

Clinical Histopathological Study of Infectious Bursal Disease in Fallujah City

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Abstract

Infectious bursal disease is a disease of young chicks it is distributed worldwide. The disease is caused by double stranded RNA Birnavirus causes immunosuppression in young chicken. The study is a clinical comparison between vaccinated flocks and non-vaccinated flocks based on the history from the owner the histopathology was conducted for bursa of Fabricius and thymus. Generally, the vaccinated flocks showed milder lesion in contrary to non-vaccinated flocks there were lymphocytic depletion and inflammatory cell infiltration in bursa mostly. In conclusion the vaccine can prevent lesion and this may lead to reduce immunosuppression, but not infection.

KEYWORDS: Gumboro disease, Hematoxylin and eosin, Thymus, Bursa of Fabricius

I.INTRODUCTION

Gumboro disease belong to avibirnaviridae family which is very contagious disease that affect poultry at early age of life (Sajid *et al.*, 2021). It was firstly discovered in Gumbro Delaware and then distributed around the world it can infect birds at age between 3 to 6 weeks and sometimes extend further (Teshome *et al.*, 2015). The economic implications of Gumboro disease are profound due to its impact on poultry health, productivity and high mortality rates can reach up to 100% in severe outbreaks, while morbidity rates are typically high even with vaccination programs in place, virulent strains of Gumboro continue to pose challenges by causing outbreaks that lead to substantial economic losses in the poultry sector (Gashaw, 2020). Despite widespread use of vaccines and improved biosecurity measures, Gumboro disease remains a persistent threat it is considered one of the top five poultry diseases globally and is considered as one of the five notifiable disease to OIE (World organization of animal health) (Ekiri *et al.*, 2021). Gumboro disease can manifest in three main forms the first form Immunosuppressive one: infect chickens infected before 14 days old of age, while clinical form: Typically seen in birds 3-6 weeks old, characterized by acute symptoms, finally subclinical form mostly is the most common form currently, often leading to decreased flock performance without obvious clinical signs (Wang *et al.*, 2024).

II.MATERIALS AND METHODS

A total number of 9 cases each cases is about 10 broiler chickens (Ross 308) based on the history whether they are vaccinated or not. They were submitted to necropsy to identify the lesions then the organ undergoes fixation with neutral buffer formalin, the organs are bursa of Fabricius and thymus. Samples with dimensions of 1 cubic (cm) were collected from bursa and thymus, 3 samples from each one the tissues were instantly fixed in 10% buffer formalin. After for the period of 72 hours to be fixed well, a tissues have been rinsed with water before being processed as per standard procedure. Water was first removed from the tissues using an alcoholic solution that was increased in concentration from 70% to absolute ethanol 100% for 2 hours in each concentration. Next, xylol was used to clear the tissues, after which the organs were embedded with semi-liquid paraffin wax at 58 °C over two phases. Finally, blocks of samples were created using the paraffin wax, and all tissues were then sectioned, Hematoxylin and Eosin (H & E) stain was utilized for staining, and a microscope was utilized to examine the histopathology (Suvarna *et al.*, 2016).



III.RESULTS AND DISCUSSION

Results

The results of bursa and thymus are divided between vaccinated and non-vaccinated cases based on the case history, the vaccinated cases who got natural infection was showing gross lesion during sampling while microscopically the finding was mild to normal architecture as seen in figure 1,2,3 and 4) which was represented by mild edema in the thymus figure 1, while figure 2 showed no pathological alterations can be mentioned, but figure 3 showed few areas of lymphoid depletion. While non vaccinated groups were different in architecture and showed different lesions Figure.4 the thymus showed reduction in follicle and odema of interfollicular septa and lymphocytes depletion with infiltration of inflammatory cells infiltration. followed by Figure.5 A bursa showed cystic formation filled with exudate and lymphocytes hyperplasia with area of desquamation with atrophy of plica. In addition, Figure.6 of bursa of Fabricicius showed loss of epithelial lining with fibrosis with areas of cellular debris indicating necrosis, while thymus showed few pale areas in the cortex indicating lymphocytes depletion with loss of thymus integrity.

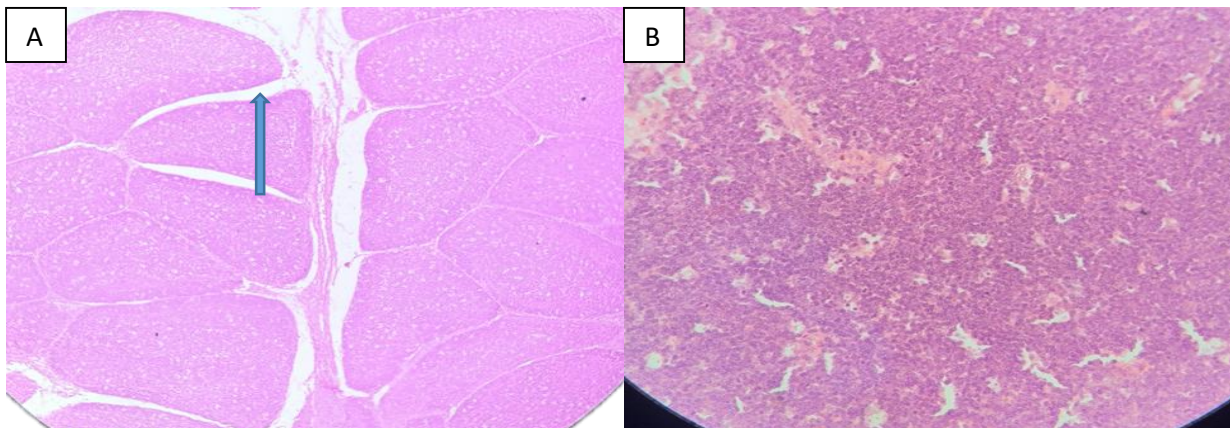


Figure.1 showed mild to negligible lesion in the thymus of broiler chicken mostly interlobular odema the blue arrow(vaccinated) A10X. B40X

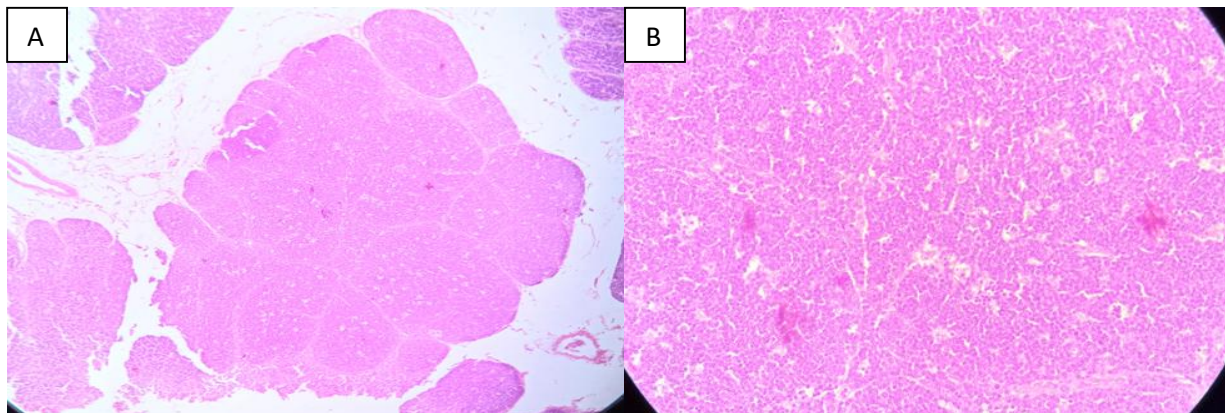


Figure.2 showed mild to negligible lesion in the thymus of broiler chicken(vaccinated) A10X. B40X

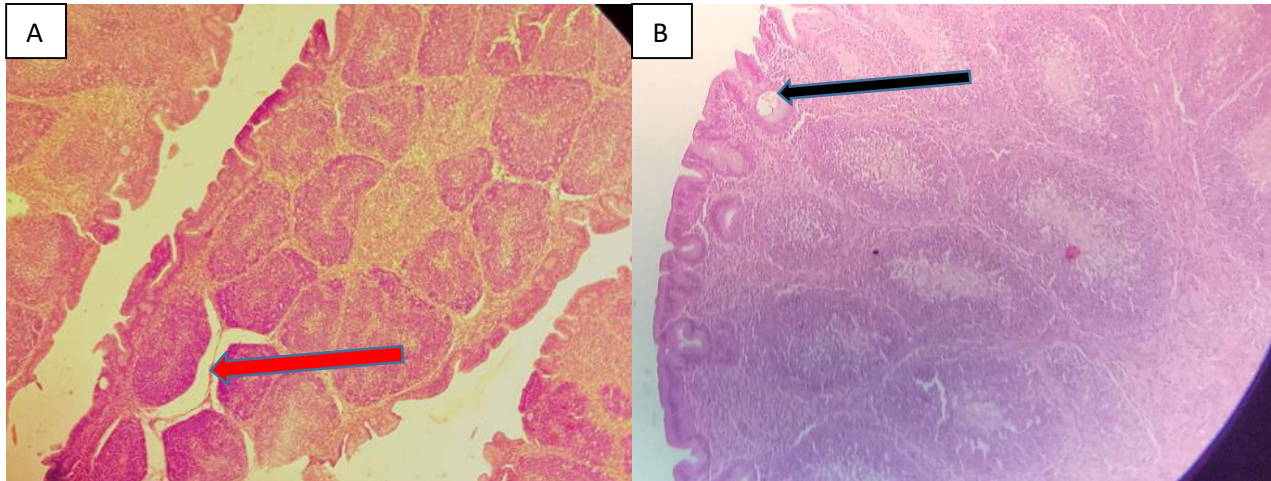


Figure.3 showed no lesion in the bursa of Fabricius of broiler chicken with mild odema A10X. Few cysts are found indicating mild depletion of lymphocytes (black arrow) (vaccinated) B40X

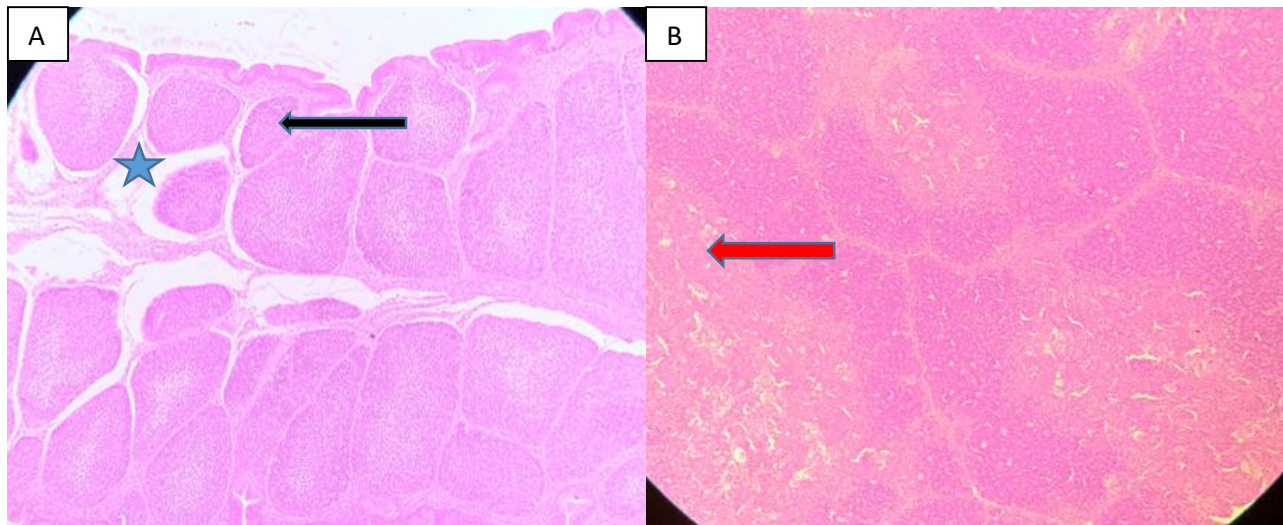


Figure.4 Histomorphology of thymus showed reduction in follicle (black arrow) and odema of interfollicular septa with infiltration of inflammatory cells(star) A10X. And lymphocytes depletion in thymus (red arrow) (Non vaccinated). B40X

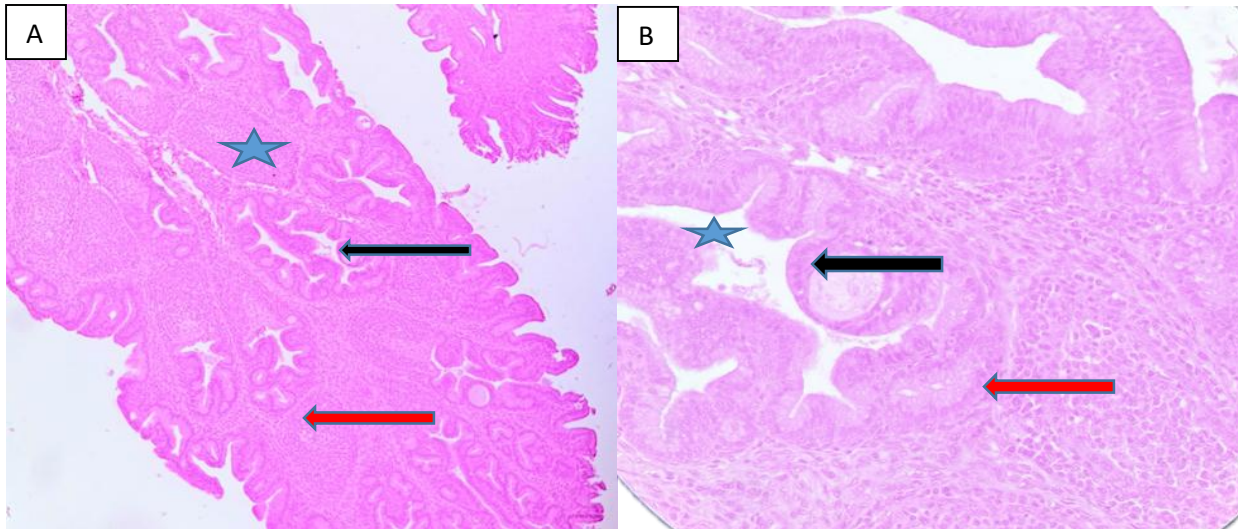


Figure.5 Histomorphology of bursa showed cystic formation filled with exudate (black arrow) and lymphocytes hyperplasia (red arrow) with area of desquamation (star) with atrophy of plica (Non vaccinated) A10X. B 40X

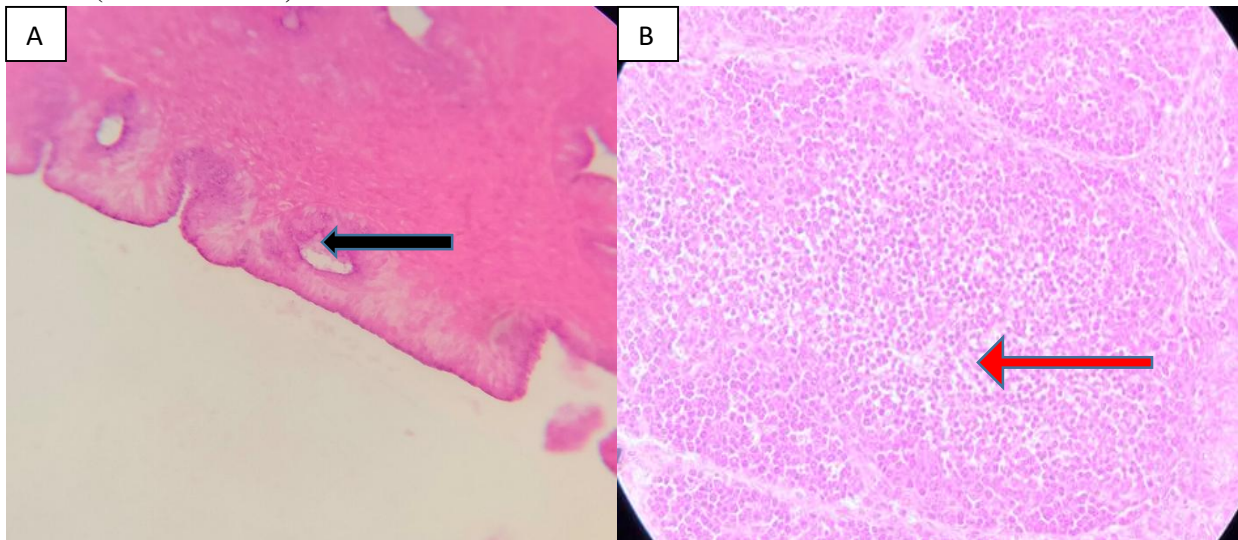


Figure.6 Histomorphology of bursa of Fabricius loss of epithelial lining with fibrosis (black arrow) with areas of cellular debris indicating necrosis A 10X. while thymus show few pale area in the cortex indicating lymphocytes depletion with loss of thymus integrity (red arrow) (Non vaccinated) B.40X

Discussion

The histopathological examination of bursa of Fabricius revealed mild lymphoid depletion this can be related to viral virulence in natural infection (Raji *et al.*, 2017). The lymphoid follicle depletion is in agreement with (Al-Zuhariy, 2023). The depletion of lymphoid follicle occurrence due to apoptosis of infected cells with IBDV (Qin & Zheng, 2017). And Wibowo *et al.* (2019) discovered histopathological abnormalities in bursal samples, including vacuolization of follicle, odema, congestion of parenchyma, bleeding and inflammatory cell infiltration and atrophy of follicles. This study's lymphocyte insufficiency and vacuolization of Fabricius' bursa are consistent with those found by (Kulsum *et al.*, 2018). Furthermore, histological tests revealed considerable lymphoid depletion as well as heterophile as well as macrophage in the interfollicular region of Bursa of Fabricius (Akter *et al.*, 2018). However, these results contrasted with those of Rosenberger (2000) and Sharma *et al.* (2000), who found no substantial inflammatory bursal lesions. Common observations were desquamation and sloughing of the bursal epithelium, which resulted in erosion of the epithelium. Both live attenuated and inactivated vaccines induce protective immune responses, which effectively reduce the severity of bursal lesions upon exposure to field strains of the virus. Studies examining bursal tissue have shown that vaccinated poultry exhibit significantly less cellular damage compared to non-vaccinated controls (Cheville, 1967; Desouky and Elsaber, 2026). This reduced damage translates to the preservation of bursal function, enabling the development of effective immune responses against other pathogens. Specifically, vaccination minimizes lymphocyte depletion, edema, and hemorrhage within the bursa, maintaining its normal architecture (Van den Berg, 2000).

IV.CONCLUSIONS

1. Gumboro disease severely impacts the immune system of young poultry.
2. It primarily targets the bursa of Fabricius, causing inflammation, hemorrhages, and progressive atrophy.
3. The thymus may also be affected in highly virulent strains.
4. Vaccination may not protect from infection but it can reduce immunosuppression based on this histopathological study and mostly if homologous strains being used.

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