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Histopathological Studies of Fowl Pox in Bantams

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Abstract: There was an outbreak of avian pox infection in a flock of bantams (*Gallus domesticus*) with gross lesions of erosions, crusts and nodules on the comb, eyelids, oral mucosa, legs and toes. In histopathological study eosinophilic intracytoplasmic inclusion bodies were visualized by light microscope in epithelial cells of the cutaneous nodules. Electron microscopy revealed numerous pox virions in the inclusion body.

Key Words: Bantam, pox, histopathology and inclusion body

Introduction

Avian pox infection is a common viral disease of domestic and wild birds especially in tropical and sub-tropical countries of the world. Sarker (1976) reported that large number of poultry was affected by fowl pox in Bangladesh. From recent study it was also found a problem for the commercial poultry rearing in Bangladesh and large number of mortality observe if the virus infect the birds before one month of age (Giasuddin, 2001). But it is now rarely reported from poultry developed countries due to better hygienic management and effective immunization program. In the mild cutaneous form of pox disease, flock mortality is usually low, but it may be high when infection is generalized diphtheritic form or when the flock affected with secondary infection mostly in poor environmental condition. When pox lesions on the eyelids may contribute to death because the bird may not be able to find feed or escape predators in scavenging types of rearing.

Fowl pox is a disease caused by avian poxvirus. Viruses classified in poxviridae are responsible for the infection in human, animal, birds and insects. These viruses produce generalized disease with pustular lesions or benign tumor on the skin.

The host antigen-related viruses known to affect avian species are in general species-specific, but may infect hosts of other avian species. These pox diseases are known as fowl pox, canary pox, pigeon pox and turkey pox. It was with the agent of fowl pox that a single elementary (Borrel) body separated from the inclusion (Bollinger) body was capable of including typical infection. It is a slow spreading disease characterized by the development of discrete nodular proliferative skin lesions on the non-feathered parts of the body such as skin of the head, particularly the comb and wattles or fibrino necrotic and proliferative lesions in the mucous membrane of the upper respiratory tract, mouth and oesophagus, where a diphtheritic membrane forms. Lesions on feet, legs and body are less common (Calnek, 1997).

In 1989, there was an outbreak of disease characterized by pustular lesions of the skin in a flock of bantams (*Gallus domesticus*). The present study reports the pathological findings of these skin lesions of bantams.

Materials and Methods

Nineteen bantams (*Gallus domesticus*) with pustular lesion were referred for the diagnosis to the department of Veterinary Pathology, Kitasato University, Aomori, Japan. In clinical and necropsy findings, bantams presented erosions, crusts or nodules on the skin of the head, particularly the comb, wattle and eyelids. Samples were obtained from autopsy and tissues were fixed in 10% buffer neutral

Fig. 1: Numerous nodules associated with erosions and crusts on the comb, wattle and eyelids

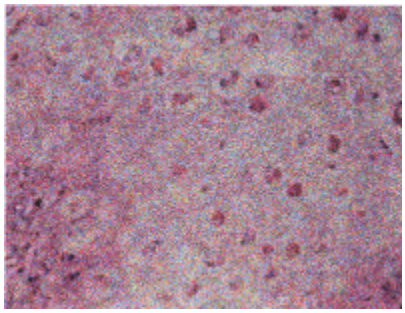

Fig. 2: Section of skin showing cytoplasmic inclusion bodies in H & E stain x 280

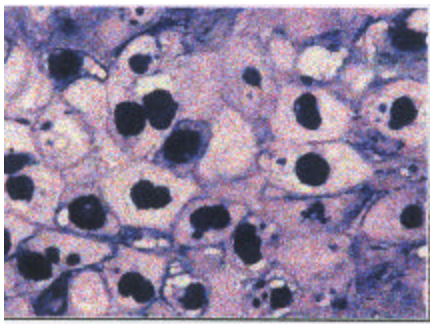

Fig. 3: Section of skin showing dark blue inclusion bodies in toluidene blue stain x 560

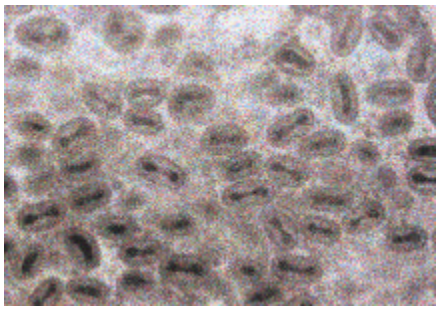

Fig. 4: High magnification electron micrograph shows numerous viral particles within the vacuoles in the cytoplasm. Lead citrate and Uranyl acetate stain x 20000

formalin. Paraffin embedded section was stained with Hematoxylin and Eosine (H&E), Periodic Acid Schiff (PAS) and Masson Trichrome (MT) according to the procedure of Luna (1968). For electron microscopy, selected areas of the skin taken from necropsy were fixed in 0.5% glutaraldehyde, postfixed in 1% osmic tetroxide and embedded in epon. 70 nm thick ultra thin section were stained with lead citrate and uranyl acetate and examined on a Hitachi H-7000 electron microscope.

Results and Discussion

Twelve of nineteen cases presented cutaneous lesions including erosions, crusts and nodules on the comb, eyelids, legs, toes and oral mucosa (Fig. 1). The nodules ranged from 2 to 4 mm in diameter, which was the characteristic lesion of the cutaneous form of pox in chicken. Histopathologically, the epidermis had marked hyperplasia (acanthosis) caused by the swelling and increased number of cells in the stratum spinosum. These cells showed ballooning degeneration and contained various sizes of pale eosinophilic inclusion bodies in the cytoplasm which was characteristic of avian pox in H&E stain (Fig. 2) and cytoplasm were found unstained with PAS stain. Pustular lesions had superficia crusts consisting of haemorrhages, necrotizing cells, bacterial colonies under the crustation. Lymphocytes and histiocytes infiltration was also noted in the dermis. Occasionally, fibroblast proliferation and fibrosis were observed in the areas, in

H&E satin (Fig. 2). This observation agreed with the work of Jorge Orios *et al* (1997). No pathological lesions were found in the liver, spleen, lungs, kidney and sciatic nerve (Minbay and Kreior 1973).

Epon-embedded sections stained with toluidene blue revealed intracytoplasmic inclusion bodies (Fig. 3) which were corresponded with H&E stain. Under electron microscopic examination these inclusion bodies were observed in all of the epidermal strata, except stratum granulosum and were constituted of numerous typical dumble-shaped nucleoid poxvirions surrounded by the distinctive membrane. Affected cells had degenerative nuclei and reduced cytoplasmic organelles, such as mitochondria, Golgi bodies or tonofilament.

Viruses were generally seen in cytoplasmic vacuoles, but sometimes they were free in the cytoplasm. They represented various stages of maturity. Immature, 344 nm-sized spherical viruses appeared free within the cytoplasm. They were delineated by viral membranes and filled with granules or contained electron-dense nucleoids.

Mature virions measured an average of 240-367 nm in cross section, recognizable by their dumble-shaped or brick-shaped nucleoids, were aggregated and surrounded by the membranes. Substances between mature particles were composed of lipid-like liquid or low-electron-density granular to filamentous materials. The virions contain centrally located biconcave nucleoid and two lateral bodies in each concavity and envelop (Fig. 4). Calnek (1997) and Jorge Oros *et al* (1997) also reported similar morphological observation about avian pox.

On the basis of clinical findings, histopathological and ultrastructural findings like, skin lesions, intracytoplasmic inclusion (Bollinger) bodies and morphological features of virions, the present study revealed that the disease which was broken out in a flock of bantams in 1989, was fowl pox.

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