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Infectious Bursal Disease: A Silent Threat to Poultry Health

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Introduction:

Infectious birsal disease (IBD) is an acute highly contagious viral disease of young chicken affecting immune system causing great economic loss to poultry industry. This article delves into the disease, etiology, epidemiology, pathology, diagnosis and management. IBD is caused by Infectious Bursal Disease Virus (IBDV) primarily affecting birds at 3-6 weeks of age throughout the world. There are two identified IBDV serotypes, namely serotypes 1 and 2. Only serotype 1 is associated with diverse clinical manifestations due to antigenic variation exist between strains. Transmission mainly occurs through fecal oral route along with direct contact with infected birds. Accurate diagnosis of infectious bursal disease involves molecular tests like real-time reverse transcription-polymerase chain reaction (rRT-PCR) for viral RNA detection. Clinical management includes supportive care and vaccination being the primary choice.

Etiology and Epidemiology of IBD:

IBDV is the etiological agent of IBD which belongs to birnaviridae family and its genome is made up of two segments of double-stranded RNA that each encodes five viral proteins (VPs). VP2 is a crucial structural protein that is accountable for triggering protective immunity in the host. Previous studies have shown that amino acid alterations within the hyper variable VP2 region can cause conformational changes in viral epitopes, which allows the virus to avoid immune responses. Two identified IBDV serotypes, referred to as serotypes 1 and 2. Serotype I IBDV can be further classified into three groups based on antigenicity and pathogenicity: classical IBDV (cIBDV), variant IBDV (varIBDV) and very virulent IBDV (vvIBDV). The highest incidence of IBD outbreaks, at 7.5%, was observed during the July–September period, coinciding with the rainy season. Unvaccinated flocks exhibited a significantly higher case fatality rate of 66.71% compared to vaccinated flocks, which showed rate of 61.01%. Commonly used vaccinations against IBD include Intermediate (I), Intermediate plus (I+), Georgia (G), and MB strains. Generally, these vaccines are administered to broiler chicks aged 12 to 15 days through drinking water.

Pathogenesis and Transmission:

The pathogenesis of IBD involves a complex interplay between the virus, the host's immune response and environmental factors. Chickens are most susceptible to clinical disease at 3-6 weeks of age when immature B cells populate the bursa and maternal immunity has reduced. IBDV primarily target the immature IgM+ B lymphocytes in the bursa of Fabricus causing atrophy of the targeted organ and damage to B and T lymphocytes. The humoral (B cell) immune response is most severely affected: the cell-mediated (T cell) immune response is affected to lesser extent. This lowers the ability of the immune system increasing the risk of serious mixed infections and secondary infections, increasing morbidity and mortality in chickens. Severity of immune suppression depends on the virulence of infecting virus and age of the host. Transmission of infectious bursal disease viruses typically occurs through close contact with infected birds or their environments, although limited mechanical transmission has been reported in some cases.

Clinical Manifestations:

Clinical manifestations of IBD depends upon several factors like age, breed and maternally derived antibody (MDA) level of chick and virulence of virus. The affected birds were reluctant to feed, unable to drink water, had ruffled feathers, depression and inability to move, whitish diarrhoea, pecking at vent region, soiled vents, closed eyes and death.

Gross Finding:

The characteristic gross lesions of the disease include haemorrhages (fig. 1), marked enlargement along with accumulation of gelatinous transudate in bursa of Fabricius 3-5 days post infection. Linear or ecchymotic haemorrhages on the pectoral and thigh musculature are usually evident. Occasionally hemorrhages are seen in proventricular mucosa at the junction with gizzard and on the surface of heart. Kidneys are pale and swollen due to urate deposition.

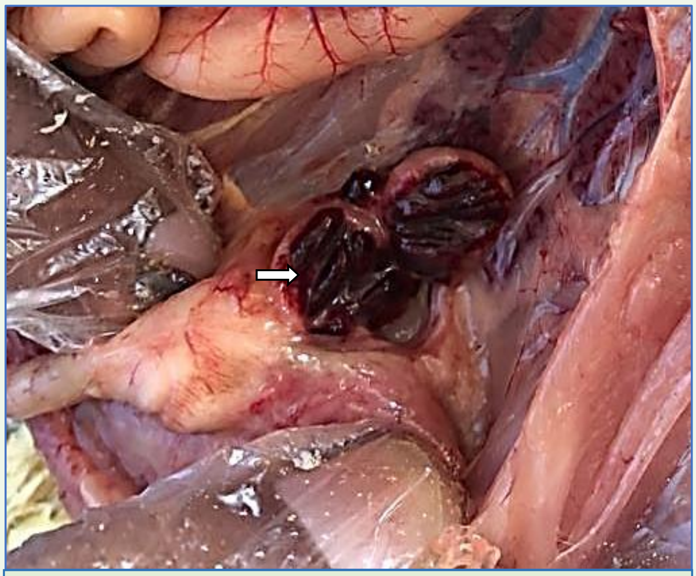

Fig. 1: Haemorrhages (white arrow) in bursa of Fabricius in infectious bursal disease affected birds

Histopathological Finding:

The bursal follicles displayed severe hemorrhage and congestion accompanied by significant depletion of

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lymphocytes (fig. 2). In the thymus, both the cortex and medulla exhibit hemorrhage, necrosis, and depletion of lymphocytes, particularly in the medulla. The spleen showed congestion and a decrease in lymphocytes within the white pulp. The caecal tonsils indicated congestion, hemorrhages, and necrosis of lymphoid follicles. Widespread necrosis and sinusoidal congestion were observed in the liver. The kidneys displayed degenerative changes in the tubules and congestion in the peritubular capillaries.

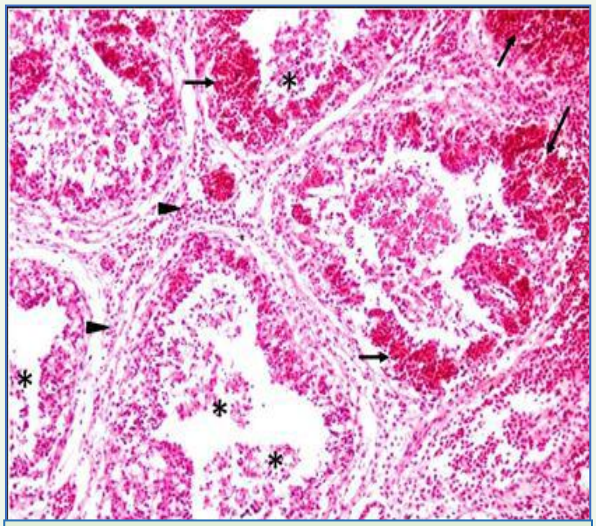
Fig. 2: Bursa of Fabricius showing severe haemorrhages (arrows), severe lymphocytic necrosis (asterisks) and infiltration of cells in interfollicular area (arrow heads). H&E ×400

Diagnosis of IBD:

For prompt management and epidemic control, an accurate diagnosis of IBD is essential. Laboratory testing includes molecular techniques; real-time reverse transcription-polymerase chain reaction (rRT-PCR) and virus isolation. Confirmatory diagnosis of IBDV is most commonly performed by serology using enzyme linked immunosorbent assay (ELISA), agar gel precipitation test (AGPT). Virus neutralization test (VNT) of bursal sections is used to detect viral RNA or antibodies in specimens. Epidemiological investigation and surveillance play a key role in identifying potential sources of infection and tracking the spread of the virus.

Control and Prevention:

Early detection to properly modify control measures, are essential to continuously evaluate the prevalence of the virus and the effectiveness of the vaccine. Effective treatment of Gumboro disease requires appropriate measures, such as bolstering biosecurity protocols on chicken farms to stop the virus's introduction and transmission. Examine and update immunization programs on a regular basis, consulting with poultry health specialists and veterinarians. Increase research and surveillance activities to track the virus's evolution and develop better containment measures.

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