

Infectious Bursal Disease

(IBD, Gumboro)

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General Information

- Common in all over the world
- Very contagious
- Clinical: depression and death
- Subclinical: immunosuppression
- Significant economic losses

Etiology

- *Birnaviridae*
 - *Avibirnavirus*, IBDV
- RNA – A and B segment
- Viral proteins
 - VP1, **VP2**, VP3, VP4, VP5
- Virus stable, long life span
 - More than 120 days in stool
 - Phenol resistant

Clinic

- Clinical course
- Immunsuppression

Immun system and Immunsupression

- Target organ **bursa fabricius**
 - On the 3rd day, due to edema and hyperemia, enlargement, gelatinous transudate, color changes from white to cream, bleeding may occur
 - 2x growth on the 4th day
 - Normal level on day 5
 - 1/3 level on day 8
- Enlargement of the spleen, bleeding in the anterior stomach and gizzard
- In vvIBDV infection, the thymus, caecal tonsils, spleen and bone marrow are adversely affected

Immun system in Chickens

Economic Importance

Clinic IBD

- Poultry R&D in 2001
- Production level 592,567 tons
- Data taken from 21 companies
- Clinical IBD
- 70-80 million USD/year

Immunsupression

- Insufficient immunity
- Increased susceptibility to diseases
- Negative impact on performance
- Treatment cost
- Economic losses are high

Diagnosis

- Clinic and necropsy
 - Clinical form
 - Subclinical form
- Laboratory diagnosis
 - Sample
- Molecular analysis and typing
 - RT-PCR and sequencing

Control Program

Breeding

- Vaccination programs
- Serological monitoring

Diagnosis and monitoring of the virus

- RT-PCR
- Typing

Broiler

- Vaccination programs
- Maternal antibodies
- Serological monitoring

Monitoring of Immunosuppression

- Clinic-necropsy
- Histopathology

Vaccines and Vaccination Program

- **Live vaccines**
 - Intermediate
 - Intermediate plus/hot
- **Immune complex**
- **Recombinant**
- IBD variant strains
- Inovo
- Incubation
- Vaccination in the field
 - Determining the day
 - Time between the vaccines
- Interaction of IBD vaccinations and other vaccines (such as ND, IB)

Serological Monitoring in Breeders

Result

- Control of the Gumboro disease
 - Clinic
 - Immunosuppression
 - Diagnosis
 - Breeder-chick relationship
 - Monitoring the disease
- Economic importance
- Healthy production

CHICKEN INFECTIOUS ANEMIA DISEASE

- Aplastic anemia in chicks
- Atrophy of lymphoid organs
- Immunosuppression
- The disease agent was first identified as CAA, later named CAV and today CIAV
- It has been defined in different countries around the world
- The disease has also been reported in Turkey

Etiology

- The agent of the disease CIAV
- Classified as the only recognized species of the *Gyrovirus* genus of the Anelloviridae
- Contains single stranded DNA
- Can be cultured on embryonated chicken egg and tissue

Epizootiology

- Common in the world
- The agent can be transmitted **vertically**
- Breeders spread the agent approximately 3-6 weeks by eggs
- The agent can also transmitted **horizontally**
- The feces contains viruses and the digestive tract is important in transmission
- Cocks transmit the agent by sperma

Symptoms

- Infection occurs on 10-14th days when transmission is vertical
- The most obvious symptom is anemia
- Retardation in growth
- Depression, paleness on face and comb, anorexia and weakness
- Bleeding under the skin
- Immunosuppression
- Mortality 10-60%
- Decrease in hematocrit value (from 29-35% to 6-27%)

Diagnosis

- Clinical and necropsy
- Laboratory examinations
 - Virus isolation
 - Serology
 - Molecular analysis

Protection and Control

- Vertical transmission must be considered
- Vaccination

**ADENOVIRUS INFECTIONS in
CHICKENS
(Fowl Adenovirus)**

- **Adenovirus (FAdV) infections in chickens**
 - Hepatitis-Hydropericardium Syndrome (HHS)
 - Hepatitis with Inclusion Bodies (HIB)
 - Adenoviral Stone Erosion (ASE)
 - Infectious Salpingitis (Egg Drop Syndrome, EDS)

Etiology

- Adenoviruses
- Genetic material DNA
- Antigenically different
- Cultured on tissue and ECE
- Resistant at pH 3-9
- Some strains can live at high temperature (60-70°C) for 30 min
- Disinfectants
 - Resistant to phenol (2%) and alcohol (50%)
 - Sensitive to aldehyde and iodine

Etiology

- Adenoviruses
- They are divided into 5 different genera according to their host distribution, antigenic structures and pathogenicity
- Aviadenoviruses
- 5 (A-E) genotypes (molecular group)
- 12 serotypes (1-11; 8 a and b)
- The serotypes differ in their pathogenicity

Epidemiology

- Increase in Avian Adenovirus (FAdV) infections in the last 20 years
- Transmission
 - Vertical
 - Horizontal
- Clinical findings seen in countries are different
 - HHS, Asia, FAdV-4
 - IBH, Latin America, FAdV-2, -8a, -8b, -11
 - AGE, Asia and Europe, FAdV-1

Clinic and Necropsy

- Adenovirus infections in chickens (FAdV)
 - Hepatitis-Hydropericardium Syndrome (HHS)
 - Hepatitis with Inclusion Bodies (HIB)
 - Adenoviral Stone Erosion (ASE)
- Incubation period is very short (experimental infection)
- A multifactorial disease
- Animals without clinical course may have FAdV
- Clinical cases are seen in mostly broiler, rarely layers and breeders

Clinic and Necropsy

- Causes immunosuppression (decrease in lymphoid cells) followed by bacterial infections
- Conditions that cause immunosuppression increase the severity of the disease
 - Diseases (like IBD, CIA)
 - High mycotoxin (Aflatoxin) in feed
- It is seen in broiler from the first week to the age of 5 weeks, it can be seen rarely in old age

Clinic and Necropsy

- Clinically similar findings of IBD and HHS
- Growth retardation, uniformity problem, mixed hair growth, loss of appetite, and sudden increased mortality
- Mortality variable
 - Can reach 30% levels in broiler
 - Death begins suddenly and reaches 10% in 3-4 days
 - Slightly increased mortality in layer flocks (0.2%/week)
- Hatching performance is adversely affected in breeder flocks

Clinic and Necropsy

- Macroscopic findings
 - Liver, pancreas and kidney are affected, hemorrhage foci are seen
 - Color change in the liver
 - Bleeding may also occur in the muscles
 - Bleeding in the hydropericardium and myocardium
 - Bleeding in the gizzard

Diagnosis

- **Clinical symptoms**
 - Age
 - Mortality
- **Necropsy (macroscopic findings)**
 - Internal organs (Liver, pancreas, kidney, gizzard)
 - Hydropericardium
 - Bleeding
- **Laboratory Examination**
 - Organ
 - Serum

Laboratory Examination

Direct

FAdV detection
PCR, FAT, EM,
Histopathology

Isolation and
identification
TC, ECE

Indirect

Detection of the
antibodies
ELISA, AGP, NT,
IFAT

Molecular Diagnosis and Typing

- PCR
- RFLP
- Sequence analysis

Control

- **Transmission route**
 - Vertical
 - Horizontal
- **Biosecurity**
- **Vaccination**
 - Serotype(s)
 - Inactivated vaccines
 - Live vaccines
 - Subunit vaccines

Result

- Prevalence of Adenovirus (FAdV) infections in chickens
- Epidemiology/molecular epidemiology
 - Sources of infection
 - Diagnosis and typing
 - Interaction with other diseases
- Immunosuppression
- Economic importance
- Control strategy

REOVIRUS INFECTIONS

Etiology

- Nucleic acid with double-stranded RNA
- Poultry reoviruses are resistant to ether, chloroform, low pH such as pH 3, trypsin and sodium deoxycholate
- The virus is also highly resistant to heat inactivation
- Unlike mammalian reoviruses, avian reoviruses do not have hemagglutination and hemadsorption properties
- Poultry reoviruses are cultured on embryonated eggs and cell cultures

Etiology

- In order to isolate and culture the virus, egg yolks of embryonated chicken eggs are used and the embryos usually die within 3-5 days
- In addition, reoviruses can be cultured on the chorioallantoic membranes of 10-day-old embryonated chicken eggs. Following the incubation, the embryo dies within 3-5 days and large necrotic membranes occur in the chorioallantoic membrane.
- After inoculations to the allantoic space, embryo deaths generally do not occur, and isolation of the virus in this way is not appropriate.

Etiology

- Primary chicken embryo tissue cultures are also used to culture the poultry reoviruses
- It has been understood that there are at least 11 serotypes in poultry reoviruses.
- Significant variations exist among the virulence of antigenically similar isolates

Epidemiology

- Poultry reoviruses can be transmitted by vertically
- It is known that vertical transmission decreases the hatching rate and increases early chick mortality
- Reovirus infections can be transmitted directly or indirectly from one animal to another
- The spread of infection is mainly with feces, contaminated food and water.
- The resistance of reoviruses to heat and disinfectants provide them to survive in hatcheries and flocks

Clinical Symptoms

- Reovirus infections are seen in two main syndromes in poultry
- **Malabsorption syndrome**
- **Viral arthritis-tenosynovitis**

Malabsorption syndrome

- Especially in broilers and turkeys
- Growth arrest
- Live weight losses
- Delay of feathering
- Upside down and coarse hairing
- Discoloration of feet and beak
- Non-ossification and enteritis

Viral arthritis-tenosynovitis

- Broiler and broiler breeders and young turkeys
- Arthritis, inflammation of the synovial membrane, tendon and myocardium
- Swelling above the knee joint of one or both legs
- Lameness

Diagnosis

- 1. Clinical and necropsy findings**
- 2. Laboratory examinations**
 - a) Virus isolation
 - b) Molecular analysis
 - c) Serological tests

Protection

- Vaccines
 - Live
 - Inactivated