



HISTOPATHOLOGICAL CHANGES ASSOCIATED WITH INFECTIOUS BURSAL DISEASE OUTBREAK IN VACCINATED COCKEREL FLOCK

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Abstract

Infectious bursal disease (IBD) was diagnosed in two hundred (200) five week-old vaccinated cockerels at the Faculty of Veterinary Medicine, University of Nigeria Nsukka. Two hundred 5 week-old cockerel flock were naturally infected with infectious bursal disease virus (IBDV) following re-vaccination at age of 28 days old. The major clinical signs observed were sudden drop in feed intake, huddling together, white-yellowish diarrhoea, prostration and death. The morbidity and mortality was up to 100 and 80 % respectively. At necropsy, lesions observed include, dehydration, enlargement of the bursa and kidney, ecchymotic haemorrhage on thigh and breast muscles, haemorrhage on the mucosal surface of the Proventriculus-gizzard junction. The bursa cavity contained yellowish gelatinous exudates, serosanguineous fluid and caseous plugs. Histopathologically, section of the bursa showed lymphocytic depletion on day 2 post infection. There was interfollicular oedema in the bursa, marked reticular cell hyperplasia, lymphoid cell depletion and heterophilic infiltration. The bursa also showed hyperplasia of corticomedullary layer. There was depletion of lymphoid cells of the periarterial lymphoid sheaths in the spleen.

Keywords: Infectious bursal disease, Cockerels. Histopathology, Mortality, Morbidity

Introduction:

Infectious bursal disease (IBD) is an acute and highly contagious disease of young birds between the ages of 3-7 weeks, characterized by high morbidity and mortality (Dinev, 2007). Infectious bursal disease has been reported in chickens as young as 9 days and as old as 20 weeks (Okoye, 1987). It was first discovered in Cosgrove in 1957 and was initially recognized as avian nephrosis. In Nigeria IBD was first reported in 1973 (Okoye and Uzoukwu, 1982; Abdu *et al.*, 2001) with the highest incidence between the months of April-July and November-December (Abdu *et al.*, 2001). It has a worldwide distribution and its effects in commercial poultry industry are very significant due to the huge losses as a result of high mortality and the opportunistic infection encountered due to immunosuppression (Khan *et al.*, 2007; Musa *et al.*, 2010). Infectious bursal disease is caused by Birnavirus belonging to the family Birnaviridae. There are two distinct serotypes of IBDV namely serotype 1 and serotype 2. Infectious bursal disease is caused by serotypes 1 which has 3 pathotypes classified as classical, virulent and very virulent or antigenic variant IBDVs (Kasanga *et al.*, 2013). All breeds of birds are affected but it has been reported that white leghorns exhibit the most severe problems and have the highest mortality rate (OIE, 2016; Igwe *et al.*, 2017). The disease is very fatal when very virulent strains of IBDVs are involved. The clinical features of IBD include depression, sudden drop in feed intake, prostration and death. Post mortem lesions seen in IBD include congestion and haemorrhage of the leg, thigh and pectoral muscles, urate deposition in the kidney, enlargement of the bursa of Fabricius (BF) and the haemorrhage of mucosa of



Proventriculus. Histopathologically BF is the main target organ of the virus (Kibenge et al., 1988); though other lymphoid organs are affected (Sharma *et al.*, 1997). This paper reports the outbreak of IBD in University of Nigeria, Nsukka in a flock of cockerels after 2 days of revaccination.

Flock history and vaccination.

Two hundred day-old white Harco cockerels were purchased from a reputable commercial hatchery Zartech Ibadan, Oyo State, Nigeria. They were kept in experimental poultry house of Department of Veterinary Pathology and Microbiology, Faculty of Veterinary Medicine, University of Nigeria Nsukka. They were reared in deep litter system and were vaccinated against IBDV on day 10 and 28 post hatchery. Feed and water were provided *ad libitum*. Proper bio-security measures were taken. The birds were to be used for experimental work but IBD infection occurred naturally at the age of 30 days before commencement of the experiment.

Clinical signs

Clinical signs of IBD were observed two days post revaccination against the virus as described by Okoye, (1987).

Post mortem examination

Many of the dead birds were necropsied for gross lesions. Samples of the bursa of Fabricius, thymus, spleen, caecal tonsils and liver were collected from chicks that recently died and fixed in 10% neutral buffered formalin for 48 hours. Two chicks from the few birds that survived were randomly selected and euthanized for sample collection on day 7 PI. The fixed tissues were trimmed, embedded in paraffin wax, and microtome sectioned into 5 µm. The sections were stained with haematoxylin and eosin (H&E) and examined under light microscopy using appropriate objective lenses.

Results

Clinical signs

Clinical signs observed include depression, droopy wing and anorexia. On day 2 post infection, all the birds were depressed and were passing out whitish-yellow diarrhoea, 10% (20 birds) mortality was recorded. On day 3 post infection, 40% (80 birds) of the birds were dead. The highest mortality was recorded on day 3 post-infection (PI). On day 4 PI 20 % (40 birds) died. Mortality recorded on day 5 post infection involved only 10 birds. Lowest mortality was recorded on day 6 which involved 3 birds. No mortality was recorded from day 7 post infection and signs of recovery were observed from day 8 PI.

Post-mortem changes

Necropsy showed dehydration, haemorrhage in leg, thigh and pectoral muscle of the dead birds. The BF appeared oedematous, hyperaemic and had a gelatinous yellowish exudate (figure1). Haemorrhage was also observed in proventriculus forming a linear band between the proventriculus and ventriculus. The spleen was slightly swollen. Kidney was also moderately enlarged with urate deposits, congested and haemorrhagic, with whitish deposits in the distended tubules (figure 1).

Histopathology

There were oedema and hyperplasia of the mucosal epithelium of the interfollicular space of the bursa. The lymphoid cells of the bursa follicle were depleted. There was an area of necrosis in the medulla of bursa follicles (Figure 2). In the spleen there was depletion of lymphoid cells of the periarterial lymphoid sheaths.

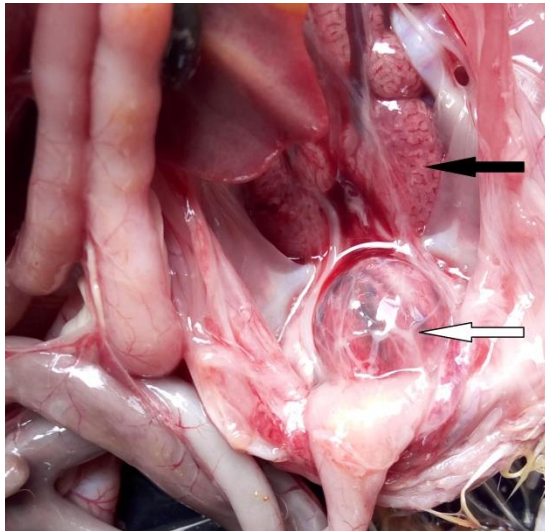


Figure 1. Bursa of Fabricius appearing oedematous and hyperaemic (white arrow) with severe enlarged kidney (black arrow)

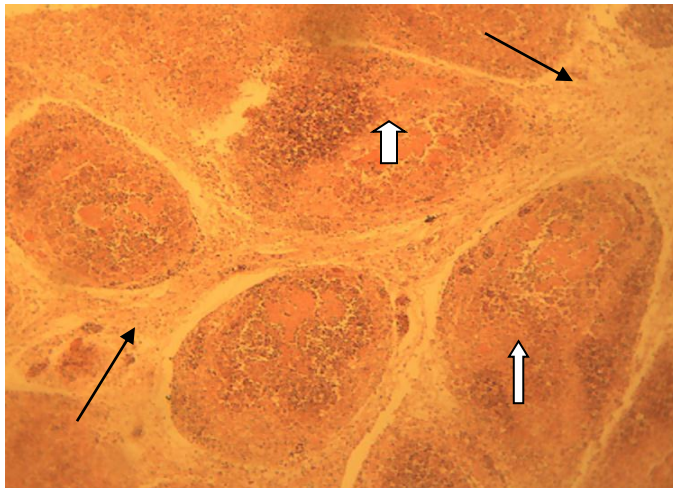


Figure 2 Bursal of Fabricius showing hyperplasia of the mucosal epithelium of the interfollicular space (Black arrow) and area of depletion of lymphocytes in the medulla (white arrow)

DISCUSSION

The tentative diagnosis of IBD in this study was made based on classical clinical signs, gross and histopathological lesions. The clinical signs of IBD seen in this study have been reported by many researchers such as Eterradosi and Saif, (2013) and Igwe et al., (2017). The high morbidity and mortality observed in this study has earlier been reported (Okoye and Uzoukwu, 1982; Hafez et al., 2003). The mortality rate recorded in this case was high when compared to other researchers' findings. This may be as a result of stress induced to the birds during re-vaccination. The classical gross lesions seen in bursa agree with the reports of Okoye and Uzoukwu, (1982); OIE, (2016) and Silva et al., (2016). Many of the clinicopathological properties seen in this study were consistence and diagnostic and are in agreement with the findings of previous workers (Okoye and Uzoukwu, 1982; Hafez et al., 2003; Khatri et al., 2005; Silva et al., 2016; Igwe, 2017).



Aliyu *et al.* (2016) reported that the histopathological changes were marked in the bursa but moderate in the spleen; while Oluwayelu *et al.* (2002) reported moderate lesions in the bursa and spleen, these contradict with the finding of this study in which both the bursa and spleen produced severe gross and histopathological findings. The outbreak recorded in this study may be due to a failure in vaccination procedures or that the birds originated from breeder with different maternal derived antibody titre. Poor preservation method of vaccine can also be incriminated in outbreak of IBD in vaccinated flock especially in some part of African countries where power supply is irregular. Vaccine failure may be encountered partly due to the emergency of field strains that are antigenically different to the strains used in available vaccine, thereby offering very limited immunity or no immunity at all.

Conclusion, vaccine failure has been recorded severally; nevertheless vaccination and biosecurity are still important in the effective control of IBD.

Recommendation, field strain of IBD virus should be determined in our study area to guide the type of vaccines to be used in controlling IBD.

References

- Abdu, P.A., J.U. Umoh, S.U. Abdullahi and I. Saidu, (2001). Infectious Bursal Disease (Gumboro) of chickens in Nigeria. *Trop. Vet.*, 19: 216-236.
- Aliyu HB, Sa'idu L, Jamilu A, Andamin AD & Akpavie SO (2016). Outbreaks of virulent infectious bursal disease in flocks of battery cage brooding system of commercial chickens. *Journal of Veterinary Medicine*, Article ID 8182160, 7 pages.
- Dinev, I. (2007). *Diseases of Poultry; A Colour Atlas*, 4th Edition Eva Santé Animal 549411125 9789549411126.
- Eterradossi, N. and Saif, Y.M. (2013). Infectious Bursal Disease. In: *Diseases of Poultry*, 13th Ed. Swayne, D. E, Glissen, J.R., McDonald, L.R., Nolan, L.K. and Suraz, D.E. and Venugopal Nair, John). Wiley and Sons, Inc., Publication:USA: 219-246.
- Hafez, H.M., Prusas C., Raue, R., (2003). Very virulent infectious bursal disease virus {vvIBDV} in vaccinated broiler flock: Course of the disease, identification and characterisation of isolated strain 67(1) 2-5.
- Igwe, A.O., Nwachukwu, O.J., Chinyere, C. N., Shittu, I (2017). Evaluation of pathological changes of natural infectious bursal disease virus infection in the lymphoid organs of Black Harco pullets. *Sokoto Journal of Vet. Sci.* 15 (2) : 18-28.
- Kasanga, C.J., Yamaguchi, T., Munang'andu, H.M., Ohya, K. and Fukushi, H. (2013). Molecular epidemiology of infectious bursal disease virus in Zambia. *Journal of the South African Veterinary Association*, 84(1): 1-4.
- Kibenge, F.S., Dhillon, A.S. & Russell, R.G. (1988). Biochemistry and immunology of infectious bursal disease virus. *Journal of General Virology*, 69 , 1757 /1775.
- Khatri M, Palmquist JM, Cha RM & Sharma JM (2005). Infection and activation of bursal macrophages by virulent infectious bursal disease virus. *Virus Research*, 113(1): 44–50.
- Khan, M.A., Siddique, M. Hassan, I., Rahman, S.U., Arshad, M. (2007). Adaptation of local wild infectious bursal disease virus in chicken embryo fibroblast cell culture. *Int. J. Agric. and Biol.*, 9: 925-927.
- Musa, I.W., Saidu, L., Adamu, J., Mbuko, I.J., Kaltungo, B.Y. and P.A. Abdu, (2010). Outbreaks of Gumboro in Growers in Zaria, Nigeria. *Nig. Vet. J.*, 31: 306-310.
- Okoye, J.O.A. (1987). The pathology of infectious bursal disease virus in indigenous Nigerian chickens. *Revue Else. Med, vet. Pays trop.* 40(1) : 13-16.



- Okoye JOA & Uzoukwu M (1982). Characterization of Nigerian strains of infectious bursal disease virus of chickens: Histopathological changes occurring in field outbreaks. *Bulletin of Animal Health Production in Africa*, **30**: 185–191.
- OIE (Office International des Epizooties) (2016). Chapter 2. 3. 12. Infectious bursal disease (Gumboro disease). In: OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals. Version adopted in May, 2016; Paris, <http://www.oie.int/en/international-standard-setting/terrestrial-manual/access-online/>. Pp 1–21.
- Oluwayelu, D.O., Emikpe, B.O., Ikheloa, J.O., Fagbohun, O.A and Adeniran, G.A. (2002): The pathology of infectious bursal disease in crossbreeds of Harco cocks and indigenous Nigerian hens. *African Journal of Clinical and Experimental Microbiology*, **3**: 95 –97.
- Sharma JM (1997). The structure and function of the avian immune system. *Acta Veterinaria Hungarica*, **45**(3): 229-238.
- Silva MS, Rissi DR & Swayne DE (2016). Very virulent infectious bursal disease virus produces more severe disease and lesions in specific-pathogen-free (SPF) leghorns than in SPF broiler chickens. *Avian Diseases*, **60**(1): 63–66.