Generalized Amyloidosis in a Partridge (Alectoris chukar)

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Summary

This study describes a case of generalised amyloidosis in a rock partridge (Alectoris chukar). The case material was a 1 year-old male rock partridge submitted to the Department of Pathology, Faculty of Veterinary Medicine, University of Ankara for necropsy. In necropsy, the liver, spleen and kidneys were swollen, pale and fragile. Histopathologic examinations revealed pinkish amorph accumulation in spleen (on capsule, along reticular of white pulp, in the wall of blood vessel, white pulp, and trabeculae), liver (in the dysse spaces and on blood vessels' walls), kidneys (on tubule basal membranes and blood vessels' walls), proventriculus, gizzard (on lamina propria and blood vessels' walls), small intestines (on lamina propria, tunica muscularis, blood vessels' walls), pancreas (on blood vessels' walls), heart (on blood vessels' walls), lungs (on bronches and blood vessels' walls) and testes (on basal membranes of tubulus and blood vessels' walls). After staining Congo red, accumulations appeared in orange and in green under polarised light microscope. Immunohistochemically, amyloid substance stained positively against amyloid A protein. These accumulations were considered as amyloidosis, which is rare in exotic birds, but common in waterfowls.

Keywords: Amyloidosis, Histopathology, Immunohistochemistry, Partridge

INTRODUCTION

This study presents a case of generalized amyloidosis encountered in a partridge. Amyloidosis is defined as the extracellular accumulation of nonsoluble autologous or precursor proteins, in fibrillar form, in various tissues and organs, and resulting dysfunction of these organs caused by the loss of parenchymal cells and micro-anatomical structure. Generalized amyloidosis, except for water fowl, is reported to be encountered rarely in avian species yet, the incidence is indicated to be high particularly in water fowl pertaining to the orders...
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**Anseriformes, Gruiformes and Phoenicopteriformes**. Amyloidosis, among species belonging to the order *Anseriformes*, occurs more frequently in the *Anatidae* (ducks, geese, swans). Furthermore, in these avian species, amyloid deposition is the type AA (Amyloid Inflammation Associated), which is accompanied by chronic inflammatory disorders.

**CASE HISTORY**

The case material was a 1 year-old male rock partridge submitted to the Department of Pathology, Faculty of Veterinary Medicine, University of Ankara for necropsy.

**Histopathology:** Systemic necropsy was performed on the partridge and the tissue samples taken at necropsy were subjected to the routine tissue processings. The 5-micron thick cross sections cut from the paraffin blocks were stained with hematoxylin-eosin (HE). Selected cross sections were stained specifically with Congo-red and Alcian blue. The preparations were examined under light microscope and polarized light microscope.

**Immunohistochemistry:** Paraffin cross sections were stained with the streptavidin-biotin-peroxidase staining technique. For peroxidase staining, amyloid-A mouse monoclonal antibody (Clone mc1; Dako) was used at a dilution of 1:250. Furthermore, for localisation of IgG, rabbit polyclonal antibodies against chicken IgG (H+L; Nordic Immunological Laboratories, Tilburg, The Netherlands) were used at a dilution of 1:100. 3-amino-9-ethylcarbazole (AEC substrate-chromogen, DAKO, Denmark) served as a chromogen.

Macroscopic examination revealed the liver, spleen and kidneys to be rather swollen. These organs, which were determined to be of pale colour, were also friable. Furthermore, heavy parasitic infection was observed in the small intestines.

Histopathological examination revealed the presence of homogenous, pink-coloured amorphous deposits, which were widespread in the capsule and white pulp of the spleen, Duyse's spaces of the liver, lamina propria and tunica muscularis of the duodenum and jejunum, in-between the glands in the lamina propria of the muscular and glandular stomach, the basal membrane of the tubuli of the testes, and the basal membrane of the tubuli and the glomeruli of the kidneys, and which were found a lesser extent in the parabronchi of the lungs. Furthermore, similar deposits were also observed in all of the listed organs blood vessels' walls as well as the walls of blood vessels.
in the pancreas (Fig. 3a) and the walls of blood vessels in the heart. When stained with Congo red, these deposits were recognized by their reddish orange colour (Fig. 1a, 2a, 3a) and they were determined to show green birefringence when viewed under the polarized light microscope. When Alcian blue was applied, the amyloid deposits found in the aforementioned locations, which were observed to stain blue (Fig. 4a-b).

**DISCUSSION**

Systemic AA amyloidosis does not display any specific clinical symptom in either wild birds or domestic poultry. At macroscopic level, the spleen, liver, kidneys and small intestines are affected most frequently. However, the proventriculus, gizzard, heart, large intestines, endocrine organs and gonads are less affected, whereas the brain, lungs and skin are affected rarely. Macroscopically, the liver and spleen enlarge and display subcapsular haemorrhages or conversion to a bronze colour. The kidneys are pale and swollen. In some instances, the heart displays dilatation of the left ventricle, hydropericardium or ascites. Microscopic examination reveals the presence of amyloid deposits in the Dysses’s spaces, Glisson capsule and blood vessel walls of the liver, the capsule and white pulp as well as the blood vessel walls and red pulp of the spleen, the interstitium, basal membrane of the tubuli and blood vessel walls of the kidneys as well as the adventitial layer of the ureters. Amyloid deposits are also observed in glomeruli, although to a less extent. Amyloid accumulation has also been determined in the duodenum and jejunum in the lamina propria and wall of the pancreas. In cases of severe amyloidosis, the presence of amyloid has also been determined in the lamina propria of the proventriculus, wall of the blood vessels in the heart and pancreas. However, amyloid accumulation has not been determined in the myocardium.

It is possible to determine the chemical type of amyloid by means of immunohistochemical techniques in which specific antisera against amyloid proteins are used. The type of amyloid most frequently encountered in animals is reactive amyloid, namely AA amyloid, of which the amyloid fibrils are formed by amyloid protein A. AA amyloidosis develops as a result of long lasting chronic infections (tuberculosis, tumours, viral or bacterial diseases) or predisposing factors such as stress. Such factors are reported to increase the level of serum amyloid A (SAA) and to cause it to breakdown and precipitate in tissues, thereby resulting in the formation of specific amyloid fibrils. Ducks constitute a significant model for amyloidosis research in avian
species. Similar studies have also been conducted in other avian species, in which tumours and chronic infections caused by bacteria or parasites resulted in AA amyloidosis. Immunohistochemical staining performed in the present study showed the type of amyloid, accumulated in the listed organs of the partridge examined, to be secondary amyloid or AA type amyloid. Furthermore, the determination of a severe infection of Ascaridia numidae in the small intestines suggested the partridge to have developed generalized amyloidosis probably due to chronic parasitic infection.

In conclusion, only a few cases of amyloidosis have been reported in avian species belonging to the order Galliformes. Except for the report of amyloid accumulation in the sinuses of a partridge infected with M. gallisepticum by McMartin et al., systemic amyloidosis has not been reported previously in this avian species. The present case study provides the histopathological and immunohistochemical definition of systemic amyloidosis, which is encountered rarely in the partridge.

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REFERENCES