

Case Study

Cryptosporidial Infection of Lower Respiratory Tract in a Budgerigar (*Melopsittacus undulates*)

Gharagozlou^{*1}, M.J., Nouri², M., Pourhajati³, V.

1. Department of Immunology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran
2. Department of Electronic Microscope, Faculty of Medical Sciences, University of Tehran, Tehran, Iran
3. Mehregan Veterinary Group, Tehran, Iran

Received 24 Apr 2013; accepted 15 Jul 2013

ABSTRACT

Cryptosporial and bacterial co-infection is reported in a budgerigar with clinical manifestations of septicemia and respiratory tract infection. Microscopically large number of round to oval 2-5µm cryptosporidial organisms were found to be lodged on the parabronchial epithelial cells of the respiratory tract. The bacterial colonies were seen around the parabronchial spaces of the lung tissue. It is suggested that the *C. baileyi* is the most likely cryptosporidium species which caused respiratory cryptosporidiosis in the budgerigar.

Keywords: budgerigar, respiratory, cryptosporidium, bacteria

INTRODUCTION

Cryptosporidium infections have been reported in wide range of domestic and wild avian hosts including chickens, turkeys, ducks, goose, quails, weavers, gulls, toucans, cranes, cockatiels, bulbul, ostrich, cacique, oropendola, parakeets, partridge and peacock (Abe & Iseki 2004, Anaia *et al* 2011, Gharagozlou *et al* 2006, Gharagozlou & khodashenas 1985, Gholani & Momayes 2006, Lindsay & Blagburn 1990, Mason & Hartley 1980, Parlasek 1993, Pavlasek 1999, Ryan 2009, Rohela *et al* 2005, Sreten & Varga 2000). Cryptosporidiosis in domestic and wild birds is often associated with infections by *C. meleagridis*, *C. galli* and *C. baileyi* (Abe & Iseki 2004, Anaia *et al* 2011,

Akiyoshi *et al* 2003, Awad *et al* 1997, Gholani & Momayes 2006, Graczyk *et al* 1996, Lindsay & Blagburn 1990, Pavlasek 1999, Ryan 2009, Sreten & Varga 2000). The birds infected by cryptosporidium spp. may have respiratory or digestive symptoms (Gharagozlou *et al* 2006, Gharagozlou, & khodashenas, 1985, Gholani & Momayes 2006, Goodwin *et al* 1996, Lindsay & Blagburn 1990, Mason & Hartley 1980, Ryan *et al* 2003, Sreten & Varga 2000). *C. meleagridis* is found in the small and large intestine and bursa of fabricius (Anaia *et al* 2011, Akiyoshi *et al* 2003, Awad *et al* 1997, Gharagozlou *et al* 2006, Lindsay & Blagburn 1990, Ryan 2009), while *C. baileyi* is more frequently associated with respiratory cryptosporidiosis, and most common cryptosporidium sp. in wild and domestic avian species. *C. galli* causes infection in the proventriculus, neither intestines nor

*Author for correspondence. Email: mjavad@ut.ac.ir

respiratory tract (Lindsay and Blagburn, 1990; Pavlasek 1999, Ryan 2009). Out of the three identified cryptosporidium species, only *C. meleagridis* is a known threat to human beings and animals, particularly, young animals, children and immunosuppressed individuals (Akiyoshi *et al* 2003, Lindsay & Blagburn 1990). In the present study, respiratory cryptosporidial and bacterial co-infection is reported in a budgerigar.

CASE HISTORY

The diseased bird was an adult female budgerigar showing clinical signs of anorexia, severe diarrhoea (creamy-yellow), wet vent, fever, respiratory distress, which finally lead to death of the animal. The cere was asymmetric; the upper part of the right nare had a nodule and the left nare showed ulceration covered by crust. The bird's carcass was necropsied, tissue samples were taken from the lung tissue, liver, kidneys, spleen and intestinal tract were fixed in a buffered formaldehyde solution, selected tissue samples were processed in a tissue processor, paraffin blocks were made and 5 micron thick tissue sections were stained with Hematoxylin and Eosin method. No attempt was made to isolate bacteria. Selected parts of the formalin fixed segments were post-fixed in 2.5% glutaraldehyde solution and processed through standard method for transmission electron microscopy (TEM). The ultra – thin sections stained with uranyl-acetate and lead citrate were examined under a Zeiss LEO 900 transmission electron microscopy.

DISCUSSION

Macroscopically, the carcass was relatively cachectic, subcutaneous tissues, lungs and other visceral organs were severely congested. The intestine was edematous. The content of gizzard was cream-yellow. The cere was necrotic and empty air sacs were inflamed and thickened. Microscopically, hyperemia, congestion and degenerative changes of kidney and liver parenchyma were noticed. The lung tissues were congested and edematous. There were present of multiple colonies of the rode-shaped or cocoid bacteria

located in the vicinity of the parabronchial tissues. The nature of the bacteria was not identified. A number of 2-5 microns round to oval hematoxylin stained cryptosporidia organisms were seen on the bronchial epithelium within the parasitiferous vacuoles' (Figures 1 and 2).

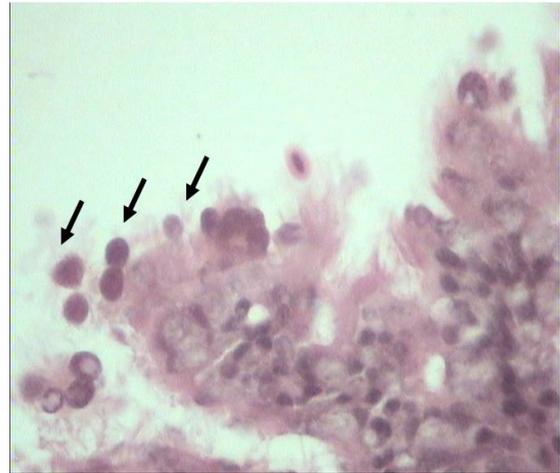


Figure 1. The lung tissue section stained with Harris H&E. the cryptosporidial organism are seen within parasitiferous vacuels (arrows). HE $\times 1000$.

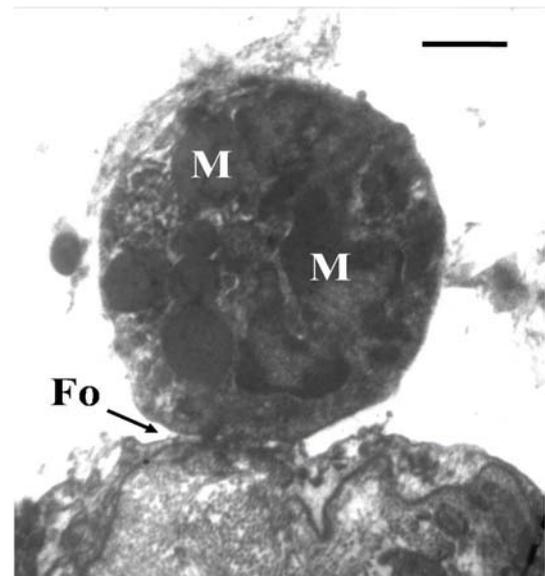


Figure 2. Transmission electron micrograph of *cryptosporidium* schizont. The merozoites are present; Fo (Feeder organ), M (Merozoite). Scale bar= 0.5 μm .

In spite of severity of the cryptosporidial and bacterial infections, inflammatory cells at the site were scanty. The species of the cryptosporidium was not

determined. However, as mentioned by many workers, *C. baileyi* is a cryptosporidium species which is associated with respiratory cryptosporidiosis in various species of domestic and wild birds (Abe & Iseki 2004, Goodwin et al 1996, Graczyk et al 1996, Lindsay & Blagburn 1990, Mason & Hartley 1980, Parlasek 1993, Ryan et al 2003, Sreten & Varga 2000) therefore it is suggested that the most likely species of cryptosporidium caused infection in the budgerigar is *C. baileyi*. Various environmental stressors and viruses cause immunosuppression could cause birds to be vulnerable to protozoal infections (Abe & Iseki 2004, Lindsay & Blagburn 1990, Ryan et al 2003, Sreten & Varga, 2000). It seems birds kept under captivity in animal sanctuaries or as pet birds, may prone to acquire infectious disease, as seen in the present study. In Iran budgerigar parakeets are popular companion sold in pet shops and kept in bird's parks and zoos. The cryptosporidium infected birds could be considered as important sources of the organisms to domestic or cage birds, therefore the birds harboring cryptosporidium organisms must be detected and strict hygienic measures should be taken into consideration.

References

- Abe, N., Iseki, M. (2004). Identification of cryptosporidium from cockatiels by direct sequencing of the PCR-amplified small subunit ribosomal RNA gene. *Parasitology Research* 92: 523-526.
- Anaia' do paixao Seva., Mikaela Renata Funada., Leonardo Richtzenhain., Marta Brito Guimaraes, Sheila do Oliveira Souza., Luciana Allegretti., Juliana Anaya Sinhorini, Vanessa Vertematti Duarte, Rodrigo Martins Soares (2011). Genotyping of Cryptosporidium spp. from free-living wild birds from Brazil. *Veterinary parasitology* 175(issues 1-2). 27-32.
- Akiyoshi, D.E., Dilo, J., Pearson, C., Chapman, S., Tzipori, S. (2003). Characterization of cryptosporidium meleagridis of human origin passed through different host species. *Infection and Immunity* 71: 1828-1832.
- Awad- el- Kariem, F.M., Warhurst, D. C., Mc Donald, V. (1997). Detection and species identification of cryptosporidium oocysts using a system based on PCR and endonuclease restriction. *International Journal of parasitology* 27: 1531-6.
- Gharagozlou, M.J. Dezfoulian, O., Rahbari, S., Bokaie, I., Jahanzad, I and Razavi, A. N.E. (2006). Intestinal Cryptosporidiosis in Turkeys in Iran. *Journal of Veterinary Medicine A*, 53: 282-285.
- Gharagozlou, M.J. and khodashenas (1985). Cryptosporidiosis in a native rooster with chronic proliferative enteritis. *Archiva Veterinaria* 17: 129-138.
- Gholani, M.R., and Momayes, R. (2006). Concurrent occurrence of adeno like inclusion body hepatitis and cryptosporidiosis in an ostrich. *Archives of Razi Institute* 61(2): 117-120.
- Goodwin, M. A., Brown, J., Resurreccion, R.S., Smith, J.A. (1996). Respiratory coccidiosis (*Cryptosporidium baileyi*) among Northern Georgia Broilers in one company. *Avian Diseases* 40: 572-575.
- Graczyk, T.k., Cranfield, M.R., Fayer, R. (1996). Evaluation of commercial enzyme immunoassay (EIA) and immunofluorescent antibody (FA) test kits for detection of cryptosporidium oocysts of species other than cryptosporidium parvum. *American Journal of tropical Medicine and Hygiene* 54: 274-9.
- Lindsay, D.S., Blagburn, B.L. (1990). Cryptosporidiosis in man and Animals. CRC press. Inc. Boca Raton: 133-148.
- Mason, R.W. and Hartley, W.J. (1980). Respiratory cryptosporidiosis in a peacock chick. *Avian Diseases* 24. (3): 771-776.
- Parlasek, I. (1993). Black headed gull (*Larus ridibundus* L.) a new host of cryptosporidium baileyi (Apicomplexa, Cryptosporididae). *Veterinary Medicine (Praha)*. 38: 629-638.
- Pavlassek, I. (1999). Cryptosporidia: biology, diagnosis, host spectrum, specificity, and environment. *Klinicka microbiologie a infekce nilekar stri*. 3: 290-301.
- Ryan, U. (2009). Cryptosporidium in birds, fish and amphibians. *Experimentally Parasitology*. 124: 113-120.
- Ryan, U., Xiao, L.H., Read, C., Zhou, L., Lal, A.A., Pavlassek, I. (2003). Identification of novel cryptosporidium genotypes from the Czech Republic. *Applied and Environmental Microbiology*. 69: 4302-4307.
- Rohela, M., Lim Y.A.L., Jamaiah, I., Khadijah, P.Y.Y., Laang, S. T., Mohd Nazri, M.H. and Nurulhuda, Z. (2005). Occurrence of cryptosporidium oocysts in Wrinkled Hornbill and other birds in the Kuala Lumpur National Zoo. *Southeast Asian J Trop Med public Health*. 36 (suppl 4).
- Sreten, T., Varga, I. (2000). Cryptosporidiosis in birds a review. *Veterinary Parasitology* 87: 261-279.