Visceral coccisdiosis in a common mynah (*Acridotheres tristis*) due to *Isospora* sp. infection

Arabkhazaeli, F.[1*], Madani, S.A.[2]

[1]*Department of Parasitology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran*

[2]*Department of Avian Diseases, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran*

Key words:
Atoxoplasma, *Isospora*, pet bird, visceral coccidiosis

Correspondence
Arabkhazaeli, F.
Department of Parasitology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran
Tel: +98(21) 61117049
Fax: +98(21) 66933222
Email: farab@ut.ac.ir

Received: 24 November 2013
Accepted: 12 February 2014

Abstract:

A captive adult common mynah (*Acridotheres tristis*) died shortly after a course of seizure and opisthotonous with an illness characterized by severe lethargy, depression, loss of appetite, polyurate, and urate discoloration. Abdominal distention and hepatomegly, visible over the abdominal skin, were noticed clinically. At necropsy, severe enlargement of liver with general discoloration was obvious. Histopathological findings included schizonts and gametes in the intestine, especially in the duodenum. Cytology from impression smears revealed intracytoplasmic Atoxoplasma-like zoites in the inflammatory cells especially macrophages within the liver and in the contact smears prepared from the liver, lung, and spleen. Based on postmortem findings of the organisms in blood mononuclear cells and in impression smears of liver and Giemsa stained impression smears of liver, the spleen and lung atoxoplasmosis caused by *Isoapora* sp. was specified as the cause of death. According to the literature, visceral coccidiosis (atoxoplasmosis), described here, could be considered as one of the severe causes of mortality among captive birds.

Case History

A captive adult common mynah (*Acridotheres tristis*) was referred with a history of severe lethargy, depression, and loss of appetite. Clinical signs and histopathological findings associated with *Isospora* (*Atoxoplasma*) infection in a common mynah in Iran are described.

Clinical Presentations

Abdominal distention and hepatomegaly were clinically visible over the abdominal skin. Polyurate and urate discoloration were noticed. The bird died shortly after a course of seizure and opisthotonous.

Diagnostic Tests

At necropsy, severe enlargement of liver with general discoloration of both lobes, as distribution of pale and congested areas, was observed (Figure 1). Intestinal distension especially in duodenum along with moderate thickening of the intestinal mucosa was obvious.

Liver cytology revealed typical vacuolization of the hepatocytes and large number of inflammatory cells especially macrophages containing circular light blue objects with purple-red center resembling *Atoxoplasma* zoites caused indention of the cells' nuclei (Figure 2A). The same intracytoplasmic parasites were seen in the lung and the spleen impression smears; however, the number of infected cells were typically lower in these two organs (Figures 2 B & C). Some degrees of erythrocyte polychromasia were seen in the lung cytology. In histological section of the liver, hepatocyte vacuolization, severe disseminated necrosis without particular lobular pattern, and parasitic interacytoplasmic inclusion bodies were numerously noted.

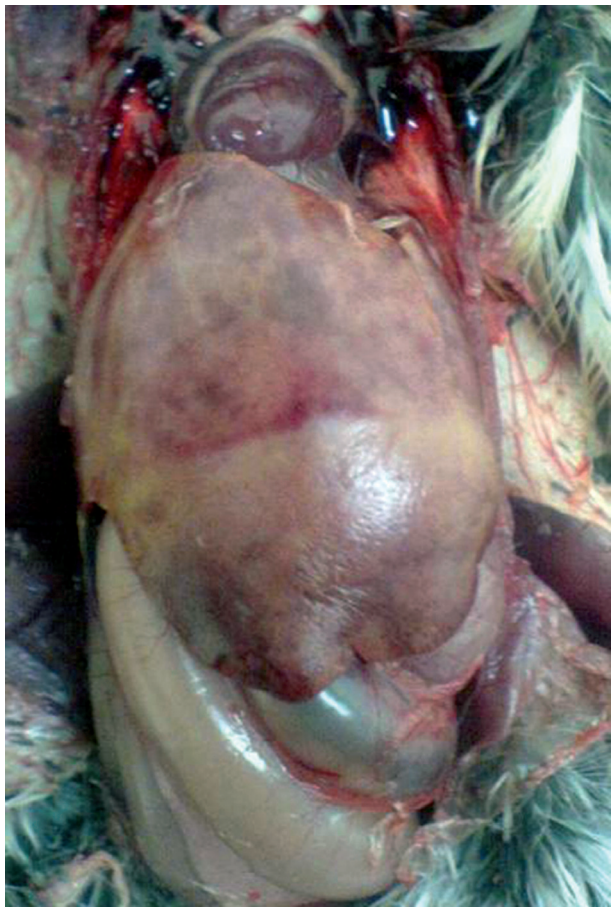

Figure 1. Severe enlargement of the liver with general discoloration of both lobes.

The parasites were also observed in the section derived from spleen. The presence of schizonts and gametocytes in the intestine, especially in the duodenum was recorded (Figure 2D).

Assessments

Atoxoplasma-like infections have been reported in several species of passerine birds, including greenfinches (*Carduelis chloris*), house sparrows (*Passer domesticus*), Bali mynahs (*Leucopsar rothschildi*), bullfinches (*Pyrrhula pyrrhula*), canaries (*Serinus canaria*) (Martinez and Munoz, 1998; Sa´nchez-Cordo´n et al., 2007; Maslin and Latimer, 2009), and rarely in raptors (Remple, 2004). To the best knowledge of the authors, there were no reports of atoxoplasmosis (with extra-intestinal merogony) from Iran, and up until now in the world in common mynah. There are reports of *Isopora* species from birds of the Sturnidae family, solely identified on the basis of the morphology of the oocysts in the feces and no *Atoxoplasma*-like organisms were found in the blood smears (Berto et al., 2011); as was the case for Tavasoli and Dastjerd (2000) who detected Isosporan oocysts in %47.6 of examined canary feces; however, they could not find mononuclear merozoites at necropsy.

Atoxoplasmosis, the cause of frequent mortalities among captive pet birds, is sometimes called "going light" as infected birds may stop eating and lose weight (Greiner, 2008). Affected birds have heavy extraintestinal merogonic infection (Gill and Paperna, 2008), often accompanied by the presence of fecal oocysts (Greiner, 2008). Following the ingestion of isosporoid (disporous tetrazoic) oocysts, coccidiosis due to *Isospora* (formerly known as *Atoxoplasma*) occurs in passerine birds, with a life cycle including invasion to both the reticulo-endothelial system and the intestinal epithelium (Pereira et al., 2011; Schrenzel et al., 2005; Adkesson et al., 2005). Merogony (asexual reproduction) occurs in both intestinal and lymphoid-macrophage cells, resulting in the presence of merozoites in the mononuclear leukocytes of the peripheral blood and dissemination to other viscera. Gametogenesis occurs in the intestinal cells of the same host (Adkesson et al., 2005). Some species of among many described *Isospora* species from birds have endogenous stages only in small intestine epithelium, while other species form extraintestinal stages in mononuclear phagocytes in different organs. The species with extraintestinal stages were suggested to be named *Atoxoplasma* (Dolnik et al., 2009). However until now, it has been sugessted that *Isospora* spp. and *Atoxoplasma* spp. in passerine birds are a unified group of organisms with intestinal and extra-intestinal forms that cause significant morbidity and mortality (Schrenzel et al., 2005). *Atoxoplasma* infections have been diagnosed using histopathologic examination of tissue samples, buffy coat smears, impression smears of organs, transmission electron microscopy and polymerase chain reaction (PCR) analysis (Adkesson et al., 2005; Greiner, 2008; Remple, 2004). Definitive taxonomic classification of *Isospora* remained ambiguous for many years and still there are many elusive aspects of the parasite pathobiology, namely the clonal expansion of the infected lymphocytes (Maslin and

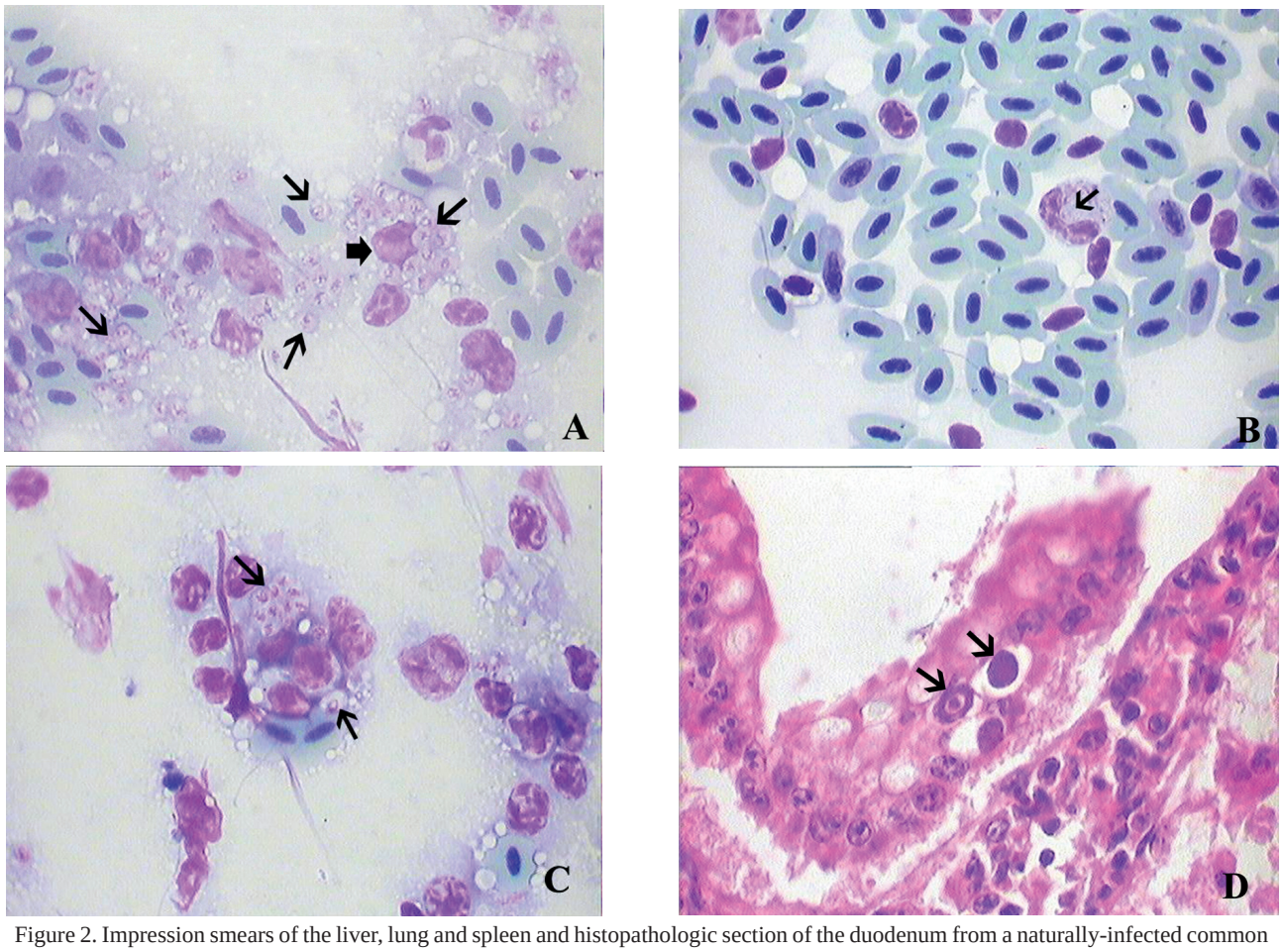

Figure 2. Impression smears of the liver, lung and spleen and histopathologic section of the duodenum from a naturally-infected common mynah: (A) Impression smear of the liver. Note the typical vacuolization of the hepatocytes and *Atoxoplasma* zoites (thin arrows) causing indention of the cells' nuclei (thick arrow) (1000x), (B) Impression smear of the lung. *Atoxoplasma* zoite (arrow) within a macrophage (1000x), (C) Spleen cytology. *Atoxoplasma* zoites (arrows) are clearly visible (1000x), (D) Histologic section of the intestine (H&E). Gametocytes (arrows) are shown in the intestinal mucosa (400x).

Latimer, 2009).

Identification of avian coccidian species is mainly based on oocysts morphology. However, regarding molecular methods, DNA derived from both species having intestinal and extra-intestinal life cycle may be present in pooled fecal samples, which limits the strength of PCR as a single diagnostic tool in species determination (Adkesson et al., 2005; Dolnik et al., 2009).

Considering the non-specific symptoms and small size of the parasite, diagnosis of *Atoxoplasma* infection is challenging. The organism may be easily missed, especially in low-grade subclinical infections (Adkesson et al., 2005), like the case for which we did not have the oocysts, and species determination was impossible.

Antemortem diagnosis of atoxoplasmosis is generally based on the finding of swollen and darkened liver through the skin, the organisms in blood mononuclear cells and less practically in impression smears of liver biopsy. At necropsy, Giemsa stained impression smears of liver, spleen, heart, or pancreas provide an effective means of diagnosis (Maslin and Latimer, 2009). As reported, standard anticoccidial drugs are ineffective against the tissue stages of the parasite, but sulfachlorpyrazine appears to decrease oocysts output in the adults, which will minimize exposure and infection in young birds. Cleanliness is also important in minimizing exposure to the oocysts (Maslin and Latimer, 2009; Adkesson et al., 2005). It is necessary for the veterinarians to consider the symptoms of visceral coccidiosis as a cause of illness in pet and wild passerines.

References

1. Adkesson, M.J., Zdziarski, J.M., Little, S.E. (2005) Atoxoplasmosis in tanagers. J Zoo Wildl Med. 36: 265-272.
2. Berto, P.B., Flausino, W., McIntosh, D., Teixeira-Filho, W.L., Lppes, C.W.G. (2011) Coccidia of new world passerine birds (Aves: Passeriformes): a review of Eimeria and Isospora Schneider, 1881 (Apicomplexa: Eimeriidae). Syst Parasitol. 80: 159-204.
3. Dolnik, O.V., Palinauskas, V., Bensch, S. (2009) Individual oocysts of isospora (Apicomplexa: Coccidia) parasites from avian feces: from photo to sequence. J Parasitol. 95: 169-174.
4. Gill, H., Paperna, I. (2008) Proliferative visceral isoapora (atoxoplasmosis) with morbid impact on the Israeli sparrow *Passser domesticus* biblicus Hartert, 1904. Parasitol Res. 103: 493-499.
5. Greiner, E.C. (2008) *Isospora*, *Atoxoplasma*, and *Sarcocystis*. In: Parasitic Diseases of Wild Birds. Atkinson, C.T., Thomas, N.J., Hunter, D.B. (eds.). Wiley-Blackwell, Ames, Iowa, USA. p. 108-119.
6. Martinez, F., Munoz, E. (1998) *Atoxoplasma* spp. in a hybrid passerine (*Serinus canaries*×*Carduelis cannabina*). Avian Pathol. 27: 420-422.
7. Maslin, W.R., Latimer, K.S. (2009) Atoxoplasmosis in canary fledglings: severe lymphocytic enteritis with preferential parasitism of B lymphocytes. Avian Dis. 53: 473-476.
8. Pereira, L.Q., Berto, B.P., Flausino, W., Lovato, M., Lopes, C.W.G. (2011) *Isospora bocamontensis* n. sp. (Apicomplexa: Eimeriidae) from the yellow cardinal *Gubernatrix cristata* (Vieillot) (Passeriformes: Emberizidae) in South America. Syst Parasitol. 78: 73-80.
9. Remple, J.D. (2004) Intracellular hematozoa of raptors: A review and update. J Avian Med Surg. 18: 75-88.
10. Sa´nchez-Cordo´n, P.J., Go´mez-Villamandos, J.C., Gutie´rrez1, J., Sierra, M.A., Pedrer, M., Bautista, M.J. (2007) *Atoxoplasma* spp. infection in captive canaries (*Serinus canaria*). J Vet Med A. 54: 23-26.
11. Schrenzel, M.D., Maalouf, G.A., Gaffney, P.M., Tokarz, D., Keener, L.L., McClure, D., Griffey, S., McAloose, D., Rideout, B.A. (2005) Molecular characterization of isosporoid coccidia (*Isospora* and *Atoxoplasma* spp.) in passerine birds. J Parasitol. 91: 635-647.
12. Tavasoli, M., Dastjerd, A. (2000) Gastrointestinal parasite of aviary and pet birds in Urimia, Iran. Pajuhesh Va Sazandegi (In persian). 62: 37-39.

مجله طب دامی ایران، ۱۳۹۳، دوره ۸، شماره ۱، ۶۲-۵۹

کوکسیدیوز احشایی ناشی از آتوکسوپلاسما در یک قطعه مرغ مینا

فاطمه عرب خزائلی [۱*] سید احمد مدنی [۲]

۱) گروه انگل شناسی، دانشکده دامپزشکی دانشگاه تهران، تهران، ایران

۲) گروه بیماریهای طیور، دانشکده دامپزشکی دانشگاه تهران، تهران، ایران

(دریافت مقاله: ۳ آذر ماه ۱۳۹۲، پذیرش نهایی: ۲۳ بهمن ماه ۱۳۹۲)

چکیده

یک قطعه مرغ مینا با نشانه‌های بالینی بی حالی و افسردگی شدید، بی اشتهایی، افزایش رسوب اورات به همراه تغییر رنگ آن در فضله، اتساع متوسط شکمی همراه با هپاتومگالی قابل تشخیص از ورای پوست ناحیهٔ شکم به کلینیک ارجاع داده شد. پرنده مدت کوتاهی پس از حضور در کلینیک با علایم تشنج و اپیستوتونوس تلف شد. در کالبدشکافی از بافت‌های کبد، طحال و ریه گسترش تماسی تهیه شد و پس از رنگ‌آمیزی گیمسا مورد بررسی قرارگرفت. در کالبدشکافی بزرگ‌شدگی شدید کبد همراه با تغییر رنگ عمومی هر دو لوب کبدی به شکل نواحی پراکندهٔ رنگ‌پریده و پرخون در کنار هم، اتساع روده‌ها به‌ویژه دوازدهه به همراه افزایش ضخامت مخاط روده به صورت ظاهری در لاشه مشاهده شد. واکوئوله بودن زمینهٔ گسترش کبد و وجود تعداد زیادی سلول‌های التهابی به‌ویژه ماکروفاژ حاوی اجسام مدورآبی کم‌رنگ با مراکز بنفش- قرمز شبیه به زوآیت آتوکسوپلاسما مشاهده شد که موجب دندانه‌دار شدن دیوارهٔ هستهٔ این سلول‌ها شده بود. در ریه و طحال نیز این اجرام تک‌یاخته‌ای داخل سلولی مشاهده شد. هیچ اُاُسیستی در گسترش مرطوب دستگاه گوارش قابل تشخیص نبود. التهاب مختصر مخاط روده همراه با نفوذ سلول‌های التهابی تک‌هسته‌ای در زیر مخاط، همچنین حضور مراحل مختلف سیر تکاملی انگل شامل شیزوگونی و گامتوگونی در روده، به‌ویژه دوازدهه، قابل تشخیص بود. بر اساس یافته‌های پاتولوژی و میکروسکوپی به‌دست‌آمده، بیماری این پرنده آتوکسوپلاسموز یا کوکسیدیوز احشایی تشخیص داده شد.

واژه‌های کلیدی: آتوکسوپلاسما، ایزوسپورا، مرغ مینا، کوکسیدیوز احشایی

*)نویسنده مسؤول: تلفن: ۶۱۱۱۷۰۴۹(۲۱)۹۸+ نمابر: ۶۶۹۳۳۲۲۲(۲۱)۹۸+ *Email: farab@ut.ac.ir*