PSITTACINE REOVIRUS:

AN UPDATE INCLUDING A CLINICAL DESCRIPTION AND VACCINATION

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Reovirus is quickly becoming recognized as a major pathogen of psittacine birds and has also been associated with disease in pigeons. Although it is the causative agent of tenosynovitis in poultry, this syndrome has not been described in pet birds. Hepatitis, respiratory disorders and intestinal disorders have also been associated with reovirus infections in poultry. 1,3,4

In psittacines, reovirus hepatitis occurs most commonly in African Grey Parrots and Cockatoos, and is often fatal in these and other old world psittacine species. New World psittacine species are also susceptible but are less severely affected. Reovirus is

often found in combination with bacteria including chlamydia. Combined infections, in which reovirus, salmonella or other bacteria, and aspergillus are found concurrently,occur frequently in flocks of newly imported African Grey Parrots. High morbidity and mortality occurs in these flocks. In New World psittacines, reovirus is often found in combination with chlamydiosis and other bacterial infections.

PROPERTIES OF THE VIRUS

Reoviruses are spherical RNA viruses 75-80 nm in diameter. They are not enveloped and are distinguished by a double capsid structure. Multiplication takes place in the cytoplasm. 2

Psittacine reovirus can easily be isolated by yolk sac inoculation in 5 to 7 day old chicken embryos, however other routes may also be used. Death will occur 3 to 4 days post inoculation, and the embryo will be congested with hemorrhagic organs.

Psittacine reovirus can also be isolated in cell culture in chicken embryo kidney cells (CEK), chicken embryo fibroblasts (CEF), or baby hamster kidney cells (BHK). In BHK cells cytopathic effect occurs as early as 24 to 48 hours post-inoculation and is manifested by giant cell formation with eosinophilic cytoplasmic inclusions. Destruction of the monolayer occurs in 3 to 5 days.

TRANSMISSION AND CLINICAL COURSE

Transmission is suspected to be primarily by ingestion; however, airborne transmission may also be involved. Epidemiological evidence suggests the presence of asymptomatic carriers. The incubation period is 5 to 7 days following experimental inoculation.

Clinical signs of reovirus infection include anorexia, lethargy or weakness, weight loss, dyspnea, and nasal discharge. Diarrhea may occur but is not a consistent sign. Urates are often yellow in color. Uveitis is often seen in combined infections but is seldom observed in uncomplicated reovirus infections. Pneumonia occurs commonly with or without fungal secondary infections. Edematous limbs and unilateral or bilateral paralysis may occur due to thrombosis and vascular compromise. Pallor of unpigmented areas of oral mucous membranes is observed in African Grey Parrots.

Anemia, and leukocytosis followed by leukopenia is often observed. Leukopenic birds are predominately heteropenic and differentials may be 90-100% lymphocytes. Serum SGOT and LDH may be elevated terminally. Serum electrophoresis is a helpful diagnostic aid. Serum albumin drops while globulins are elevated in both natural and experimental infections.

POST MORTEM LESIONS AND HISTOPATHOLOGY

Hepatomegaly and splenomegaly are often observed post mortem. Grossly the livers may have fine tan to yellowish speckling or mottling of the external and cut surfaces. The spleen is usually congested and may exhibit necrosis. 3

Microscopic lesions include acute multifocal to diffuse areas of coagulation necrosis of the liver. Multifocal to diffuse mononuclear cell infiltrates may be found in most cases in the liver, kidney and intestinal lamina propria. Intravascular thrombi and microthrombi are common and suggestive of disseminated intravascular coagulation (D.I.C.).

SEROLOGY

Three to five serotypes of avian Reovirus have been discribed in poultry. Three isolates were tested by Dr. Jack Rosenburger for antigenic similarity to poultry reoviruses. (6) One isolate was from African Grey Parrots from Ghana, one from Cockatoos from Indonesia and the third from Macaws from Bolivia. All isolates were from birds which died in quarantine or immediately afterward and had no contact with birds in the United States. He found the Ghanan and Indonesian isolates to be antigenically different from poultry strains while the Bolivian strain was antigenically similar.

Infected psittacine birds develop precipitating antibodies to

reovirus which can be detected by agar gel immunodiffusion testing. Antigen was prepared from super-infected BHK cultures and used in immunodiffusion techniques as described by Olsen et al. (5) Precipitating antibody can be detected within 2 to 3 weeks of infection and persists for at least 2 to 4 weeks. Recovered birds also develop virus neutralizing antibody.

VACCINATION

Commercially available poultry reovirus vaccines are ineffective against common strains of psittacine Reovirus in field trials. Therefore a vaccine derived from a psittacine isolate was developed at the University of Florida. A betapropriolactone-inactivated, aluminum hydroxide adjuvanted autogenous vaccine was made from virulent virus grown in BHK cells. Viral concentration was in excess of 10 6 cell culture infective doses (CCID 50) per ml. It was dosed at 1/2 ml per bird given intramuscularly. Vaccination was repeated in 10 to 14 days.

In field trials the vaccine has been administered to over 2500 birds of 14 species without adverse effects. It has been used in the face of outbreaks in flocks of African Grey Parrots and Cockatoos. If administered early in an outbreak it appears to be helpful in reducing morbidity and mortality.

TREATMENT AND CONTROL

The use of chlorhexidine in the drinking water will slow the spread of the disease in an outbreak and is an effective preventative for birds which may be exposed to the virus. (A) Chlorhexidine should be used at the rate of 20 ml/gallon drinking water. Long term use may be necessary in order to allow the disease to run its course. Use of chlorhexidine for 30 days or more is not harmful. In order to reduce the numbers of infective viral particles in the environment the birds and cages should be misted daily with chlorhexidine.

Treatment for affected birds is limited to supportive care and therapy for secondary invaders. Chloramphenicol is routinely added to the feed in outbreaks involving African Greys due to the high incidence of concurrent salmonellosis. Likewise Chlorotetracycline is recommended as an adjunct in treating Cockatoos, Amazons and Macaws to combat concurrent chlamydial infections. Hematinics and methiscol R are helpful adjuncts to therapy.(B) The prognosis is poor for infected Old World birds but good for most New World birds.

A - Chlorhexidine - Nolvasan Solution - Fort Dodge Laboratories, Fort Dodge, Iowa, 50501 or Virosan Solution - Bioceutic Laboratories, St. Joseph, Missouri, 64502.

B - Methiscol Capsules - USV Pharmaceutical Corp., Scarsdale Road, Tuckahoe, N.Y. 10707

DISCUSSION

Psittacine Reovirus is a major cause or morbidity and mortality in imported psittacine birds. It appears that the Bolivian reovirus is a poultry strain and is not a consistent finding in birds imported from Bolivia. The Indonesian and African strains however are consistently found in birds imported from these regions, and result in considerable mortality. The African strain is most prevalent in birds from Ghana but is also found in birds from Cameroon and possibly other West African countries. In lots of birds in quarantine, which are given Chlorhexidine in the water, mortality is consistently lower than in birds not recieving chlorhexidine. However, some birds are apparently carriers and breaks after release from quarantine are frequent. These birds will often contaminate other flocks after shipment from quarantine stations to wholesale and retail outlets. Ideally they should be vaccinated either prior to importation, while in quarantine or after release, prior to sale. Follow-up vaccination in the pet shop or aviary is also recommended.

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