

<Case Report>

Pox viral infection in a rufous turtle dove

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Abstract : A dead dove was found on the road and submitted for diagnosis. The bird was severely emaciated, with deformation in its facial area. Grossly, white coalescing nodules were seen on the cut surface of the nasal cavity. Histopathologically, epithelial cells of the upper respiratory tract were markedly proliferated, with ballooning degeneration, down growth of the rete ridge, and large eosinophilic intracytoplasmic inclusion bodies. Parakeratotic hyperkeratosis and focal necrotic focus was present in the proliferative area. The facial bones showed partial bone resorption. Transmission electron microscopy revealed numerous viral particles in epithelial cells with dumbbell-shaped bodies, consistent with poxvirus.

Keywords : dove, electron microscopy, intracytoplasmic inclusion body, poxvirus

Rufous turtle doves (*Streptopelia orientalis*) are the abundant resident columbid in Korea. This dove is easily found in the street as well as in the forest. However, diseases of this dove are not as widely reported as those of domestic birds. Avian pox is a well-known infectious disease in domestic and wild birds and is caused by avian poxvirus, member of the genus *Avipoxvirus* of the family *Poxviridae* [2, 9]. Avian poxviruses are transmitted by mechanical injuries including insects biting such as mosquitoes, mites, midges, and flies, and contaminated materials such as aerosols from infected animals, feed or water [1, 4, 6, 7]. Although avian pox occurs in various species of bird, the induced lesions are very similar. The characteristic lesions of this disease appear primarily in two forms such as cutaneous form and diphtheritic form. The cutaneous form is the most common lesions and shows proliferative lesions on featherless epidermal areas such as comb, wattle, beak, legs, feet, and eyelids, whereas the diphtheritic pattern is characterized by nodular proliferative lesions on the mucous membranes of the mouth, pharynx, esophagus, and upper respiratory tracts [7, 8, 9]. To perform the morphologic diagnosis of the poxvirus infection, light microscopic examination or electron microscopic evaluation as alternate tool are mainly used [6, 8, 9]. In current study, we describe the poxvirus infection in a rufous turtle dove based on morphologic characteristics.

A dead dove was found on the road and submitted for diagnosis. The affected bird was severely emaciated and the gizzard and proventriculus were empty. Facial deformation due to proliferative masses in the nasal cavity was observed.

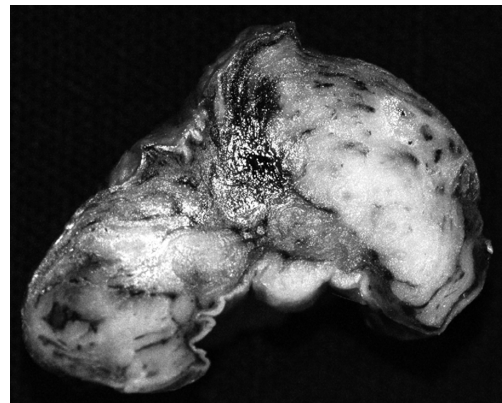


Fig. 1. Cut surface of the nasal cavity. White large coalescing nodules were replaced in the nasal cavity and sinus expanded and the affected dove had rough lines in face.

No ectoparasites were observed on the carcass. Various sized white coalescing nodules were seen in upper respiratory tract (Fig. 1), but there were no proliferative lesions in any areas of the body. At necropsy, parenchymal organs and facial tissue including nodules were fixed in 10% buffered formalin, embedded in paraffin, and sectioned at 4 μ m. The sections were then stained with hematoxylin and eosin for histopathology. For electron microscopic evaluation, small pieces of formalin-fixed tissues were fixed in 2.5% glutaraldehyde in 0.1 M phosphate buffer (pH 7.2), postfixed in 1% osmium tetroxide in the same buffer, and embedded in epoxy resin

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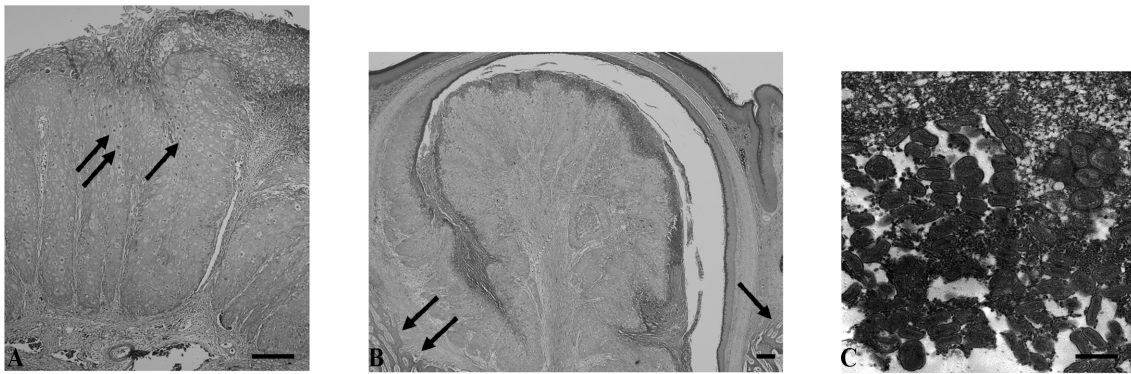


Fig. 2. Mass of upper respiratory tract. (A) Epithelial cells of mucous membrane were markedly proliferated and had ballooning degeneration, down growth of rete ridge, and large eosinophilic intracytoplasmic inclusion bodies (arrows). Parakeratotic hyperkeratosis and focal necrotic focus was present in proliferative area. (B) Proliferative nodules were filled in the nasal cavity and partial bone resorption was seen in the facial part (arrows). (C) Electron microscopic photograph showed typical poxviral particles with electrodense central cores surrounded by a convoluted outer membrane. H&E stain (A and B). Scale bars = 200 μ m (A), 500 μ m (B), 500 nm (C).

(PELCO Eponate 12 Embedding Kit; Ted Pella, USA). Semi-thin sections were stained with toluidine blue for light microscopic survey. Ultrathin sections of the selected areas were double-stained with uranyl acetate and lead citrate and observed under an H-7100FA electron microscope (Hitachi, Japan).

Histopathologically, epithelial cells of upper respiratory tract were markedly proliferated and had ballooning degeneration, down growth of rete ridge, and large eosinophilic intracytoplasmic inclusion bodies (Fig. 2A). Parakeratotic hyperkeratosis and focal necrotic focus were present in proliferative mucous membrane. Partial bone resorption was seen in facial bones (Fig. 2B). Additionally, pulmonary congestion and muscular hemorrhage were observed. On transmission electron microscopy, numerous viral particles existed in proliferative epithelial cells. These particles had electrodense central cores surrounded by a convoluted outer membrane (dumbbell-shaped bodies), consistent with poxvirus (Fig. 2C).

Avian pox is among the oldest known avian diseases due to the characteristics of gross lesions. The diagnosis of avian poxvirus infection is made with the gross findings, histopathologic findings such as intracytoplasmic inclusion body, electron microscopic assessments such as the observation of viral particles in epidermis, or virus identification by chicken embryo inoculation, cell culture, and DNA sequencing using polymerase chain reaction [6, 8, 9]. However, it is difficult to diagnose avian pox viral infections only with external clinical finding and gross lesions. For the confirmation of pox viral infections, it is necessary to analyze histopathologic examinations and/or electron microscopic findings [6, 8, 9]. Therefore, we carried out the histopathologic findings and electron microscopy examination. Although an avian poxvirus infection can be suspected by gross findings, it must need differential diagnosis with nutritional deficiencies, mycotoxins, papilloma virus infection, scaly leg mites, and neoplasia which could induce similar lesions [5, 9]. Specially, in the diphtheritic form, differential diagnosis must be conducted

with neoplasia due to nodular proliferative lesion. In current case, nasal cavity was filled with proliferative nodules and facial deformity was simply induced by proliferative nodules. Therefore, tumors in nasal cavity could be suspected only with gross lesions.

Mortality of poxvirus infection is usually low in pigeons [9]. However, if there is a secondary infection, mortality rates may be markedly increased. The diphtheritic form involving oral cavity and upper respiratory tract causes higher mortality rate than the cutaneous form [3, 6]. This form is infrequently observed in wild birds [6]. Diphtheritic lesions such as white elevated nodules appear in mucous membranes, grow really fast, and are often coalesced [9]. In current case, white large coalescing nodules were detected in upper respiratory tract including nasal cavity and sinuses suggesting to cause respiratory distress. As a result, it is considered that the affected dove may become dyspneic and consequentially attain to death.

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