

INFLAMMATORY LESIONS IN CASES OF BIRDS KEPT IN CAPTIVITY

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Abstract

Exotic bird pathology comprises diseases, both infectious and non-infectious, incompletely studied so far as pathogenetic mechanisms, lesions identified and measures of management. The present study comprises a number of 33 cases of birds kept in captivity belonging to Corvidae, Fringillidae, Psittaculidae, Columbidae, Phasianidae and Apodidae families that were submitted to diagnosis after death of the birds. Out of these, 16 cases presented inflammatory lesions affecting different body organs and tissues. Results revealed frequent gross lesions of the lungs, liver and digestive tract. Histologic examination marked mainly lesions of fibrinous and necrotic pneumonia, necrotic hepatitis and catarrhal enteritis. Three cases were affected by chronic lesions of granulomatous inflammation located mainly in the coelomic cavity and digestive tract. Bacteriologic investigations revealed mostly Gram negative bacteria isolated from the lesions. Most frequent pathogens causing disease in the cases taken into study belonged to Salmonella, Escherichia, Pseudomonas, and Staphylococcus genera. In conclusion, results of inflammatory lesions revealed by gross and microscopic examination in correlation with microbiologic results represent a further step in evaluation of avian patients and risk of cross-contamination. Frequent affected regions in the body were the lower respiratory tract, liver and intestinal tract, suggestive for the type of contamination with the bacterial pathogens.

Key words: exotic bird, bacteria, inflammation, pathology.

INTRODUCTION

Exotic avian pathology comprises a wide variety of diseases, which is due to behavioural, physiological, genetic and predisposing factors that contribute to different pathways of disease, both infectious and non-infectious. In addition, ornamental birds are at higher risk of developing long term diseases such as neoplasia or nutritional and metabolic disorders that can cause immunosuppression and bacterial pathogen invasion (Hoefer, 1997; Nemeth et al., 2016).

Reports on large number of cases examined revealed that post mortem diagnosis was frequently associated with infectious causes, due to husbandry conditions, overcrowded spaces, interference with wild birds and other causes (Lutful Kabir, 2010; Nemeth et al., 2016; Schmidt et al., 2003).

A variety of bacteria frequently cause enteritis and pneumonias in exotic bird species (Schmidt et al, 2003). Gram negative pathogens can be primary or secondary invaders (Lutful Kabir, 2010).

The present paper is aimed to focus on lesions and organs predisposed to react in case of a bacterial inflammatory process in cases of exotic and ornamental birds and bring benefits to both breeders and veterinarians in charge of these species and pathologists.

MATERIALS AND METHODS

During 2014-2016 a total number of 33 cases of avian species was submitted to diagnosis at the Department of Pathological Anatomy.

The cases belonged to private owners and were classified in several groups, according family taxon, into *Corvidae*, *Fringillidae*, *Psittaculidae*, *Columbidae*, *Phasianidae* and *Apodidae*. All cases were submitted to full necropsy, histopathologic examination (H.&E., H.E.A., Ziehl-Neelsen and Gram stains), microbiologic examination (bacterial cultures) and for some cases by complementary examinations such as cytopathology on tissue imprints or pathologic liquids or radiography for coelomic cavity and joints.

RESULTS AND DISCUSSIONS

Regarding epidemiologic data, all 33 avian corpses were submitted for complete necropsy evaluations and complementary examinations. Out of these, 16 cases were selected as being affected by inflammatory processes, the other 17 being affected by other lesions such as neoplasia, dystrophy or severe post mortem changes marked by autolysis.

The bird corpses examined in the present paper belonged to the following family taxon: *Corvidae* (one case), *Fringillidae* (one case) *Psittaculidae* (six cases), *Columbidae* (five cases), *Phasianidae* (one case) and *Apodidae* (two cases).

Gross examination of the bird corpses submitted to diagnosis in the present study revealed several lesions on different organs, affecting mostly either respiratory system or digestive tract.

On respiratory system there were lesions, both acute and chronic, mostly on lower respiratory tract on lungs and more rarely on air sacs. Lesions were identified as deposits of yellowish material on the pleural surface of the lungs in four cases of birds submitted to diagnosis. Other types of gross lesions were represented by whitish-grey lesions

disseminated in the lung with various size, from 1 mm to 10 mm.

Regarding the digestive tract, lesions were identified mostly in liver and less often in the intestines.

The liver was affected in three cases of pigeons, four cases of parrots and the case of the pheasant (*Phasianus colchicus*) and the case of Eurasian siskin (*Carduelis spinus*). Lesions identified on gross examination were white foci of necrosis disseminated both on the surface and in the liver parenchyma. In five cases, gross lesions were represented by diffuse congestion or hepatomegaly.

Intestinal tract was affected in two cases of parrots by proventricular and ventricular dilation associated with whitish grey aspect of the mucosa in these regions. Five cases presented intestinal catarrhal secretion along with reddish aspect of the mucosal surface.

Other gross lesions were identified in one case of pigeon that presented increased size and whitish material in the humero-radio-ulnar joints. In this case, complementary examinations were done such as radiographic examination showing the presence of an inflammatory process inside the articular space. Afterwards, a fine needle aspiration was performed for cytopathologic examination and microbiologic culture of the liquid.

Overall gross lesions are presented in Table 1.

Table 1. Evaluation of gross examination of the bird cases affected by inflammatory processes

Case data	Respiratory tract	Digestive tract	Other lesions
<i>Columba livia</i>	-	Hepatomegaly	Humero-radio-ulnar arthritis
<i>Columba livia</i>	Pulmonary congestion	Catarrhal enteritis, congestion	-
<i>Columba livia</i>	Fibrinonecrotic pneumonia	Hepatomegaly	-
<i>Columba livia</i>	Fibrinonecrotic pneumonia and thickening of air sacs	-	-
<i>Columba livia</i>	-	Liver necrosis	-
<i>Melopsittacus undulatus</i>	-	Catarrhal enteritis, congestion	-
<i>Melopsittacus undulatus</i>	-	Hepatomegaly	-
<i>Melopsittacus undulatus</i>	Pulmonary congestion	-	-
<i>Agapornis roseicollis</i>	Necrosis on right pulmonary lobe	Proventricular dilatation	-
<i>Psittacula krameri</i>	Necrosis on right pulmonary lobe	Proventricular dilatation	-
<i>Platyceercus eximius</i>	-	Hepatomegaly	-
<i>Phasianus colchicus</i>	-	Hepatomegaly and discrete nodular lesions in omentum and adipose tissue	-
<i>Carduelis spinus</i>	Discrete granulomatous lesions and congestion	Diffuse liver and intestinal congestion, catarrhal enteritis	Hydropericardium, diffuse congestion in spleen and kidneys
<i>Corvus frugilegus</i>	-	Liver necrosis	-
<i>Apus apus</i>	Pulmonary congestion	Catarrhal enteritis, congestion	-
<i>Apus apus</i>	Pulmonary congestion	Catarrhal enteritis, congestion	-

Histopathologic examination performed on tissues obtained from each case revealed inflammatory lesions of different degree for each of the 16 cases of birds.

Lungs were mostly affected by fibrinonecrotic pneumonia consistent of areas of detritus surrounded by inflammation with mixed heterophils and macrophages. Other identified

lesions were represented by congestion and oedema.

Bacterial presence was observed in the lung parenchyma both extracellular and intracellular in seven of the 16 cases affected by inflammatory lesions.

Liver lesions consisted of multifocal to coalescing necrosis in five cases, inflammatory reactions in the proximity of centrilobular areas in three cases and in one case in the margins of the organ. Other cellular changes were represented by binucleation, frequently located around the inflammatory processes and oxiphilia of the hepatocytes.

Three cases of birds submitted to diagnosis were affected by discrete mononuclear infiltrates in the areas of the centrilobular veins areas with nodular aspects of mononuclear aggregates. Other lesions identified in the liver were congestion and hemosiderosis.

Microscopic examination of proventriculus and ventriculus revealed significant changes in the cases of the two parrots affected by dilation. Histology of the stomach compartments in the two cases of birds with proventricular dilation revealed mucosal necrosis, frequent bacterial involvement due to overgrowth in the lumen.

Examination of intestinal samples revealed seven cases of birds affected by inflammatory processes, two more than the cases suspected at gross examination. The samples were collected from both small and large bowel and revealed three cases with catarrhal duodenitis, two cases of typhlitis and two cases with diffuse inflammation of both small and large bowel.

Microbiologic examination

Samples were obtained by fresh cut surface of different organs such as lung, air sac, small and large bowel, and by case proventriculus and articular fluid.

Historically, in exotic birds, any finding of a gram negative bacteria has been considered to indicate disease. However, organisms such as *E. coli* have been found in surveys of psittacine birds without clinical signs or lesions indicative of intestinal disease. Therefore, positive results in microbiologic examination need to be associated with gross and microscopic lesions to confirm the cause of the bird's death. Salmonellosis is another disease that can cause significant lesions and cause death of exotic

species and is sometimes associated with wild bird feces or rodent contamination of food (Schmidt et al., 2003). In the case of the pigeon with articular inflammatory process, microbiologic culture of the liquid obtained by fine needle aspiration, isolated *Salmonella typhimurium*, a frequent pathogen involved in pigeon pathology (Rosenthal et al., 2008).

Respiratory bacterial pneumonias occur either by inhalation of the pathogen or as part of a septicaemia process, sometimes secondary to malnutrition or viral infections (Schmidt et al., 2003).

Multiple scientific papers set the liver as a commonly targeted organ for systemic bacterial infections in birds. In this case, both gram positive and negative bacteria can cause hepatitis (Lumeij, 1996).

Results obtained in the present study are comprised in Table 2.

Table 2. Bacteriological test results of studied birds

Bacterial isolates	Positive results
<i>Staphylococcus aureus</i>	3
<i>Streptococcus spp.</i>	1
<i>Pseudomonas aeruginosa</i>	4
<i>Escherichia coli</i>	3
<i>Salmonella typhimurium</i>	4
<i>Mycobacterium avium</i>	1

Results of microbiologic examination revealed *Pseudomonas aeruginosa* and *Salmonella typhimurium* as most frequent bacteria affecting the cases taken into study, followed by *Staphylococcus aureus* and *E. coli*. Gram negative bacteria isolates, such as *E. coli*, *Klebsiella sp.*, *Proteus sp.*, *Salmonella sp.* and *Yersinia sp.* cause most systemic infections in exotic birds. In some cases, *Pseudomonas sp.* is a common isolate as a result of gut or respiratory infections or systemic invasion of the liver or other organs. Most frequent gram positive isolates are *Staphylococcus* and *Streptococcus sp.* and the mechanism of dissemination is through blood from chronic necrotizing skin lesions or by extension from adjacent air sac lesions (Randall and Reece, 1996; Schmidt et al., 2003).

The case (*Carduelis spinus*) that had a mycobacterial infection was tested both with special histopathology stains and microbiologic culture. Both evaluations showed disseminated infection on most internal organs, while at first, gross examination revealed mostly diffuse congestion in internal organs.

CONCLUSIONS

Main inflammatory lesions identified were fibrinonecrotic pneumonia, necrotic hepatitis and catarrhal enteritis associated with frequent congestion of the organs.

Most frequent isolates in the present study by bacteriologic investigations were *Salmonella typhimurium*, *Escherichia coli* and *Pseudomonas aeruginosa*.

The affected regions of the body (lower respiratory tract, liver and intestinal tract) were suggestive for the type of contamination with the bacterial pathogens.

Inflammatory lesions revealed by gross and microscopic examination in correlation with etiological data obtained in bacteriological examination represent a further step in evaluation of wild and/or exotic birds.

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