

Avian Metapneumovirus Infections

Etiology

Pneumoviridae (family)

- *Metapneumovirus* (**Avian Metapneumovirus**) (genus)
- *Orhopneumovirus* (genus)

- RNA

- According to the genetic and antigenic characteristics

- Serotypes of the virüs
 - Serotype A
 - Serotype B; most common serotype
 - Serotype C; USA-1996
 - Serotype D; rare, mainly isolated from ducks (France)

aMPV Infections

In Chickens

- Swollen Head Syndrome (SHS)
- aMPV-A serotype

In Turkeys

- Turkey Rhinotracheitis (TRT)
- aMPV-A serotype

Epidemiology

- Turkeys and chickens of all ages are the natural hosts of the virus
- Transmission of the disease occurs through direct contact or via the respiratory route
- Contaminated feed, water, equipment, and migratory birds play an important role in the spread of the virus
- The disease has no zoonotic importance

Clinical Signs

- Respiratory diseases are often caused by multiple pathogens, including secondary agents.
- The virus causes ciliary loss in the respiratory tract, leading to upper respiratory infection
- Mortality in turkeys is 30–50%, it may reach 80%.
- In chickens, infection may be subclinical

Clinical Signs

TRT (TURKEYS)

- Mild to severe rhinotracheitis
- Upper respiratory tract infection
- Reduced feed intake and huddling

SHS

- Head and neck swelling
- Periorbital and infraorbital sinus swelling
- Torticollis and opisthotonos
- Decreased egg production
- Soft- or thin-shelled eggs

Necropsy Findings

- **In turkeys and ducks**

- large amounts of exudate are present in the trachea
- Oviductitis, folded shell membranes in the oviduct, malformed eggs
- Ovarian and oviductal distension
- Abnormal eggs with thickened albumen and solidified yolk

- **In chickens**

- diffuse yellow, gelatinous edema in the subcutaneous tissues of the head and neck
- White caseous mucus in the infraorbital sinuses

Diagnosis

Clinic and necropsy

Differential diagnosis

Material

- Sinus exudate, swab from upper respiratory tract

Laboratory diagnosis

- Virus isolation
- RT-PCR
- Serology (ELISA)

Protection

Biosecurity

Vaccination

- live vaccines
- Inactivated vaccines

Infectious Laryngotracheitis Infection (ILT)

ILT

- It is an important viral disease causing severe respiratory tract infection.
- It is distributed worldwide.
- It occurs in different poultry production systems.
- It is difficult to control due to latency and carrier birds.

Etiology

- *Herpesviridae* (family)
 - *Iltovirus* (genus)
 - ***Gallid herpesvirus type-1 (GaHV-1)***
- DNA
- The virus can survive in carcasses and respiratory exudates.
- It can survive in litter for up to 20 days, depending on environmental conditions

Host Distribution

- Chickens (natural host), usually **>3 weeks of age**
- There are reports of infection in turkeys
- In ducks, infection is usually **subclinical**

- ❖ Müştak IB and Akan M **reported the first ILT infections in broiler breeder chickens in Turkey (2018)**

Epidemiology

- ILTV is mainly shed through respiratory secretions.
- The virus is released into the environment via coughing, sneezing, and ocular and nasal discharges of infected birds, and is transmitted to other birds through airborne droplets via the respiratory tract, eyes, and to a lesser extent, the oral route.
- Direct contact plays an important role in transmission.
- Indirect transmission is also possible through contaminated equipment, people, and transport cages.
- Birds exposed to the virus or vaccinated develop an immune response, which stops active virus shedding; however, they remain latently infected.
- Recovered birds are considered lifelong potential sources of infection.

Clinical Signs

- Severe respiratory distress
- Open-mouth breathing,
- Gaspings, coughing, sneezing, bloody mucus (severe cases)
- **“Pump-handle respiration”** (neck extension to clear trachea)
- Nasal discharge, conjunctivitis, lacrimation
- Swollen infraorbital sinuses and periocular edema
- Depression and decreased egg production
- Mortality up to 50% in unvaccinated flocks

Necropsy Findings

Acute form

- Hyperemia and severe edema of the trachea
- Thickened, red tracheal mucosa
- Dense fibrin accumulation and clotted blood in the lumen
- Petechial hemorrhages and submucosal bleeding in the trachea and larynx
- Fibrinopurulent exudate and mucus accumulation in the trachea

Mild form

- Thickening of the tracheal and laryngeal mucosa
- Small amounts of fibrin deposition

Diagnosis

Clinic and necropsy

Material

Laboratory diagnosis

- Histopathology
- Isolation and identification
- Molecular diagnosis/typing
- Serology

Protection and Control

Biosecurity

Vaccination

- Live vaccines
- Vector vaccines

Newcastle Disease (NDV)

General Information

- It is listed by WOAHA
- It is a notifiable disease in Turkey
- It is an internationally important disease

Etiology

Paramyxoviridae (family)

Paramyxovirinae and *Pneumovirinae* (subfamily)

Paramyxovirinae

- *Rubulavirus*
- *Respirovirus*
- *Morbillivirus*
- *Henipavirus*
- *Avulavirus: Avian paramyxovirus*

APMVs have 9 serotypes (APMV1-11)

APMV-1 (Newcastle disease virus)

APMV-2, -3, -6 and -7 cause infection in poultry

Etiology

Paramyxoviruses carry two types of surface spike proteins:

- **Long spike proteins:** hemagglutinin (HA) and neuraminidase (N) activities
- **Short spike proteins: (F glycoprotein)** responsible for attachment to the host cell membrane and fusion, leading to destruction of infected cells

Etiology

They have identical morphological and chemical structures, but differ in their biological properties, and therefore **have three pathogenic types**.

1. **Lentogenic ND viruses** (HB-1, La Sota, F, Clon-30): They are not virulent and are referred to as the **Hitchner type**. They cause very mild or subclinical respiratory infections and do not result in mortality. They are commonly used as vaccine strains.
2. **Mesogenic ND viruses** (Roakin, Komarov, Mukteswar, MK-107): They have **moderate virulence** and cause **respiratory and nervous system infections**.
3. **Velogenic ND viruses** (Milano, Herts, GB, Israil, Çorum): They are **highly contagious and lethal** and cause **respiratory, digestive, and nervous system infections**.

Etiology

They are classified into **three groups based on organ tropism**.

1. **Pneumotropic strains:** cause severe respiratory lesions and paralysis
2. **Viscerotropic strains:** primarily affect the digestive system and also the respiratory tract; cause severe hemorrhages in the proventriculus and bleeding and ulceration in the intestines
3. **Neurotropic strains:** affect the nervous system, causing paralysis and neurological disorders

Epidemiology

The global distribution of Newcastle disease has been shaped by **four major panzootics**.

- ✓ It was first reported in **England in 1926**.
- ✓ It emerged as a **global threat in 1960** and continued to spread **until 1973**.
- ✓ The **third panzootic spread** remains unclear.
- ✓ The **fourth panzootic** emerged in the **Middle East in the late 1970s**, reached **Europe in 1981**, and subsequently spread worldwide.

It was first reported in Turkey in 1944

Epidemiology

- The disease has been detected in 236 poultry species
- The host spectrum is variable (from reptiles to humans)
- Chickens are the most susceptible species, and the disease usually has an acute course.
- The virus is shed in all secretions and excretions.
- Transmission occurs via the respiratory and digestive tracts, eyes and conjunctiva, and through skin lesions.
- Humans, wild birds, rodents, parasites, movement of infected or dead birds, and the use of infected feces as fertilizer play an important role in disease spread.

Diagnosis

Material: The faeces, cloacal swabs, trachea, tracheal swabs

Virus isolation: EEC, TC

Pathogenicity tests of isolated virus

Mean death time (MDT), intracerebral pathogenicity index (ICPI), intravenous pathogenicity index (IVPI)

Molecular methods

Virus direct diagnosis: RT-PCR

Molecular epidemiology

Clinical Signs

- Sudden death,
- respiratory distress,
- swelling of the head region,
- decreased egg production,
- diarrhea,
- neurological disorders such as paralysis of the neck and wings are observed.

Clinically, the disease occurs in **five different forms: Doyle, Beach, Hitchner, Beaudette, and avirulent forms.**

Clinical Signs

Doyle type (viscerotropic velogenic form)

- The most severe form of the disease
- Sudden onset with rapid spread within the flock
- Death may occur without obvious clinical signs
- Hemorrhagic lesions in the proventriculus and intestines
- Rapid breathing and digestive disturbances
- Watery green diarrhea and bloody feces
- Edema of the head and eye region
- Paralysis of the legs and wings
- Torticollis and opisthotonus
- Morbidity and mortality rates: **80–100%**

Clinical Signs

Beach type (neurotropic velogenic form)

- Acute course with very rapid spread
- Respiratory distress and coughing
- Decreased feed intake and reduced egg production
- **Neurological signs (leg and wing paralysis, torticollis) are not observed**
- Morbidity: **100%**
- Mortality: **up to 90% in young birds, around 50% in adults**

Clinical Signs

Hitchner type (mesogenic form)

- Moderately virulent
- Mainly affects chicks, with an acute course
- Sudden onset of severe respiratory distress
- Decrease in egg production and egg quality
- Neurological disorders may develop
- Mortality is variable

Clinical Signs

Beaudette type (lentogenic form)

- Low-virulence strains
- Mild respiratory signs
- Respiratory distress and coughing in adult chickens
- Decrease in egg production

Avirulent form (asymptomatic enteric)

- Very low-virulence strains
- No clinical signs
- Asymptomatic course

Necropsy Findings

When the respiratory system is affected,

- inflammation and hemorrhages are observed in the trachea.
- The air sacs are inflamed and appear opaque.

In disease caused by **viscerotropic virulent NDV**,

- hemorrhages are seen in the proventriculus and internal organs, with petechial hemorrhages in the small intestine.

In asymptomatic NDV infection,

- pancreatitis may be observed.

In cases with neurological signs,

- degenerative changes are seen in the brain and nerves.

Diagnosis

- **Virus isolation** (embryonated chicken eggs)
- **Serological tests** (ELISA, HI test)
- **Molecular analysis** (RT-PCR and sequencing of the **F protein cleavage site** for pathotyping)

The amino acid sequence at the F protein cleavage site is critical for determining virulence

Protection and Control

Protection

- Biosecurity
- Vaccination (for ND)

Control

Active surveillance programs

- Free-ranging poultry
- Backyard poultry
- Commercial flocks
- High-density poultry areas

Disease investigation

- Diagnostic studies in suspected cases

Responsible authorities / stakeholders

- Provincial and District Veterinary Authorities
- Commercial poultry enterprises / producers
- Poultry owners and workers

Legislation

Cordon /Quarantine

Culling /destruction

Control the movements of animals

Cleaning/Disinfection

Vaccination (for ND)