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***Histoplasma farciminosum***

***Cryptococcus farciminosum, Zymonema farciminosum, Histoplasma capsulatum var. farciminosum)***

 Both *Histoplasma capsulatum* and H. *farciminosum* cause clinical disease in horses . Histoplasmosis caused by H. *capsulatum* has been recognised in horses in certain areas of the world. The infection rate varies according to the geographic area and the age of the animal. Reports indicate that epizootic lymphangitis is a disease which is distributed world-wide, with endemic foci in North Africa and Asia.

**The main characteristics of disease:**

 The disease 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.

**Aetiology:**

 *Histoplasma farciminosum* is the cause of epizootic lymphangitis. 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 μm. The saprophytic stage is **mycelial** and both forms can be cultivated if suitable media, temperature of incubation and carbon dioxide tension 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.

**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. In the Sudan, H. farciminosum has been isolated from granulomatous lung lesions of two horses suffering from pneumonia. A fatal pneumonia

due to H. farciminosum has been reported in an immunosuppressed foal.

**Clinical signs**

 Cases of epizootic lymphangitis can be grouped into four different forms, namely: **cutaneous, respiratory, ocular and asymptomatic** carriers. The clinical findings of each form will be discussed. 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 fréquent. Infection may occur as conjunctivitis or a naso-lachrymal infection . Several authors hâve reported lachrymal and conjunctival lésions as the sole symptoms among equines .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 thèse soon form crater-like granulating ulcers that bleed easily. The lésions are

usually found near the external nares. Thèse lésions may also occur in the lungs.

**Asymptomatic carriers** can be identified clinically by the identification of fibrocalcific skin lésions at previous sites of infection . Such horses will give a positive resuit to an intradermal sensitivity test and positive reactions to serological tests.

**Diagnosis**

 Gross lésions are manifested by pyogranulomas, purulent discharge of thickened superficial lymphatic vessels and enlargement of régional lymph nodes. Histopathologically, a Laboratory tests used in the diagnosis of epizootic lymphangitis include isolation of the causative agent by culture and tests for the présence of antibodies in the blood.

 Haematological picture showed leucocytosis, neutrophilia, and an increase in the erythrocyte sedimentation rates . The tests described below are used in the diagnosis of epizootic lymphangitis.

**Direct smear examinatîon and culture technique**

 Diagnosis is usually based upon démonstration of the typical yeast-like, double-contoured cells in pus collected aseptically from the lésion and confirmed by culturing the pathogen. H. jarciminosum is a Gram-positive organism and is successfully cultivated on a variety of média. Growth is relatively slow; most isolâtes require from four to eight weeks for development of characteristic colonies . As the culturing technique is not totally reliable, a négative direct smear and/or culture should not be used as the basis of excluding the possibility of infection. The culture of several samples on différent occasions may be required before the results can be considered either positive or négative .

**Treatment**

 Epizootic lymphangitis is a chronic disease, although some cases may heal spontaneously a few weeks after the development of clinical signs. Intravenous dosing of iodide may be used , this type of treatment is a satisfactory procedure, particularly in endemic areas. The intravenous

injection of 100 ml of sodium iodide of a 10% solution, repeated weekly for four weeks, gives good results.

Different antifungal drugs have also been used and successful treatment with amphotericin B has been reported . The infected horses were treated with an intravenous injection of amphotericin 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. The lesions should heal fully within four weeks. In vitro testing, at a concentration of 50 mol/ml to 100 mol/ml of amphotericin B inhibited strongly the growth of the yeast phase of H. farciminosum . 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.