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Viral Respiratory Diseases of Chicken in Egypt (Review)

Neven Ramzy
Department of Virology, Institute of Animal Health Research,
Dokki, Giza, Ismailia branch.

Abstract

Infectious bronchitis, Newcastle disease, infectious laryngotracheitis, avian influenza, and pneumovirus are the viruses that more frequently affect the respiratory tract of chickens, because of their tendency to change its antigenic properties Infectious laryngotracheitis has appeared in the broiler industry as a serious disease. Newcastle is a highly contagious, disease in which all birds in a flock usually become infected within three to four days. Avian pox is a relatively slow-spreading viral disease in birds, characterized by wart-like nodules on the skin and diphtheritic necrotic membranes lining the mouth and upper respiratory system. In spite of regular vaccination of chicken flocks in Egypt with Infectious Bronchitis virus (IBV) vaccine, respiratory and kidney lesions had developed. Sporadic outbreaks of avian influenza were reported in several countries .In general, the highly pathogenic forms of these diseases are easily diagnosed mainly because of the high mortality and typical lesions observed. Pneumo viruses are now widely distributed in the poultry industry, causing "swollen head syndromes," which is a term used to describe the condition in chickens. Vaccination programs are constantly adjusted to improve protection against diseases. Improved vaccines are needed to control the diseases.

Key words: Fowl pox, infectious bronchitis virus, Newcastle disease virus, infectious laryngotracheitis virus, avian influenza virus, avian pneumovirus.

Introduction

Respiratory disease often presents itself with one or more birds sneezing/snicking. These birds can have a runny nose and foamy running eyes. In severe cases these birds can have swollen sinuses (presents as swelling around the eyes), stop eating and in extreme cases die. Several avian viruses have a predilection for the respiratory tract of chickens. Infectiuos laryngeotrachitis virus (ILT), Newcastle disease virus (NDV), avian influenza virus (AIV), Infectious bronchitis virus (IBV), and Pneumovirus primarily infect the respiratory tract of chickens. Other viruses, such as adenovirus and reovirus are invaders of the upper respiratory tract of chickens. Clinical signs due to respiratory disease range from nasal and ocular discharge, gasping or open mouth breathing, wheezing, snick with various mortalities in a flock can be observed. Rarely the birds may not have any clinical signs and die acutely such as in Bird flu and Newcastle disease. Similarly gross and microscopic lesions due to respiratory diseases range from fibrinous to lymphoplasmacytic airsacculitis, pleuritis, pneumonia, sinusitis/rhinitis, laryngitis,

tracheitis and conjunctivitis. Respiratory tract, whereas IBV, NDV, and AIV also invade other tissues such as the kidneys and the reproductive system (IBV), the gastrointestinal tract (NDV, IBV, and AIV), and the central nervous system (NDV, AIV). To control most respiratory viruses, live and inactivated vaccines have been developed and used by the poultry industry for many years. the commercially available vaccines did not control the condition in the field **(Parsons et al., 1992).** In most cases, live vaccines are prepared with attenuated strains of the respective virus and therefore, these viruses replicate in the tissues of the respiratory tract, inducing a reaction that is known as postvaccination reaction. The degree of this reaction varies from very mild to severe, depending on factors such as degree of attenuation, concentration. One of the most common respiratory infections of chickens is Infectious Bronchitis (IB) infection. With IB infection clinical signs of respiratory were noise, runny eyes and nose. In layers and breeder drops in egg production can be sudden and severe, but differentiation from influenza or Newcastle disease infection would be related to the absence of significant acute mortality in uncomplicated classic IB infection.

Infectious laryngotracheitis

The ILT was first described in 1925 **(May & Thittsler),** and it has been described in many countries in which remains as a serious disease mainly in areas of intensive production of chicken such as North America, South America, Europe, China, Southeast Asia and Australia. Infectious laryngotracheitis is caused by (ILT) herpesvirus which continues to cause outbreaks of respiratory disease in chickens world-wide. Severe epizootic forms of ILT show a great respiratory distress, gasping, expectoration of bloody mucus, and high mortality. Mild forms of infection, sometimes enzootic, are characterized by mucoid tracheitis, sinusitis, unthriftiness, and low mortality. Etiological agent: Infectious Laryngotracheitis virus (ILTV) is classified as a member of the family Herpesviridae in the subfamily Alphaherpesvirinae. The virus is taxonomically identified as Gallid herpesvirus 1 **(Roizman, 1982).** ILTV strains vary in virulence for chickens **(Cover & Benton, 1958; Jordan, 1966; Pulsford, 1963; Pulsford & Stokes, 1953)**. Naturally occurring I LTV strains vary in virulence from highly virulent strains that produce high morbidity and mortality in exposed chickens to strains of low virulence that produce mild to- inapparent infections **(Cover & Benton, 1958; Jordan, 1966; Pulsford, 1963; Pulsford & Stokes, 1953).** Latence of ILTV as is the case of other herpesviruses, ILTV establishes latent infections, which have been demonstrated by the re-isolation of virus from the seventh week after infection by repeated tracheal swabbings **(Bagust, 1986),** and at 2 months after infection in tracheal cultures **(Adair et al., 1985).** Clinical signs generally appear 6- 12 days following natural exposure **(Kernohan, 1931a.b; Seddon & Hart, 1935).** Experimental inoculation

via the intratracheal route results in a shorter incubation period of 2-4 days **(Benton et al., 1958; Jordan, 1963; Seddon & Hart, 1935).** Gross lesions are most consistently observed in the larynx and trachea, even though the conjunctiva and other respiratory tissues could be affected. Tissue changes in tracheal and laryngeal tissues may be mild, with only excessive amount of mucus, conjunctivitis, sinusitis, and mucoid tracheitis **(Davidson &Miller., 1988; Linares et al., 1994),** or severe, with hemorrhage and/or diphtheric changes. ILT is a major viral respiratory disease included within List E of the Office International des Epizooties (OIE). The chicken is the only significant primary host species for ILTV, and no other reservoir species have been recognized, even though pheasants and peafowls can sometimes be naturally infected by contact with chickens actively shedding ILTV **(Guy & Bagust, 2003).** ILT infections must be differentiated from others respiratory diseases which present similar clinical signs and lesions. In these cases ILT diagnosis must be assisted by laboratory methods. The application of biosecurity measures will avoid exposing susceptible chickens via contaminated fomites. The importance of site quarantine and hygiene in preventing the movement of potentially contaminated personnel, feed, equipment, and birds is central to successful prevention and control of ILT **(Kingsbury & Jungherr, 1958).** To control the condition, vaccines of chicken embryo origin as well as cell culture have been used with limited success. The recommended application route of these vaccines is the intraocular procedure, a method clearly inappropriate for the broiler industry.

Newcastle Disease Virus

Newcastle disease (ND) is economically most important poultry disease and distributed worldwide causing devastating loses in poultry industry. Newcastle disease virus (NDV) has a wide host range and has been reported to infect more than 240 species **(Alexander and Senne, 2008; Cattoli et al., 2011)** of birds. In chickens virulence ranges from non-virulent, associated with asymptomatic enteric infections or unapparent or mild disease of respiratory tract (lentogenic strains), mild respiratory disease and moderate mortality rates (mesogenic strains) to severe disease with high mortality rates up to 100% (velogenic strains). Genetic classification has divided NDV into 2 classes (I and II), with class I composed of only 1 genotype (class I, genotype I) and with class II divided into 18 genotypes (class II, genotypes I–XVIII). Genotypes V, VI, and VII are virulent viruses and predominant genotypes circulating worldwide. Out of these, genotype VII is particularly important because it is associated with many or the most recent outbreaks in Asia, Africa and Middle East. For rapid and accurate diagnosis real time RT-PCR tests are equally or more sensitive than virus isolation and are always faster than virus isolation. Vaccination against ND is widely practiced. The number of NDV isolations increase during the cold season, whereas in the summer very few outbreaks caused by lentogenic strains

are observed. Velogenic, viscerotropic, or neurotropic strains of Newcastle disease virus have not been isolated from the commercial poultry industry in the U.S. in more than 20 yr. The live vaccines used to control NDV around the world are, with very few exceptions, of the lentogenic type: B1, LaSota, F (Asplin), V4, Ulster and VG/Ga. Mesogenic strain are now very seldom used. The tendency of the poultry industry is to use vaccines of low reactivity, although still providing a high rate of protection. Such vaccines are already on the market, as well as recombinant vaccines.

Avian Influenza

Sporadic outbreaks of avian influenza were reported in several countries **(O. I. E. Bulletin, 1996).** In general, the highly pathogenic form of the disease is easily diagnosed mainly because of the high mortality and typical lesions observed. However, the disease caused by the low pathogenic strains is not always easily recognized, and the virus can rapidly spread to other susceptible poultry populations. Also, low pathogenic strains can become highly pathogenic, as it has already been observed in outbreaks in the USA in 1983 and in Mexico in 1994. The control of avian influenza is based on eliminating the virus by eradicating the disease, or establishing a vaccination program using inactivated vaccines to decrease the rate of virus multiplication in the field, with the final goal of eliminating the virus. Avian influenza is a viral disease of several avian species in various parts of the world. The disease can range from asymptomatic and mild to hyperacute and fatal. Chickens inoculated with highly pathogenic (HP) virus had histologic lesions of necrosis and inflammation in cloacal bursa, thymus, spleen, heart, pancreas, kidney, brain, trachea, lung, and skeletal muscle, whereas chickens inoculated with MP virus had histologic lesions most frequently in lung and trachea or lacked histologic lesions. Immunospecific staining for avian influenza viral proteins was most common in cells within heart, lung, kidney, brain, and pancreas of chickens inoculated with HP viruses, but immunospecific staining was present only and infrequently in trachea and lung of chickens inoculated with MP-Penn AIV. MP-Alab did not produce lesions nor have viral antigen in inoculated chickens but did produce serologic evidence of infection.

Infectious Bronchitis Virus

The Coronavirus IBV constitutes one of the most important viruses in poultry medicine because of its numerous serotypes that have been described **(Hopkins, 1974; Johnson and Marquardt, 1975).** The Massachusetts (Mass) strain of IBV is considered to be the prototype strain for the group and is the representative of the Mass serotype.

Infectious bronchitis is an acute, highly contagious viral disease of chickens, manifested by respiratory signs, renal disease and a significant drop in egg

production. Air borne transmission in the direction of prevailing wind. The spread of infection is rapid in a flock. Some birds become carriers and shedders of the virus through secretions and discharges for many months after the infection. IB virus persists in contaminated chicken houses for approximately four weeks. Numerous descriptions of viruses that differ from the common IBV serotypes have appeared in the recent literature. With the common use of molecular techniques to study avian viral isolates, the possibility of finding differences among isolates is greater than the possibility of finding similarities. **(El- shahidy et al 2015)** showed by electrophoretic pattern of amplified S1 gene a specific band at 380bp. IBV Ismailia isolates are clustered in distinct phylogenetic group with 4 recent IBV isolates circulating in Egypt scince 2012. Perhaps it is necessary to attempt to establish groups of viruses based on their shared characteristics; with additional work in vivo to determine the ability of current vaccines to protect against new viral isolates, as has already been suggested **(Avellaneda et al., 1994).** Variant strains, or isolates that differ from the common serotypes, have also been described **(Gelb et al., 1991).**

Pneumovirus

This group of viruses is now widely distributed in the poultry industry. Although the name avian rhinotracheitis was proposed, it appears that the name avian pneumovirus infection is the most appropriate for both species **(Jones, 1996).** In chickens, broiler breeders have been more severely affected, with. Swelling of the infraorbital sinuses being the most common sign or lesion. Torticollis is observed in the late stages of the disease in breeders. This clinical manifestation has not been observed in broilers. Although in some countries the presence of the disease has been diagnosed based on virus isolation, antibodies have been detected in numerous countries. The virus neutralization and ELISA tests have been used frequently to detect antibodies against this virus. To control the disease, live and inactivated vaccines have been used in chickens and turkeys. Although in some countries vaccination results have been variable, in the author's experience, the respiratory conditions and declines in production are more easily controlled in vaccinated flocks.

Avian Pox

Avian pox is a relatively slow-spreading viral disease in birds, characterized by wart-like nodules on the skin and diphtheritic necrotic membranes lining the mouth and upper respiratory system. It has been present in birds since the earliest history. Mortality is not usually significant unless the respiratory involvement is marked. The disease may occur in any age of bird, at any time. Avian pox is caused by a virus of which there are at least three different strains or types; fowl pox virus, pigeon pox virus and canary pox virus. Although some workers include turkey pox virus as a distinct strain, many feel that is identical to fowl pox virus. Fowl pox can be transmitted by direct or indirect contact. The virus is highly resistant in dried

scabs and under certain conditions may survive for months on contaminated premises. The disease may be transmitted by a number of species of mosquitoes. Mosquitoes can harbor infective virus for a month or more after feeding on affected birds. After the infection is introduced, it spreads within the flock by mosquitoes as well as direct and indirect contact. Recovered birds do not remain carriers. . Affected young birds are retarded in growth. Laying birds have a drop in egg production. Birds of all ages that have oral or respiratory system involvement have difficulty eating and breathing. On immunization of chickens and turkeys with the recombinant, protection is afforded against a lethal challenge with either the homologous or a heterologous influenza virus strain **(Jill T.,et al 1988).**

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