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Case Report

Esophageal squamous cell carcinoma in a backyard rooster

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Abstract

Squamous cell carcinoma, a malignant epithelial neoplasm originating from the epidermis squamous cells or the digestive mucosa epithelium, was diagnosed in an adult rooster. The rooster was lethargic and presented difficulties in swallowing. Physical examination revealed a large deep mass in the cranial cervical region. Due to poor prognosis, the bird was euthanized and then post mortem examined. Grossly, in the oral portion of the esophagus, there was a mass invading and partially occluding the lumen. Microscopically, the mass had neoplastic cells interconnected by evident desmosomes junctions and keratin pearl formations. Microscopic findings confirmed the diagnosis of squamous cell carcinoma. This neoplasia is an important differential diagnosis for esophageal lesions in birds. There are various carcinogens for squamous cell carcinoma such as sunlight, virus, some chemicals and chronic wounds, the last one being a possible cause of the squamous cell carcinoma in this rooster as no evidence of other etiologies were found.

Key words: avian pathology, esophagus, neoplasia, histopathology.

Introduction

In backyards chickens, neoplastic diseases have been reported at a lower frequency than infectious diseases (9). Among the possible types of tumors that affect birds, squamous cell carcinoma (SCC) has been frequently reported (10). SCC is a malignant neoplasm that originates from squamous cells of the skin epithelium or digestive mucosa. Grossly, it is usually a firm, yellowish mass and could have different growth patterns, such as cauliflower, nodular, infiltrative or ulcerative types (12). Microscopically, epithelial cells proliferations with keratin formations are occasionally arranged in concentric layers (keratin pearls) and keratinocytes are interconnected by desmosomes junctions as found in the normal epithelium. In domestic poultry this usually occurs in the cutaneous form, and mainly originates from feather follicle epithelia. Therefore, it is called keratoacanthoma (6). The digestive form is rarely reported in poultry, but previous reports describe it as invasive (3, 12) and rarely metastatic (7, 10). Some cases might be related to some chemicals (12, 15), physical damage (4) and viral agent (7, 10). Digestive SCC occurs more often in the esophagus and pharynx (10, 12), and can also affect the hard palate (13), tongue (1) and crop (7). This report documents a case of squamous cell carcinoma in the esophagus of a backyard rooster.

Case Report

The rooster exhibited lethargy and frequent loss of neck and head stability. The bird had difficulty eating. The owner performed hand feeding but the animal presented difficult in swallowing. Physical examination revealed a large deep mass in the cranial cervical region, in the topography of the cranial esophagus. The left eye was in miosis, with the pupillary margin of the iris slightly irregular and its ventral portion was whitish (Fig. 1). Due to the poor prognosis, the bird was euthanized by cervical dislocation and then submitted to post-mortem examination. Grossly, the bird's nutritional status was poor with atrophy of the pectoral muscles and prominence of the sternum. At the sagittal section of the left eye, the iris

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was thickened and mildly whitish. In the oral portion of the esophagus, near the pharynx, there was a large firm mass about 7.0 cm in diameter, invading and partially occluding the lumen of the organ. The cranial part of the esophagus was dilated. The surface of the tumor in contact with the lumen was ulcerated, as well the esophageal mucosa. On the cut surface, the mass was light yellow interspersed with gray friable material and surrounding by light red mucosa (Fig. 2). In addition to sections of the esophageal mass, sections of the brain, eyes, trachea, lungs, air sacs, heart, spleen, liver, pancreas, crop, proventriculus, gizzard, small and large intestines and testicles, were collected. These samples were fixed in 10% buffered formalin, and routinely processed, paraffin embedded, sectioned at 4.0µm of thickness, stained with hematoxylin and eosin, and examined by a white light microscope (8).



Figure 1. Adult backyard rooster. Left eye. Iris with slightly irregular in the pupillary margin and with opaque ventral area.

Microscopically, the mass in the esophagus was diagnosed as SCC. The neoplasia was invasive, poorly delimited, composed of cells from the squamous layer, arranged in cords and islands (Fig. 3) as well as infiltrating the submucosa and the muscular layers. Neoplastic cells had broad, eosinophilic cytoplasm with evident desmosomes junctions. The nuclei were large, oval to round, with loose chromatin and single or multiple prominent nucleoli (Fig. 4). Anisocytosis and anisokaryosis were marked and there were 38 mitosis figures in 10 fields high power fields (400x). There were dyskeratosis and multifocal keratin pearls. In addition, there were areas of necrosis surrounded by heterophils and numerous multinucleated giant cells in sites facing the lumen. In the eyes, moderate multifocal lymphoplasmacytic iridocyclitis with lymphoblasts and several mitoses were found (Fig. 5). In the retina of the right eye, near the optic disc, there was a focally extensive area of photoreceptor cell loss, with disorganization and pyknosis of the outer and inner nuclear cell layers (atrophy). In addition, there was hypertrophy and hyperplasia of the Müller cells in the inner plexiform layer and ganglion cell layer.



Figure 2. Adult backyard rooster showed in fig. 1, esophagus. The lumen is dilated and there is an extensive circular loss of mucosa in the oral portion, near the pharynx. In this area, a mass of 7.0 cm in diameter, ulcerated, yellow and interspersed with gray friable material is seen.

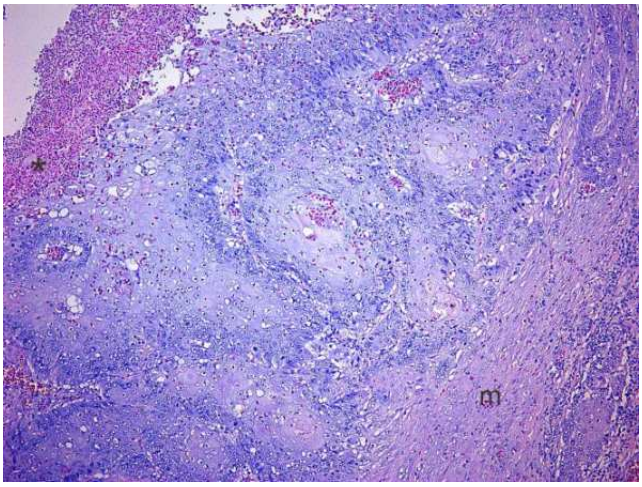


Figure 3. Photomicrography of squamous cell carcinoma in the esophagus. Neoplastic cells arranged in cords and islands, infiltrating the muscular layer (m) and with heterophils and necrotic cells in the surface (*). (H.E., original objective 5x).

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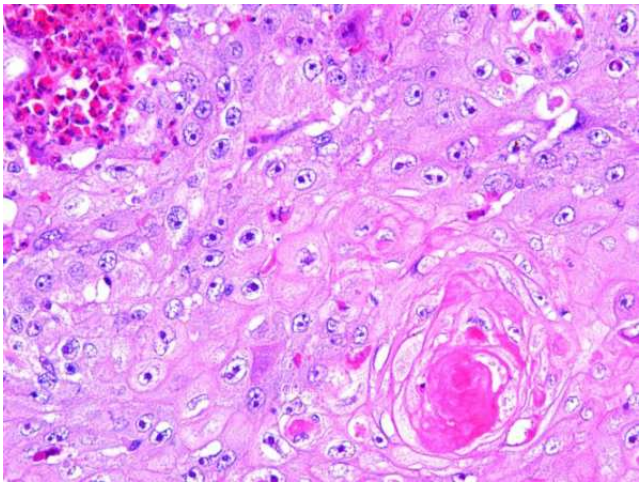


Figure 4. Higher magnification of fig. 3. Neoplastic cells with broad and eosinophilic cytoplasm, broad nuclei, rounded to ovals, loose chromatin and single or multiple prominent nucleoli. There are also corneal keratin pearl formation and focal area with necrosis and heterophilic infiltration (H.E., original objective 40x).

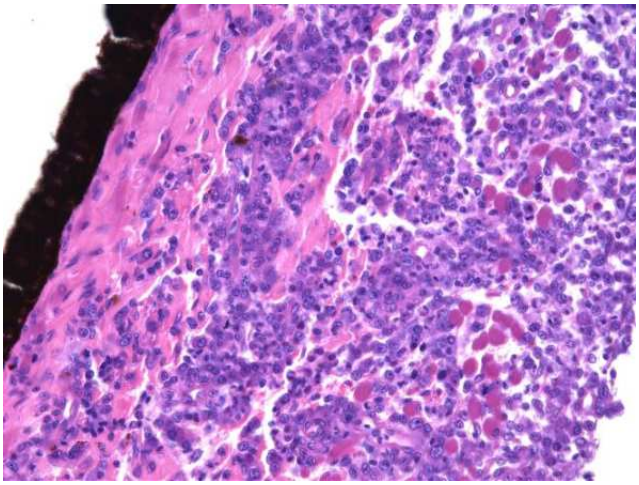


Figure 5. Iris of eye showed in fig. 1. Moderate lymphoplasmacytic iridocyclitis with lymphoblastic cells infiltrating the iris stroma with a few mitoses (H.E., original objective 40x).

Discussion

Gross and histopathological findings confirmed the diagnosis of an ulcerative and infiltrative SCC in the esophagus of a backyard rooster. The histological lesions were similar to those described in other reports (10, 12, 18). Grossly, SCC in the digestive system can range from 1.0 to 6.0 cm in diameter, invades the adjacent wall and occludes the lumen of the esophagus (10, 12, 18). In this rooster, the neoplasm measured approximately 7.0 cm in diameter and partially occluded the esophagus, causing swallowing difficulties for the bird.

The organs of the digestive system most affected by SCC in birds are the esophagus and pharynx (10, 12). However, it may occur in the crop (7) hard palate (13) and tongue (1). There are cases of this neoplasm in the digestive system reported in different breeds of adult roosters (3, 18) and in a Montagu's harrier (*Circus pygargus*) in Spain (13), in chickens in the United States of America (1, 7), in a red layer in Italy (10), and in broilers in China (12, 15). Apparently, there is no correlation between digestive SCC in avian species and geographical distribution. However, a study in China revealed that an area with high frequency of esophageal carcinoma in humans also had a parallel excessive occurrence of SCC in chickens (12).

The biological behavior of SCC may vary depending upon the site of origin. SCC in the skin is described as having no invasive or metastatic characteristics (6). However, reports of SCC in the digestive tract have been describe as having these characteristics (10). There are reports of primary SCC in the esophagus and pharynx with pulmonary metastasis (10, 12) and SCC in the hard palate (13) with radio and tibial metastases (13), differing from the present report where the neoplasm was limited to the esophagus.

SCC should be differentiated from the lesions caused by *Trichomonas* spp. (19), the diphtheritic form caused by *Avipoxvirus* (5), and the necrotic esophagitis caused by *Gallid herpesvirus* I, an etiologic agent of the respiratory disease called infectious laryngotracheitis (ILT) (16). Microscopically, *Avipoxvirus* produces intracytoplasmic eosinophilic inclusion bodies (Bollinger's inclusion bodies), providing the differential diagnosis. (10), *Trichomonas* spp. primarily causes an inflammatory response sustained by protozoa, which could be identified intralesional (20). Fibrin-heterophilic, lymphocytic and necrotic esophagitis with many syncytial cells containing eosinophilic intranuclear inclusion bodies are determinant in providing a diagnosis of ILT (16).

Some hypotheses have been suggested concerning causative agents of SCCs. Regarding the dermal form, infectious agent, such as virus (*Avipoxvirus*) was suspected of inducing SCC (5), as well as exposure to chemical agents (14). In China, 299 cases of esophageal SCC were reported in backyard chickens, and occurrences in humans were also reported. Nitrosamine was identified in food eaten by humans and birds in the region (12, 15). Nitrosamine is a substance derived from nitrite and nitrate components and is used as a food additive. It is considered carcinogenic, as it can induce DNA mutation (17). Concerning the rooster in this report, it was not possible to establish a relationship between a virus or a chemical agent and the presence of the SCC.

Another possible etiology for the development of the SCC in this case could be trauma. Chronic tissue lesions result in a prolonged inflammatory response. The recurring injury and regeneration triggers the release of nitrogen and oxygen molecules from inflammatory cells. These molecules, in some cases, interact with DNA during proliferation of the epithelium, resulting in alterations to

the genome via mutations, deletions or rearrangements. This change in the genome can induce cell formation without proliferation control, resulting in carcinoma (4). Report of SCC found in skin with chronic wounds was described in horses (2). As the feed of backyards birds may contain abrasive materials, it is possible that the esophageal mucosa of the bird suffered recurrent lesions and a SCC developed, but due to the advanced stage of the neoplasm, it was not possible to confirm.

Lymphoplasmacytic iridocyclitis or transformed lymphoblasts may occur during infection with *Gallid herpesvirus* 2, which causes Marek's disease. Changes resemble inflammatory lesions in the iris, ciliary body as well as the choroid layer and differ from neoplastic lesions common in the peripheral nerves (11). The left eye of the rooster in the present report was affected by similar inflammatory lesions aforementioned. However, in right eye, the lesion was chronic, which lead to atrophy and no neoplastic lymphocytes were found in this eyes or other organs, such as sciatic nerves and brachial plexus.

The anatomopathological findings were essential in the diagnosis of squamous cell carcinoma in the esophagus of this adult backyard rooster. The etiology of the neoplasia in this case, could not be identified, but trauma could be a possible cause. On the farm there were dozens of backyard chickens as well as ducks, geese and guinea fowl. However, only this rooster was affected.

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