

Diagnostic Exercise

From The Davis-Thompson Foundation*

Case: **215**; Month: **June**; Year: **2023**
Answer sheet

Title: Avian poxvirus infection in a turkey

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Clinical History: A young male turkey (*Meleagris gallopavo*) was referred to the Veterinary Hospital of the Federal University of Paraíba (UFPB), having multiple skin nodules. The owner reported that twenty-four chickens (twelve adult and twelve young) and nine turkeys (four adult and five young) had similar lesions on the same property. The animals were raised together, and several birds died, mainly turkeys and chicks.

Clinical Findings: The turkey was numb, with multifocal to coalescing firm crusted nodules with a depressed center were on the head, neck and limbs, and focally extensive areas of necrosis in the oral cavity. Fragments from the skin lesions were sampled for biopsy.

Gross Images:

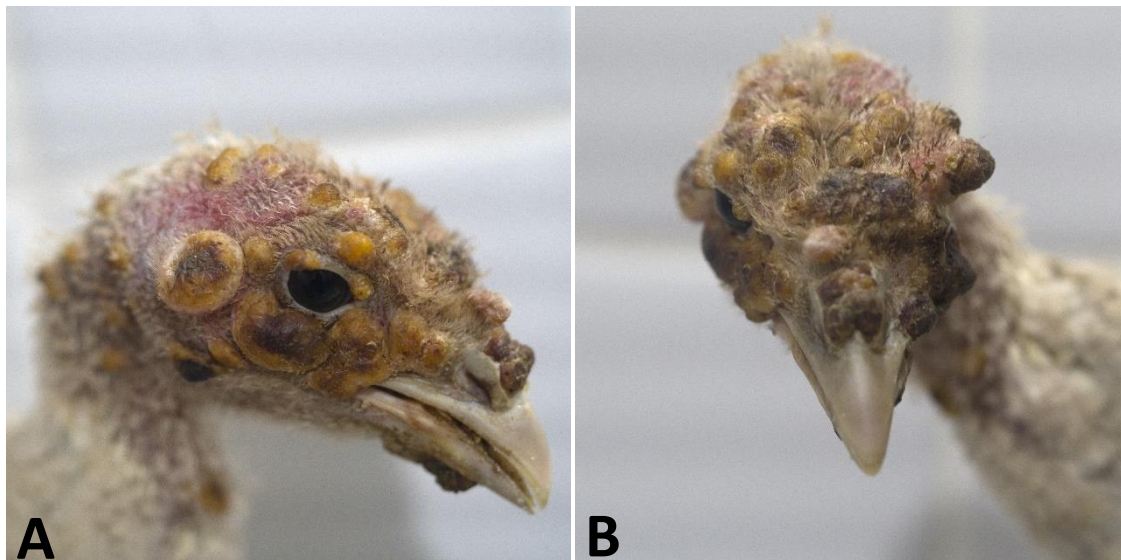


Figure 1: Right lateral (A) and frontal view (B) of the head of a turkey. Multifocal to coalescent, proliferative crusted nodules with a depressed necrotic center

Microscopic Images:

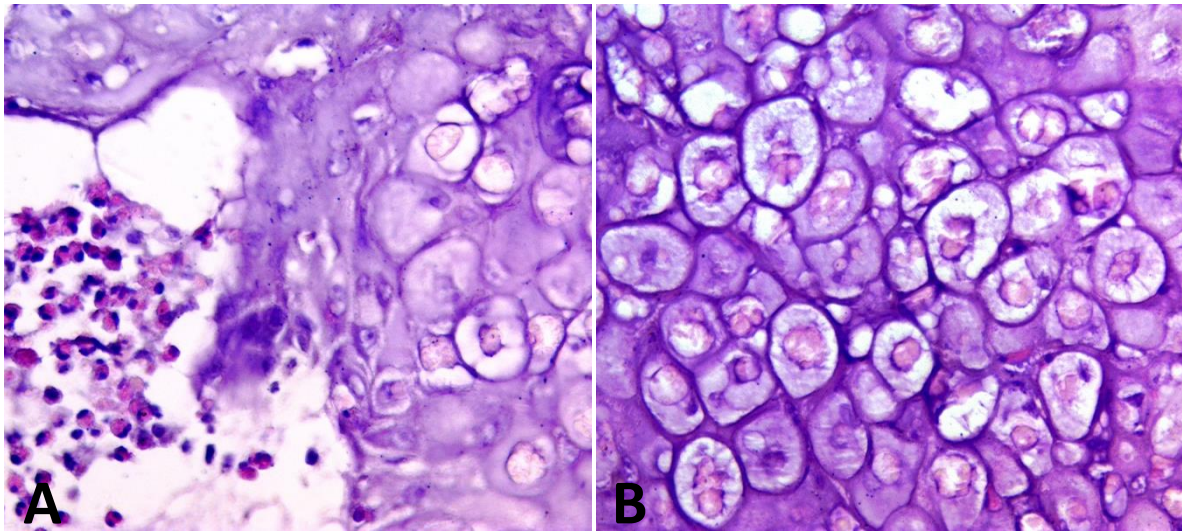


Figure 2 Skin. **(A)** Epidermal hyperplasia with vacuolar degeneration and heterophilic infiltrate. HE. Obj. 40x. **(B)** Ballooning degeneration of the keratinocytes with intracytoplasmic eosinophilic inclusions (Bollinger bodies) that peripheralizes the nuclei. HE. Obj. 60x.

Follow-up questions:

(1) Histological description: Feathered skin: The stratum *germinativum* of the epidermis is markedly hyperplastic up to twelve times normal thickness and covered by a serocellular crust. Keratinocytes are swollen with cytoplasmic vacuolation (ballooning degeneration). Many keratinocytes were expanded by 15-30 μ m eosinophilic intracytoplasmic inclusion bodies (Bollinger bodies) displacing and distorting the keratinocyte nuclei. Multifocal areas of lytic necrosis effacing the epidermis and extending into the dermis were observed. Within the areas of necrosis were large amounts of viable and degenerate heterophils admixed with fewer lymphocytes and macrophages.

(2) Name of the condition: Fowl pox.

(3) Etiology: Avianpoxivirus.

(4) Forms of clinical presentation: Cutaneous (dry pox), diphtheritic (wet form) and mixed.

(5) Two differential diagnoses: Lymphoproliferative disease of turkeys and vitamin B deficiencies (pantothenic acid and biotin) in young chickens.

Comments: Comments: In this case, the histopathological confirmation of the avianpoxvirus infection in the cutaneous lesions leads to the belief that the lesions observed in the oral cavity correspond to the diphtheric presentation of the same disease.

Avianpoxvirus infection, known as fowl pox, affects domestic and wild birds worldwide (2). The virus belongs to the Poxviridae family, which comprises 12 different species causing infection in birds, and its name is defined by the infected bird species, including chickens, turkeys, canaries, sparrows,

parrots, pigeons, quails, flamingos, penguins, starlings, mynahs, junco, among others (4). Generally, this agent does not cause the death of the individual, but due to the injuries, the risk that the bird suffers a higher risk for secondary bacterial infections, predation or accidents (9). In poultry, poxvirus infection can lead to economic losses due to decreased food intake and reproductive rate (3).

Arthropods serve as mechanical vectors for poxvirus transmission. They feed on the blood of sick birds, become infected, and transmit the virus by inoculating the agent in a healthy bird. Direct contact with sick birds through injured skin, ingestion, or inhalation of viral particles are also implicated in the dissemination of poxviruses (2,3).

The disease can occur in the cutaneous form (dry pox), characterized by proliferative nodular lesions on the skin, mainly in the featherless parts of the body. A less common diphtheritic form (wet pox) is characterized by focally extensive proliferative lesions that coalesce in large areas of fibrinonecrotic membranes in the oral cavity and other mucosal surfaces of the upper gastrointestinal and respiratory tract. A mixed form with cutaneous and oral lesions can also occur (3,4).

Histologically, epithelial hyperplasia occurs with hydropic degeneration (ballooning degeneration) and hyperkeratosis, with characteristic type A eosinophilic intracytoplasmic inclusion bodies (Bollinger bodies) in keratinocytes (3,8). In the mucous membranes, there is hypertrophy and hyperplasia of mucus-producing cells, followed by an increase in epithelial cells that contain inclusion bodies (8).

The definitive diagnosis can be obtained through histopathological examination and its association with the clinical history and macroscopic lesions (3,8). Other techniques can be used to confirm the diagnosis, including polymerase chain reaction (PCR) and viral isolation (7,10).

Differential diagnoses for the cutaneous form include lymphoproliferative disease of turkeys, caused by an exogenous retrovirus characterized by focal to multifocal tumors (1), and pantothenic acid and biotin deficiencies in young chicks (6). In the diphtheritic presentation, the main differential diagnoses include infectious laryngotracheitis of chickens caused by *Gallid alpha herpesvirus 1* (5) and *Trichomonas gallinae*, the latter being more common in columbiforms and raptors (7,8).

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*The Diagnostic Exercises are an initiative of the Latin Comparative Pathology Group (LCPG), the Latin American subdivision of The Davis-Thompson Foundation. These exercises are contributed by members and non-members from any country of residence. Consider submitting an exercise! A final document containing this material with answers and a brief discussion will be posted on the CL Davis website (<https://davisthompsonfoundation.org/diagnostic-exercise/>).

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