

Avian lymphoid leukosis in 63 weeks old layers – Case report

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ABSTRACT

Although avian leucosis has been eradicated in some countries, it is still associated with economic losses due to decreased productivity, morbidity and immunosuppressive dependent diseases in other countries. Clinical and necropsy examination on dead Isa Brown layers followed by the histopathology of neoplastic tissue samples from the carcasses were conducted. Aggregations of lymphoblastic cells were consistently observed in the liver, lungs and spleen. Though the gross neoplastic lesions presented a picture of acute Marek's disease, age differentiation, necropsy pattern, absence of pleomorphism in the lymphoid cells and the aggregation of lymphoblastic cells, a diagnosis of lymphoid leukosis in the flock was made. The disease may not be common; however, it could be prevalent in the area hence control measures need be taken into consideration if productivity is to be optimized.

Keywords: Avian leucosis, lymphoblastic cells, nodular lesions, pleomorphism.

INTRODUCTION

Avian lymphoid leucosis is a neoplastic disease of poultry caused by avian leucosis virus, an oncogenic retrovirus causing enormous economic losses in the global poultry industry, (Feng and Zhang, 2016; Dunn, 2022). The disease is placed on List C of the Food and Agriculture Organization *Animal Health Yearbook 1995*, designating diseases of socio-economic and or public health importance (Payne and Venugopal, 2000). Avian leukosis virus (ALV) is among the most common naturally occurring avian retrovirus that can cause a variety of neoplastic disease conditions in chickens. The International Committee on Taxonomy of Viruses (ICTV) has designated ALV as the type species within the *Alpharetrovirus* genus of the family *Retroviridae* (Dunn, 2022). In addition to causing neoplasia, ALV is known to be associated with reduced productivity and other production problems in affected flocks especially for the egg producers (Fadly 2000). The disease is characterized by B-cell lymphoma occurring in chickens approximately 16 weeks of age and older. The cells of the bursa of Fabricius are the principal target cells for neoplastic transformation (Purchase, 1986). Avian lymphoid leukosis usually appears in chickens of 4 to 8 months post-infection following an orderly progression, and finally results in massive lymphomatosis and death of the host. The frequency of infection has been

reduced substantially in the primary breeding stocks of several commercial poultry breeding companies, particularly egg type breeders and infection has become infrequent or absent in certain commercial flocks (Dunn, 2022). Standard criteria used for diagnosis include history, clinical signs, gross necropsy and histopathology. There is no treatment or vaccine available so eradication of the virus from breeding flocks is the most effective control method (Dunn, 2022). Avian leukosis viruses (ALV) are divided into subgroups A, B, C, D and J, on the basis of differences in their viral envelope glycoproteins. Chicken are the natural hosts of the virus. The virus is horizontally and congenitally transmitted. It is readily inactivated by disinfectants. Tumors are more frequent in congenital than in horizontal infection. However, the type of ALV-induced tumour is influenced by strain of virus, exposure dose, host genotype and sex, route and age at exposure (Payne & Fadly, 1997). Tumours are often not detectable until 14 weeks of age. Death rarely occurs before 14 weeks of age and is more frequent around the time of sexual maturity. Because the incubation period is rarely less than 14 weeks, ALL is usually a neoplastic disease of breeders and commercial egg-layers, but not of broilers, roasters, or fryers. A subclinical disease syndrome characterized by depressed egg production in the absence of tumour formation

is considered more important economically than the deaths from lymphoid leucosis (Dunn, 2022).

The clinical findings include inappetence, weakness, diarrhea, dehydration, emaciation, depression followed by death. Infected birds may not develop tumours but they may lay fewer eggs. Post mortem lesions include diffuse or nodular lymphoid tumours on the liver, spleen, bursa and occasionally in the kidney, gonads and mesentery. Microscopically, the tumors cells are uniform, large lymphoblasts (Dunn, 2022).

CASE HISTORY

Five carcasses of brown layer of age 63 weeks belonging to Soma farm Nigeria Limited in Ikwuano Abia State with a flock size of 3672 layers were brought to the VTH MOUAU Umuahia on the 6th of March, 2023. A farm visit was conducted. Detailed history regarding the clinical signs of some live birds suspected for avian leucosis and dead birds submitted for necropsy were collected and recorded. Clinical observations, necropsy and histopathological examinations were made. Egg production before the incidence was 76% but went down to 58.2% during the incidence. Mortality rate of 2.31% was recorded during a period of 2 months of onset of clinical manifestation.

CLINICAL OBSERVATION

Clinical observations made in the flock include reduction in egg production, reduction in egg size, depression, lethargy, anorexia, dehydration, paleness of combs and wattle and slight cyanosis in some others. Abdominal enlargement and diarrhea were also observed in some of the affected birds.

GROSS LESION

Necropsy revealed markedly enlarged liver with varying sizes of nodular lesion that appeared to be focal or diffuse in distribution (figure 1 and 2). The nodular formation had resulted in the loss of the liver architecture

The nodules ranged from 0.5cm to 5cm in diameter and color ranged from white to grey. The tumours were soft in consistency with glistening surface and were fairly spherical in shape. The liver was friable. The spleen was slightly enlarged but tumours were not apparent but were evident on palpitation. Similarly, the lungs showed slight nodular consistency that was grossly inapparent.

HISTOPATHOLOGICAL EXAMINATION

The samples of the affected organs mainly the liver, lungs and the spleen were collected and fixed in 10% buffered neutral formalin. The fixed tissues were embedded in paraffin, sectioned at 4 μ m thick, and stained with hematoxylin and eosin. The sample slides were observed under light microscopy.

HISTOPATHOLOGICAL LESIONS

Spleen: Histologically, the cytology of the tumour comprised of multifocal area of lymphoblastic cells (fig. 3) in the spleen. Comparatively, the liver showed multifocal areas of hepatocellular necrosis with variable infiltration of heterophils and small lymphocytes. Individualization of hepatocytes was observed with variable degree of degenerative changes evident in (fig 3). The cellular infiltration was devoid of pleomorphism.

Unlike the other tissue samples presented on this slide, the liver showed multifocal areas of hepatocellular necrosis with variable infiltration of heterophils and small lymphocytes, (Fig. 5). The cellular composition of the lungs consists of multifocal areas of massive infiltration of uniform population of lymphoblastic cells into the connective tissues of the pulmonary parenchyma. As can be observed from fig. 6, it's multicentric in origin and the pattern is one of coalescing foci.

DIAGNOSIS

Tentative diagnosis of avian lymphoid leucosis was made. Differential diagnoses also considered were Marek's disease and reticuloendotheliosis. The diagnosis of ALL was confirmed by histopathology. The multifocal aggregation of lymphoblastic cells evident in the spleen, liver and lung slides show a pattern of coalescing foci consistent of ALL

DISCUSSION AND RECOMMENDATION

The clinical sign exhibited by the birds in this study though non-specific, are typical of ALL as observed by Faddy and Nair (2008). Other researchers are equally in agreement with these findings (Latif, 2005; Cai *et al.*, 2014; Freha, 2017, Bluthia, *et al.*, 2017).

Enlargement of the liver is usually a common feature of this disease hence the term "big liver disease". Grossly, the appearance of the tumor in this report is indistinguishable from that seen in acute Marek's disease induced tumors. These finding have been reported by (Fadly, 1987; Fadly, 1997; Okonkwo, 2015), though the age of the birds (63 weeks) nearly excludes Marek's disease as a differential diagnosis. The tumor lesions were largely restricted to the liver and showed little presence in other organs. This could be due the virus strain, infecting doze, route of infection or stage of infection as Burmester *et al.* (1959) had reported sequel to the high strain variability associated with the liver.

The form of ALL observed in this study appeared to be the nodular form of the lymphoid leucosis which is different from the milliary form that is associated with smaller and uniformly distributed nodules of nearly similar sizes as noted by Fadly, (2000).

The histopathology in this report was quite typical of ALL. The multifocal aggregation of lymphoblastic cells evident in these spleen and liver and lung slide show a pattern of

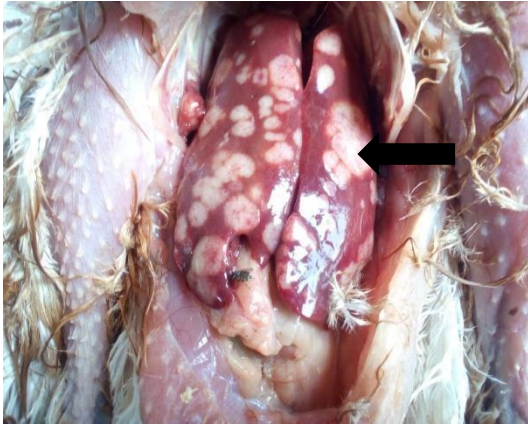


Fig. 1. Enlarged liver (in-situ) with varying sizes of nodular lesion (black arrow)

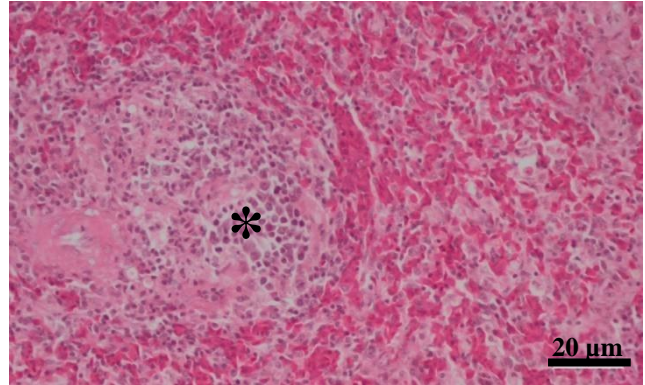


Figure IV. A section of the Spleen showing multifocal areas of aggregations of lymphoblastic cells (*)

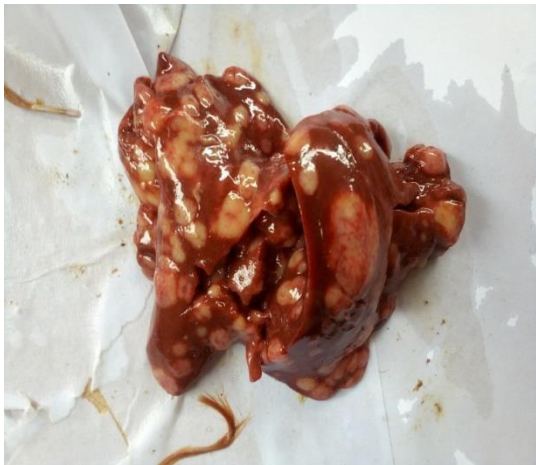


Fig. II. Enlarged liver with varying sizes of nodular lesion

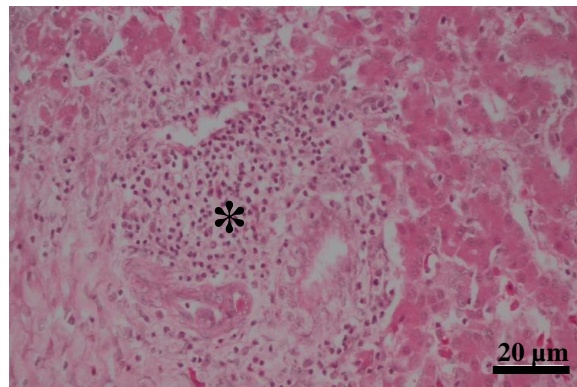


Figure IV: A section of the Liver showing multifocal areas of hepatocellular necrosis and lymphoblastic cells (*)

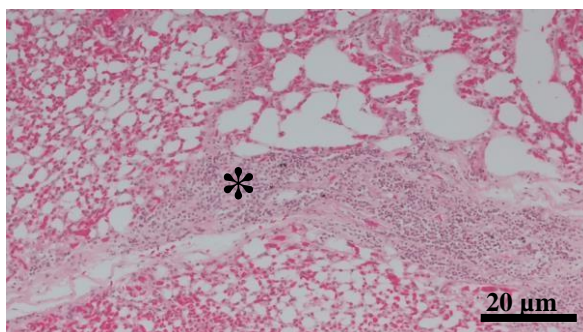


Fig. VI: Multifocal areas of massive infiltration of a uniform population of lymphoblastic cells (*) into the connective tissues of the pulmonary parenchyma

coalescing foci consistent of ALL (Fadly and Nair, 2008). The tumour appears to be focal and grow by expansion unlike the more infiltrative and invasive lesion of Marek's disease as observed by Randall, (1991). The degenerative changes and necrosis observed in the liver is consistent and diagnostic of ALL (Gopal *et al* 2012; Swathi *et al.*, 2012). The predominant cells composed of lymphoblast showed lack of pleomorphism that is characteristics of Marek's disease induced neoplasm. In the lungs, multifocal areas of massive infiltration of a uniform population of lymphoblastic cells into the connective tissues of the pulmonary parenchyma were observed. Thus a case of ALL was confirmed in this study from the clinical, gross and histopathological lesion presented.

Since there is no treatment or vaccine available, eradication of avian leucosis viruses from the parent flocks is the most effective control method. Parent flocks should be evaluated for viral shedding by testing for viral antigens in the albumen of eggs with enzyme immunoassays or by biologic assays for infectious virus. Eggs from shedder hen should be discarded, so that progeny flocks typically have reduced levels of infection. The farm was advised to source day old birds from hatcheries that evaluate their parent stock on leucosis virus status, and also since the virus is not highly contagious compared with other viral agents. Strict biosecurity measures should be adopted. The farmer was equally advised to make use of virucidal disinfectants in their dips and in sanitizing the poultry housing as this will inactivate the virus when present.

CONCLUSION

The confirmation of avian lymphoid leucosis (ALL) based on post mortem examination and histopathological examination in this report indicates that ALL is prevalent in Ikwuano LGA, Abia State, Nigeria.

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