet Medicine* 5(2): 75-84.
- Coles, B. (2007). *Essentials of avian medicine & surgery*, 3rd edition, Pp: 12 Blackwell Publishing.
- Daghir, N.J., Haddad, K.S., (1981). Vitamin B₆ in the etiology of gizzard erosion in growing chickens. *Poultry Science* 60:988– 992.
- Gelis, S. (2003). The Gouldian finch (*Erythrura gouldiae*) in health and disease, *Seminars in Avian Exotic and Pet Medicine* 12(4): 215-227.
- Gill, J., (1987). Diseases of lorikeets, In: Sindel S (ed): *Australian lorikeets*. Pp: 23-27. Chipping Norton, New South Wales, Surrey, Beatty.
- Greiner, E.C., Ritchie, B.W. (1994). Parasites, In: Ritchie BW, Harrison GI, Harrison LR, (eds) *Avian Medicine: Principles and Application*. Pp: 1014-1019. Lake Worth, FL, Wingers Publishing.
- Harry, E.G. and Tucker, J.F., (1976). The effect of orally administered histamine on the weight gain and development of gizzard lesions in chicks. *Veterinary Record* 99:206–207.
- Hoerr, F.J., Carlton, W.W., Tuite, J., Vesonder, R.F., Rohwedder, W.K., Szigeti, G. (1982). Experimental trichothecene mycotoxicosis produced in broiler chickens by *Fusarium sporo-trichiella* var. *sporotrichioides*. *Avian Pathology* 11:385– 405.
- Joseph, V., (2003). Infectious and parasitic diseases of captive passerines, *Seminars in Avian Exotic and Pet Medicine* 12(1): 21-28.
- Keymer, I. F. (1958). The diagnosis and treatment of common psittacine diseases. *Modern Veterinary Practitioner* 39(21):22-30.
- Kosugi, Y., Baba, E., Fukata, T., and Arakawa, A., (1986). Effects of cage contamination with coccidia and Salmonella on acute salmonellosis in young chickens, *Avian Disease* 30(2): 313-318.
- Macwhirter, P. (1994). Passeriformes. In: Ritchie BW, Harrison GI, Harrison LR, (eds) *Avian Medicine: Principles and Application* Pp: 1172-1199. Lake Worth, FL, Wingers Publishing.
- Madill, D.N., (2000). Parasitology in birds, Post Grad Found in Vet Science University of Sydney. Proc 334; 351-381.
- McDougald, L. R. and Fitz-Coy, S.H. (2008). Coccidiosis. In: Saif Y.M., Fadly A.M., Glisson, J.R., McDougald L.R., Nelan L.K., Swayne D.E., *Disease of poultry*, 12th edi, pp. 1068-1084. Blackwell publishing.
- Maxey, B. W. and R. K. Page. (1977). Efficacy of lincomycin feed medication for the control of necrotic enteritis in broiler-type chickens. *Poultry Science* 56:1909-1913.
- Okazaki, T, Noguchi, T., Igarashi, K., Sakagami, Y, Seto, H., Mori K, Naito H, Masumura T, Sugahara M. (1983). Gizzero-sine, a new toxic substance in fish meal, causes severe gizzard erosion in chicks. *Agricultural and Biological Chemistry* 47:2949– 2952.
- Oluleye, O. B., (1982). The life history and pathogenicity of a chicken coccidium *Eimeria hagani*, Levine, 1938. Ph.D. Dissertation, Auburn University, Alabama USA. P 66.
- Ono, M., Okuda Y., Yazawa S., Imai Y., Shibata I., Sato S., and Okada, K. (2003) Adenoviral gizzard erosion in commercial broiler chickens, *Veterinary Pathology*, 40:294–303.
- Page, C.D., and Haddad, K. (1995). Coccidial infections in birds. *Seminars in Avian Exotic and Pet Medicine* 4(3): 138-144.
- Patton, S., (1993). An overview of avian coccidia. *Proceedings of the annual conference of the association of avian veterinarians*, Nashville, TN, 47-51.
- Petrak, M.L., (1969). *Disease of cage and aviary birds*, Pp 306 Lea & Febiger Philadelphia.
- Scott, J.R. (1996). Passerine Aviary diseases: diagnosis and treatment. Tampa, FL, *Proceeding of Association of Avian Veterinarians*. Pp:39-48.
- Samour, J. (2008). *Avian Medicine*, 2nd edition, Pp 290 Mosby.
- Schmidt, G.D., Roberts, L.S., (1989). In: Brake DK (ed): *Foundations of parasitology* (ed 4). Pp: 114-138. St Louis, MO, Times Mirror/ Mosby.
- Schmidt, R.E., Reavill, D.R., Phalen, D.N. (2003). *Pathology of pet and aviary bird*, Pp 53, Blackwell Publishing.
- Shibata, I., Hirai, H., Okamoto, T. (1988). Proventriculus and gizzard lesion in embryos and chicks of broiler. *Journal of the Japan Veterinary Medical Association* 41:795-799.