

Marek's Disease

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ABSTRACT

Highly contagious viral disease of poultry caused by Herpesvirus mainly affects chickens causing malignant lymphomatosis. Virus has many strains varies from non-pathogenic to very virulent strains. It is present worldwide causing huge economic losses. Main route of transmission is inhalation of infected skin dander and dust. No vertical transmission occurs, only horizontal transmission occurs. It is characterized by peripheral enlargement and T-cell lymphomas.

Introduction:

Highly contagious viral disease of poultry caused by Herpesvirus [1] mainly affects chickens causing malignant lymphomatosis. Virus has many strains varies from non-pathogenic to very virulent strains [2]. It is present worldwide causing huge economic losses. Main route of transmission is inhalation of infected skin dander and dust [3]. No vertical transmission occurs, only horizontal transmission occurs. It is characterized by peripheral enlargement and T-cell lymphomas. Two forms exist clinical and subclinical. Infected birds remain carrier for life time. Clinical signs include early mortality, paresis of the leg, wings, and neck, and eye lesions that affect vision. Diagnosis is made by observing clinical signs, history, gross pathology, and histopathology. Currently, no treatment is available. Vaccines can be given in OVO or when chicks hatch. Proper vaccination, stress free environment and strict biosecurity measures ensure proper prevention [4].

Etiology:

MDV (marek's disease virus) belongs to Genus Mirdavirus (subfamily Alphaherpesvirinae). Virulent disease is caused by Gallid Alphaherpesvirus 2 which is further divided into mild, virulent, very virulent and very virulent plus pathotypes. Meleagrid Alphaherpesvirus 1 and Gallid Alphaherpesvirus 3 include non-virulent strains which are now used as vaccines against Marek's disease [5].

Host:

Gallinaceous birds including chicken, quails and turkeys are affected by MDV. Quails and chickens are naturally infected while experimentally turkeys also get infected. Experimentally it is concluded that MDV cannot infect animals and mammalian cells so there is no zoonotic significance. It can infect birds at any age but usually 6-week age birds are more susceptible to MDV [6].

Transmission:

Feather follicles which anchor feathers into skin are main source of MDV. Through electron microscopy epithelial cells of follicle contain high number of infectious virions. Feather follicles and dust are considered as major route of transmission. Inhalation of these infected follicles and dust spread the disease. Minor cuts also become source of transmission when come in contact with infected material. No vertical transmission is present, disease spread only through horizontal route. Once a bird gets infected with MDV it remains carrier for whole life [7].

Pathogenesis:

After inhalation of infected dust, MDV starts [8]. Phagocytes take this virus to lymphoid organs (thymus, spleen and bursa) then the virus replicates in lymphocytes. In vivo four phases of mareks disease are known. These phases include proliferative phase, latent phase, early cytolytic and 2nd phase of cytolytic infection (productive restrictive). In proliferative phase lymphoma formation may or may not occur. B lymphocytes infection occurs within some days after virulent MDV strain infection, ultimately antigens are produced which will cause death of the cells, this is restrictive productive infection. Enveloped virions are produced in epithelium of feather follicles in productive infection. Bird become life time carrier in latent stage. Furthermore, antigens are not expressed but virus can be recovered from infected lymphocytes. In latent phase some T cells may undergo neoplastic changes and escape host immune system and ultimately neoplasm may form [9].

Clinical signs & symptoms:

Various clinical signs are present in MDV infection including neurological symptoms, multiple lymphomas development, chronic wasting and tumor formation. Neurological signs include paralysis, tics, ataxia and torticollis. Incidence of this disease depends on several factors (age, maternal antibodies, gender, genetic, strain of virus, dose of virus, dose and strain of vaccine given, stress and other multiple environmental factors). Bird shows depression before death, in most of the cases a syndrome of transient paralysis can also occur. Ataxia appears in chicken which remains for many days but

recover ultimately. In vaccinated birds this syndrome is infrequent. When birds become paralyzed, they are unable to reach their feed and water sources, ultimately resulted in death. Early mortality, atherosclerosis, persistent neurological disease, cytolytic infection and transient paralysis are also present along with lymphoid neoplasms. In MDV affected birds the main gross lesion is enlarged nerves [10]. These nerves include peripheral nerves, mainly sciatic nerve, vagus nerve and brachial nerve. The peripheral nerves become enlarged which results in loss of their striation. Lymphoid tumors which maybe diffused or nodular in nature are present in many visceral organs including gonads, kidneys, muscles, spleen, heart, liver and proventriculus. Rarely bursa become tumorous but mostly it becomes atrophic. In broilers, during defeathering enlarged feather follicles are main cause of condemnation of meat. By performing histological examination of the lesions, population of small, medium and large lymphoid cells, plasma cells and large anaplastic lymphoblasts are seen. Inflammatory cells as well as tumor cells are present in lesions. In case of bursa, tumor cells are present in intra follicular areas. Ocular involvement is also seen which results in vision impairment ultimately bird feels difficulty in approaching water and feed source which will decline their production and increase mortality rate. Mostly in transient paralysis legs are affected in such a way that bird will not be able to move anymore [11].

Diagnosis:

Diagnosis is made on mainly history taking, signs and symptoms, gross pathology and histopathological examination. For research purpose, virus isolation, PCR, immunohistochemistry and serology can be performed. In laboratory diagnosis we performed virus isolation, identification, virions characterization, antigen and DNA detection. We can also detect induced antibodies against MDV [12].

Treatment & prevention:

There is no treatment available for MDV but only vaccination and precautionary measures are tools to prevent this disease. Strict biosecurity measures along with good sanitation are required. Now a days development of genetic resistance through breeding programs is introducing in birds in order to develop immunity against MDV. Vaccines which are widely used include Turkey herpesvirus(HVT), CVI988/Rispens and SB-1 or 301B/1 [13]. HVT vaccine is used as recombinant vaccines with other poultry diseases (ND, ILT, IBD). It provides immunity against Marek's as well as other diseases. Bivalent vaccines (HVT and SB-1 or 301B/1 Gallid alphaherpesvirus 3 strains) provide additional immunity against virulent MDV. Currently most effective commercial vaccine is CVI988/Rispens (attenuated Marek's disease virus strain). HVT is also mixed with it at vaccination. In ovo vaccination is done on 18th d of incubation. Automated technology is used for in ovo vaccination which reduces labor cost also. Thawing and reconstitution of vaccine should be proper handled and proper dose should be administered. Vaccines which are cell associated are effective because they are less chances of neutralization of vaccine by maternal antibodies. Vaccines are almost 90% effective and reduces the risk of getting Marek's disease in layer and broiler flocks [14].

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