EPIZOOTIC LYMPHANGITIS

Learning objectives

To know in detail about,

- Synonyms of *Histoplasma farciminosum*
- Causative agents of epizootic lymphangitis
- Morphology, cultural and biochemical characteristics of *H.farciminosum*
- Different forms of epizootic lymphangitis
- Different diagnostic methods used for epizootic lymphangitis
- Treatment, control and prevention of epizootic lymphangitis

HISTORY AND MORPHOLOGY

- *Histoplosma capsulalum* and *H. farciminosum* cause clinical disease in horses.
- Epizootic lymphangitis is characterised by a cord-like appearance of the subcutaneous lymphatic vessels, especially of the limbs, neck and chest and the development of a series of pyogranulomas, the discharge from which contains yeast-like cells of the pathogen. Rarely, infection may lead to pneumonia and conjunctivitis.
- Histoplasmosis caused by *H. capsulatum* has been recognised in horses in certain areas of the world.
- *Histoplosma farciminosum* (Synonyms: *Cryptococcus farciminosum*, *Zymonema farciminosum*, *Histoplasma capsulatum* var. *farciminosum*) is the cause of epizootic lymphangitis.
- *Histoplosma farciminosum* will be used to name the agent, although according to Ajello the organism does not belong to the genus *Hisloplosma*.
- Epizootic lymphangitis is a disease which is distributed world-wide, with endemic foci in North Africa and Asia.
- The organism was first demonstrated in pus by Rivolta in 1873 but was not successfully cultivated until 1896 when the first pure cultures were obtained by Tokishiga in Japan.
- The yeast form of the organism appears in pus as a double-contoured oval or ovoid body, measuring 2.5-3.5 µm by 3-4 um. The saprophytic stage is mycelial form.

CULTURAL CHARACTERISTICS

- Both yeast and mycelial forms can be cultivated if suitable media, temperature of incubation and carbon dioxide tenson are provided.
- The organism grows slowly when the yeast phase is grown on media rich in protein and in an atmosphere enriched with CO2.
- Several culture media have been used, but the most satisfactory were Sabouraud's dextrose agar enriched with 2.5% glycerol; brain heart infusion agar enriched with 10% horse blood; nutrient agar supplemented with 2% dextrose; mycobiotic agar and mycoplasma-like organism medium.
- Growth on all media is very slow and appears after four to eight weeks of incubation at 25°C.
- Colonies of the mycelial form are a yellowish/light brown to deep brown, convoluted, waxy and cauliflower-like.
- In body tissues, the ability of *H. farciminosum* to convert from the mycelial form to the yeast form appears to be dependent on temperature and nutrition as well as the strain, However, *in vitro*, conversion of the mycelial form to the yeast form of *H. farciminosum* can be achieved by incubating at 35°C to 37°C.
- Complete conversion to the yeast form is achieved only after four to five repeated serial transfers onto fresh media every eight days.

BIOCHEMICAL CHARACTERISTICS AND RESISTANCE

Biochemical characteristics

- The biochemical characteristics of the mycelial form include positive reactions to catalase and urease tests as well as the assimilation of ammonium sulphate as the sole source of nitrogen.
- No Fermentation of carbohydrate sugars, liquefaction of gelatine or reduction of nitrate occurs.

Resistance

- The organism is highly resistant to the effects of physical and chemical agents and can survive for at least a month in the dust of stables or kraals.
- This pathogen is also known to be viable and virulent after desiccation in the laboratory for 25 months.
- *H. farciminosum* may survive for up to ten weeks in non-sterile water at 26°C.

EPIDEMIOLOGY

- Epizootic lymphangitis is a contagious disease which can infect humans.
- The disease mainly affects horses, mules and donkeys, although infection may occur in camels and cattle.
- Mice and rabbits may be infected experimentally.
- Horses under six years of age are most susceptible.
- The mode of transmission of the disease is not well established.
- Direct contact with infective materials through injured skin or through cutaneous abrasions is the most common mode of infection.
- Spread of infection can also occur indirectly through contaminated objects such as grooming tools, feeding and watering utensils and harnesses and wound dressings.
- Flies that feed on open wounds may act as possible vectors.
- The organism has been isolated from the alimentary tract of biting flies that had alighted in open lesions and the disease has developed in horses 4.8 km from the nearest case.
- Experimentally, flies (*Musca* spp. and *Stomoxys* spp.) have been shown to be capable of transmitting the infection.
- Transmission also possible via stallions to mares by copulation.

PATHOGENESIS

- The incubation period ranges from several weeks to six months.
- Following the initial invasion of the skin, the organism spreads through the lymphatic vessels to the regional lymph nodes, and in more advanced cases involves the internal organs.
- Nodular and chronic suppurating lesions are evident in the skin overlying lymph vessels and nodes.
- When mucosal lesions occur, most are confined to the upper respiratory tract and eyes.
- The nasal infection is usually accompanied by mucopurulent discharge containing large numbers of the fungus.

PATHOGENECITY

Clinical signs

- The cases of epizootic lymphangitis can be grouped into four different forms, namely: cutaneous, respiratory, ocular and asymptomatic carriers.

- The cutaneous form of the disease, after which the disease was named, is the most common.
- The initial lesion is an open granulomatous wound along the course of a lymphatic vessel, which has a tendency to ulcerate, or to undergo alternating periods of discharge and closure for some weeks before healing with residual scar formation.
- Lesions are most common in the forelimbs, the chest wall and the neck. In severe cases, skin over the entire body may be affected.
- The lesions begin as indolent, chancre-like papules, becoming larger over the course of weeks and eventually form irregular pyogranulomatous nodules, which frequently ulcerate.
- Mortality does not usually exceed 10% to 15% and the main loss results from the inability of animals to work for several weeks because of extremely painful lesions.
- The ophthalmic form of the disease is less frequent. Infection may occur as conjunctivitis or a naso-lachrymal infection.
- The infection rarely becomes generalised. Initial infection is characterised by a watery discharge from one or both eyes and some swelling of the eyelids, followed by the development of papules and ulcerating button-like growths on the conjunctiva and/or on the nictitating membrane .
- The respiratory form of the disease is characterised by lesions which are mostly confined to the upper respiratory tract.
- This form usually occurs as a late development in the cutaneous form of the disease.
- On the nasal mucosa, the lesions begin as yellowish papules or nodules and these soon form crater-like granulating ulcers that bleed easily.
- The lesions are usually found near the external nares. These lesions may also occur in the lungs.
- Asymptomatic carriers can be identified clinically by the identification of fibrocalcific skin lesions at previous sites of infection. Such horses will give a positive result to an intradermal sensitivity test and positive reactions to serological tests.

Lesions

- Gross lesions are manifested by pyogranulomas, purulent discharge of thickened superficial lymphatic vessels and enlargement of regional lymph nodes.
- Histopathologically, a typical granulomatous tissue reaction occurs with a predominance of the large macrophages, many of which contain oval organisms in the cytoplasm.
- Affected tissues stained by Gram stain revealed the presence of ovoid double-contoured yeast-like cells.
- Periodic-acid Schiff or Gomori's methanamine silver stains are very useful to demonstrate the presence of the organisms.
- Typical nodules of liquefied foci have also been recorded in the pleura, spleen, liver and bone marrow.

DIAGNOSIS

Diagnosis

- Laboratory tests used in the diagnosis of epizootic lymphangitis include isolation of the causative agent by culture and tests for the presence of antibodies in the blood.
- Haemalological picture showed leucocytosis, neutrophilia and an increase in the erythrocyte sedimentation rates.
- Direct smear examination and culture technique

    - Diagnosis is usually based upon demonstration of the typical yeast-like, double-contoured cells in pus collected aseptically from the lesion and confirmed by culturing the pathogen.
    - *H. farciminosum* is a Gram-positive organism and is successfully cultivated on a vanety of media.
    - Growth is relatively slow; most isolates require from four to eight weeks for development of characteristic colonies.
- Serological tests
    - In the absence of positive culture of *H. farciminosum*, a presumptive diagnosis is usually made, based on the presence of antibodies in the serum.
    - Although several serological tests have been used for the diagnosis of epizootic lymphangitis, none of the tests are sufficiently sensitive or specific to confirm diagnosis.
    - The four serological tests such as FAT, AGID, ELISA and serum agglutination are relevant.
- Electron microscopic examination
    - Tissues taken from cutaneous lesions revealed the presence of oval bodies.
    - Most of the details of the fine internal structures could be observed.
- Animal inoculation
    - Experimental transmission of *H. farciminosum* has been attempted in mice, guinea-pigs and rabbits.
    - Imnunosuppressed mice were highly susceptible to experimental infection and can be used for diagnostic purposes.
    - Intra dermal test
    - An accurate and reliable method of skin testing is the intradermal test.
    - This consists of intradermal injection of 0.1 ml of soluble antigen prepared from *H. farciminosum*.
    - An increase in the thickness of the skin of 8 mm to 20 mm, 24 h after injection of the antigen can be regarded as a positive result.

Differential diagnosis

- A number of diseases may be confused with epizootic lymphangitis (e.g. glanders, strangles, ulcerative lymphangitis and sporotrichosis), especially when these diseases occur under the same environmental conditions.

TREATMENT

- Epizootic lymphangitis is a chronic disease, although some cases may heal spontaneously a few weeks after the development of clinical signs.
- The intravenous injection of 100 ml of sodium iodide of a 10% solution, repeated weekly for four weeks, gives good results.
- The infected horses were treated with an intravenous injection of amphotencin B at a dose of 0.2 mg/kg body weight three times on alternate days.
- The scabs were removed and the areas cleaned daily with an iodine solution for seven days.
- Administration of griseofulvin, repeated if necessary, has given good results when combined with iodides and local surgical treatment.
- The surgical treatment usually consists of opening the nodules and packing with gauze soaked in 7% tincture of iodine.

CONTROL AND PREVENTION

- Outbreaks in non-endemic areas are probably best controlled by the slaughter of affected animals.
- The long incubation period of the disease, the high resistance of the causative agent and the presence of clinically healthy carriers make control of the disease difficult inendemic areas.
- Control of the disease depends upon elimination of the infection by culling infected horses and preventing spread by hygieneic precautions.
- Cleaning and disinfection will help to prevent the disease from spreading.
- This method of control is the most satisfactory and proven to be mandatory for largebreeding companies in endemic areas.
- A killed formalised vaccine prepared from the yeast form of the fungus, administered subcutaneously in a dose of 5 ml once a year, has given good results.
- An attenuated vaccine was developed by exposure of the causative agent to high temperature.
- Horses inoculated subcutaneously with 3 ml in a single dose have given a higher protection rate.