RINDERPEST
(CATTLE PLAGUE)

Dr. Omer Khazaal Sallou
**Definition:**

- Rinderpest is a contagious viral disease affecting cloven hoofed animals (mainly cattle and buffalo).
- It is caused by a morbillivirus (species *Rinderpest virus*) and is marked by fever, diarrhea, inflammation of mucous membranes and high mortality in epidemics.
Etiology

- Rinderpest is associated with a morbillivirus (family Paramyxoviridae).
- The immunity which develops after infection or vaccination with one strain protects against all other strains or isolates.

Epidemiology

1. Occurrence

Natural infection occurs commonly only in domestic cattle, buffalo and yak but in some outbreaks, sheep and goats do become infected and show clinical signs.
2. Morbidity and case fatality
The morbidity and case-fatality rates approximate 100% and 50% respectively.

3. Methods of transmission
- Close contact between infected and non-infected animals is usually necessary for spread of the disease because the virus does not survive for long outside the host.
- The virus is excreted by infected animals in urine, feces, nasal discharges, and perspiration. Transmission occurs through contaminated feed or by inhalation of aerosol.
Pathogenesis

- The virus is inhaled in infected droplets; it penetrates through the epithelium of the upper respiratory track and multiplies in tonsils and regional lymph nodes.
- From these sites, the virus enters the blood in mononuclear cells and is disseminated throughout the body, intimately associated with leukocytes and only a small proportion free in plasma.
- The virus has a high degree of affinity for lymphoid tissues and alimentary mucosa and replicates in monocytes, lymphocytes and epithelial cells.
- There is a striking destruction of lymphocytes in tissues resulting in marked leukopenia.
The focal, necrotic stomatitis and enteritis which are characteristic of the disease.

Death is usually from severe dehydration, but in less acute cases, death may be from activated latent parasitic or bacterial infections which are exacerbated because the animal is immunosuppressed as a result of the destruction of lymphoid organs by the virus.
Clinical findings
Clinical findings may be *peracute, acute, subacute* or *inapparent* (in species other than cattle and buffalo).

**Peracute form:** It is characterized by high fever, congested mucous membranes, respiratory distress and death 1-3 days later.

**Acute form**
- The incubation period of the disease is usually 6-9 days.
- The first stage of the disease is several days of high fever (40.5-41.5 ºC), without mucosal lesions (phase of prodromal fever), anorexia, a fall in milk yield and lacrimation.
Subsequently, it is followed by the mucosal phase and characterized by inflammation of buccal, nasal and conjunctival mucosae, in some cases, hyperemia of vaginal mucosa and swelling of vulva.

The lacrimation becomes more profuse and then purulent and is accompanied by blepharospasm.

Bubbly salivation of clear blood-stained saliva is followed by purulent saliva and halitosis.

Discrete, grayish, raised necrotic lesions (1-5 mm in diameter) develop, appearing first on the inside of the lower lip and adjacent gum, on the cheek mucosa at the commissures, and on the lower surface of the tongue.
The necrotic material sloughs, leaving raw, red areas with sharp edges and these may coalesce to form shallow ulcers. **Vesicles are not present.**

Severe diarrhea, and sometimes dysentery with tenesmus, appears as lesions develop in abomasum and intestines.

Skin lesions affecting the perineum, scrotum, flanks, inner aspects of thighs and the neck are less common.

Other signs include dyspnea, cough, diarrhea, severe dehydration and sometimes abdominal pain.

A few animals may survive and go into a convalescent phase during which the mucosal lesions heal rapidly, the diarrhea eventually stops and recovery of body condition takes several weeks.

Pregnant cattle may abort at this stage.
**Advanced mucosal erosions**

**Purulent discharges**

**Shallow erosions in the mouth**
Note how these have a sharp margin

**Extensive mucosal erosion**
Erosion under the tongue

Dehydration and death
Subacute form

- In enzootic areas, both a subacute form and a skin form occur with lower morbidity and mortality.
- The temperature reaction is mild and the accompanying anorexia and malaise are not marked.
- The inflammation of the mucosae is catarrhal only and there is no dysentery.

In the skin form, the systemic reaction is absent and small pustules develop on the neck, over the withers, inside the thighs and on the scrotum. Most affected animals recover and convalescence is short.
Clinical pathology and laboratory diagnosis

- A rapid chromatographic strip test (Penside test) that can detect rinderpest antigen in lachrymal fluid and is a useful tool for field personnel.
- A technique suitable for laboratory and field use is the agar gel diffusion (AGID) technique.
- Other satisfactory methods of detecting rinderpest antigen in feces, buccal scrapings, ocular and nasal discharges in the early stages of the disease are the complement fixation, immunofluorescence, immunohistology and passive hemagglutination tests.
The serum neutralization test is the most suitable assay for surveillance of virus circulating in the field and for monitoring the efficiency of a recent vaccination campaign.

Other available serological tests include those based on the detection of fluorescent antibody and immunoperoxidase, an ELISA which is accurate and easy to perform and can differentiate between rinderpest and PPR, and a rapid dot-enzyme immunoassay test suitable for field use.
Necropsy findings

- The important necropsy findings are in the alimentary and upper respiratory tracts and in the external genitalia in females.
- The carcass is dehydrated, emaciated and soiled with fetid feces.
- Small, discrete, necrotic areas develop on the oral mucosa and separation of the necrotic material leaves sharply walled, deep erosions with a red floor which may coalesce to form large erosions or ulcers. These lesions extend to the pharynx, upper esophagus and abomasum, particularly the pyloric region.
- Zones of hemorrhage and erythema running transversely across the colonic mucosa produce a characteristic striped appearance, the so-called 'zebra stripes'.
“Zebra stripes”
Differential diagnosis

1. Foot and mouth (FMD).
2. Malignant catarrhal fever (MCF).

Treatment

Treatment is ineffective and should not be undertaken because of the danger of disseminating the disease. Vaccines are of no value in treating already infected animals or those infected up to 48 hours after vaccination.
Control

- In endemic areas, control used to be by annual vaccination and surveillance.
- The principal vaccine used to control rinderpest throughout the world is the tissue culture rinderpest vaccine (TCRV) produced in calf kidney cells for cattle.
- Prevention of the introduction of ruminants and pigs from known infected areas is routinely practiced in countries which do not have the disease.
- Infected premises should be cleaned and disinfected. Solutions of caustic soda and lysol are ideal and the premises can be restocked after 1 week.