Infectious disease of equine characterized by lymphadenitis, lymphangitis and farcy. With or without systemic involvement.

It includes:

- *Glanders. الرعام
- Epizootic lymphangitis. السراجا
- *Ulcerative lymphangitis.
- *Strangles. السقاو
- *Sporotrichosis.

Glanders (Farcy)

Lymphadenitis and lymphangitis that has ulcerated to this horse's skin - this is refered to as farcy

A removed nasal septum of a horse showing different stages of lesions caused by glanders. First, a nodule develops and then ulcerates. It then heals by granulation which leads to cicatrisation and is left as stellate scars

- Glanders is a contagious, acute or chronic, usually fatal disease of Equidae. It is characterized by serial development of ulcerating nodules that are most commonly found in the upper respiratory tract, lungs, and skin.

Causative organism: (Systematic name in 1997):

Burkholderia mallei.

Older names:

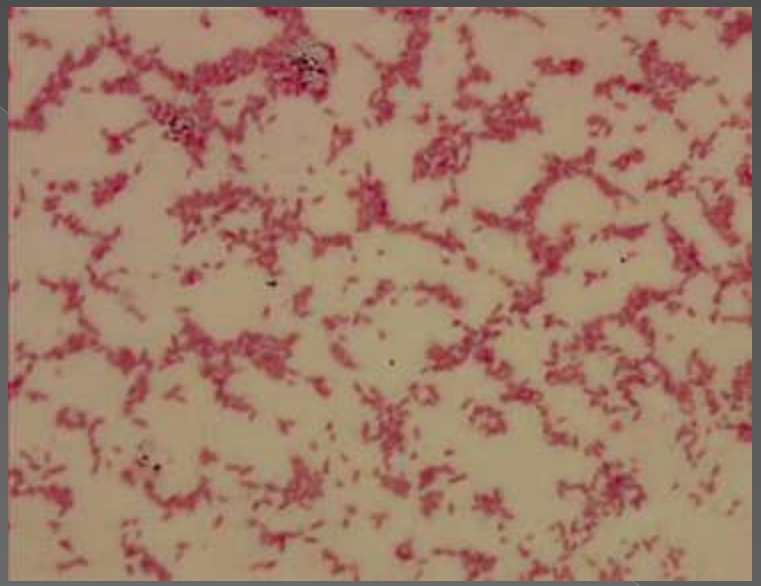
Pseudomonas mallei,

Malleomyces mallei,

Actinobacillus mallei.

- Gram-negative, pleomorphic bacillus.
- non-motile.
- non-spore-forming.
- oxidase positive.
- can grow on MacConkey agar.
- non-haemolytic.
- Aerobic.

Gram stained smear of B. mallei from a pure culture



Colonies of B. mallei on blood agar. Smooth, glistening, rounded, non haemolytic , yellowish white colonies

Epidemiology

Once widespread, now it has been eradicated from many countries

The disease is still endemic in Iraq, Turkey, Pakistan, India, Mongolia, China, Brazil, and the United Arab Emirates.

Host Range

- Affects solipeds
  - Donkeys -Acute form
  - Horses-Chronic form
- Carnivores, humans, and goats susceptible
- Swine and cattle resistant

B. mallei, is an obligate parasite, readily destroyed by light, heat and the usual disinfectants; rarely survive in the environment for more than few weeks.

Forms of the disease

- Nasal,
- pulmonary, and
- Cutaneous

Animal may be affected by more than one form at a time.

Clinical signs

- Acute form: Clinical signs of acute glanders in equine include: High fever; cough; dyspnea (difficulty breathing); Thick nasal discharge (usually unilateral, or out of one nostril); with rapidly spreading ulcers on the nasal mucosa and nodules on any part of the skin; although lower extremities and abdomen are mostly involved. Death due to septicaemia occurs in few days.

Chronic form

It may appear in one or more of the usual three major forms;

- Pulmonary.
- Skin.
- Nasal.
- chronic nasal and skin forms commonly occur together).

Chronic form: Coughing;

- Weight loss;
- intermittent fever;
- possible thick nasal discharge, usually out of one nostril;
- Ulcers and nodules on the nasal mucosa;
- Enlarged sub maxillary lymph nodes;
- Chronic enlargement and indurations (hardening) of lymphatics and lymph nodes., Joint swelling and painful leg edema (fluid swelling); and Nodules, particularly on the legs, they are of variable sizes.

- As small as a peanut to as large as an orange. These nodules degenerate and form ulcers that discharge highly infectious, sticky pus. Cord Like thickening of Subcutaneous Lymph vessels Called Farcy pipe is characteristic clinical sign.

- usually chain of nodules on a thickened lymph vessel are observed.. Lymph nodes draining the area become involved and may discharge to the exterior. Animals affected with the chronic form are usually ill for several months; transmitting infection to others and contaminating the environment.

- In the chronic nasal form; nodules develop in the mucosa of the nasal septum and lower parts of the turbinates. The nodules degenerate into deep ulcers with raised irregular borders. Characteristic star-shaped cicatrices remain after the ulcers heal.

- In the early stage, the sub maxillary lymph nodes are enlarged and edematous, and later become adherent to the skin or deeper tissues.
- Pulmonary involvement commences as chronic pneumonia with cough and frequent epistaxis and labored breathing.

Chronic debilitating form of Glanders with mucopurulent nasal discharge

Acute pulmonary form with epistaxis. Mostly experimental infection

Acute pulmonary form of Glanders

Animal died with acute pulmonary infection

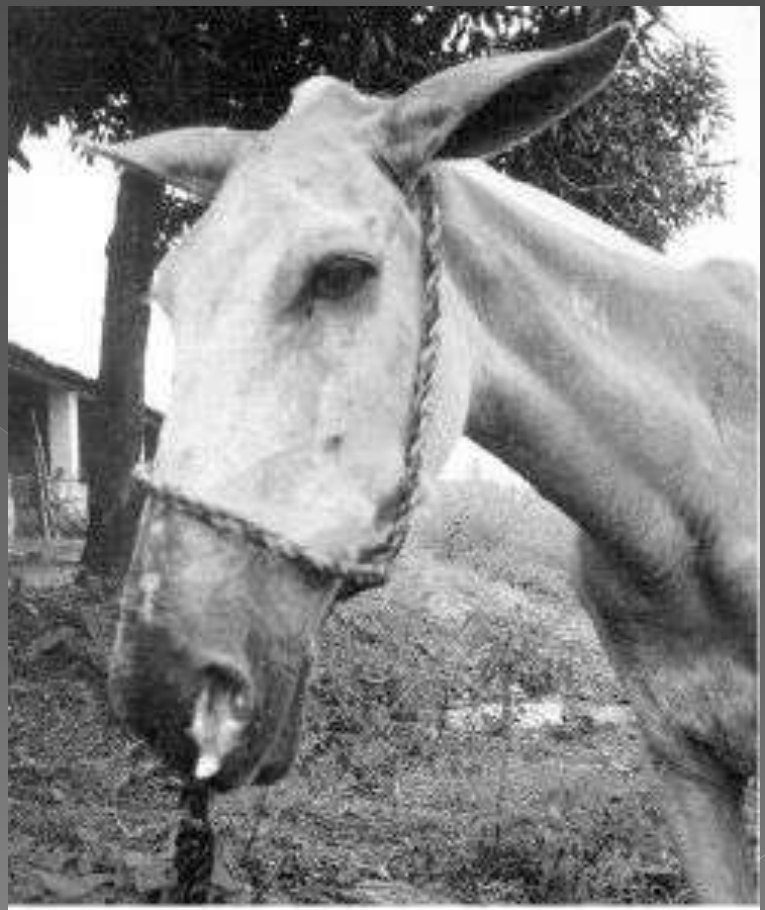


Fig. 1. Mormo em eqüídeo. Descarga nasal muco-purulenta.

exposed nasal septum of a horse showing the range of lesions observed in glanders

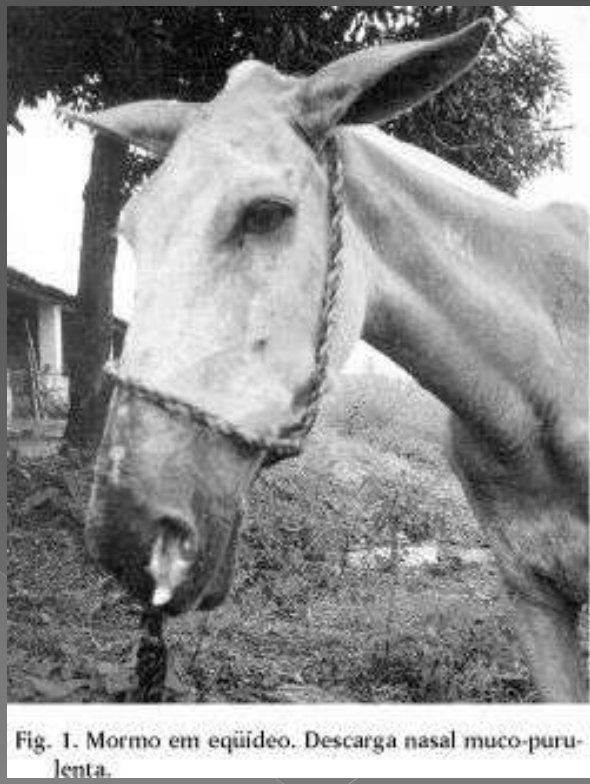


Fig. 1. Mormo em eqüídeo. Descarga nasal muco-purulenta.

Pathogenesis:

- Inhalation: Catarrhal rhinitis → followed by purulent eruption of nasal mucosa; Proteolytic enzyme presented by bacteria; lead to irritation of nasal mucosa and development of nasal ulcers, which distribute to the nasopharynx and the lungs.

Pathogenesis:

- Ingestion: Proteolytic enzyme → mucous irritation → ulcers → blood & lymphatic circulation → predilection tissue (lung & septum nasi). The bacteria is available at discharge of nose, pus from the part of swelling body, saliva, tear of eyes, feces and urine.

Pathogenesis

- Through skin : ➡ To the Blood ➡ nearest lymph node ➡ nodules at outer surface of lymph node ➡ broke out into ulcers & pus excretion.

Pathogenesis:

- Invasion mostly occurs through the intestinal mucosa and a septicemia (acute form) or bacteremia (chronic form) is set up. Localization mostly occur in the lungs; but the nasal mucosa and the skin are also common sites.. Other viscera may also be affected with typical nodules. Deaths mostly result from anoxic anoxia.

Transmission in animals

2. Infection through infected skins and abrasions by direct contact or grooming utensils is rare.
3. Infection by inhalation may occur but it is rare under natural conditions.

Mode of transmission in man:

1. Direct contact with infected animals through:
   - Abraded skin, Mucous membranes and fomites.
2. Inhalation.
3. Ingestion.
4. Person-to-person (rare).

Glanders was believed to have been spread deliberately by German agents to infect large numbers of Russian horses and mules on the Eastern Front.

Funny donkey

Diagnosis:

1.Characteristic clinical signs:

- The typical nodules, ulcers, scar formation, and debilitated condition may provide sufficient evidence for a clinical diagnosis. Because these signs usually do not develop until the disease is well advanced, and because they may be shared by other common infectious disease of equine; specific diagnostic tests should be used as early as possible; as the mallein test and isolation of the causative agent.

2.Mallein test

- Sensitive and specific clinical test for glanders.
- Injected material is a protein fraction of the glanders organism (*Burkholderia mallei)*known as purified protein derivatives(PPD).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Route of inoculation

Mallein is Injected:

- In the skin(intradermo-palpebrally).
- Eye-drops(Ophthalmic test.

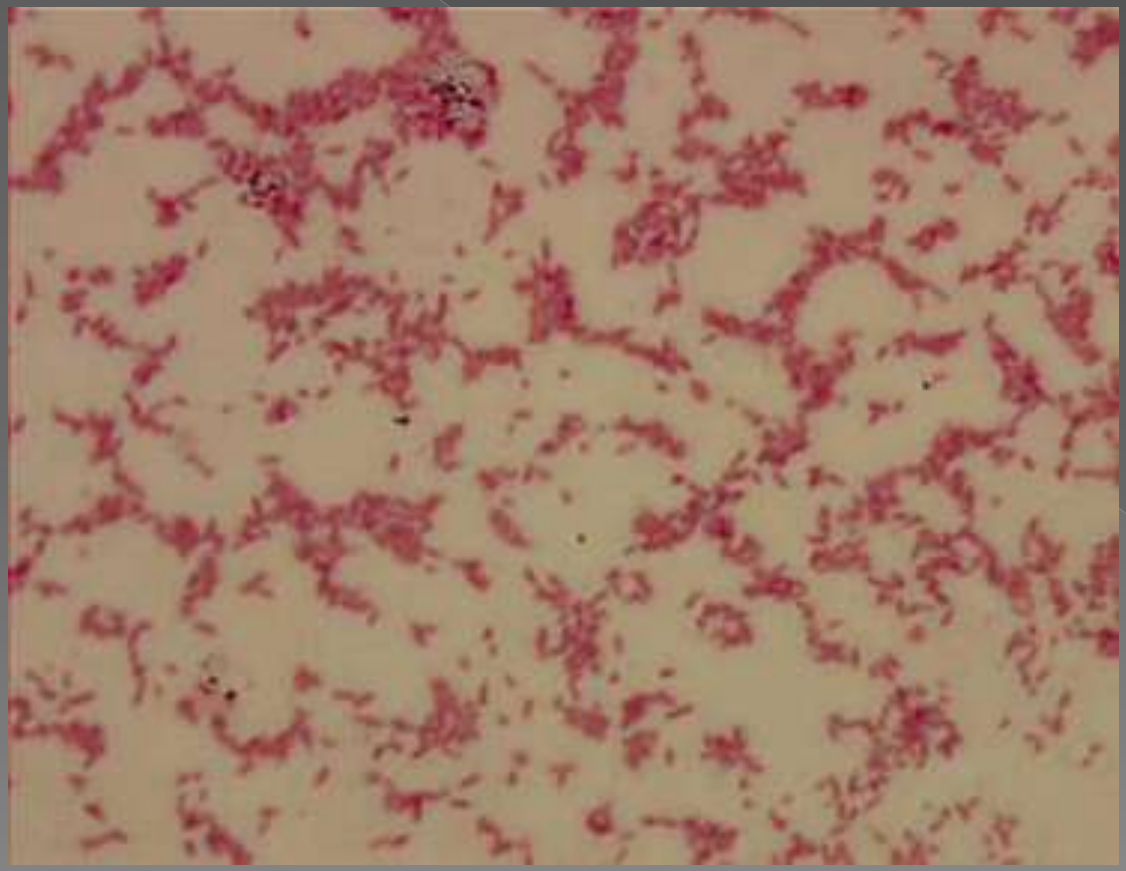
POSITIVE MALLEIN REACTION

Oedematous swelling and congestion of the whole eye with mucopurulent ocular discharge after 24-72 hours of injecting the mallein

3.Direct primary smear examination

Direct primary pus smear prepared from pus of unopened nodule; stained by Gram stain reveals only small number of gram negative pleomorphic beaded rods. It is of limited value and when it is seen negative it become more suggestive for glanders since other similar diseases will reveal large number of the causative agent.

B. mallei. Gram's stained smear from pure culture



4.Isolation and identification of *B. mallei.*

- Culture of exudate from lesions, or pus from an unopened nodule reveals the presence of the causative organism.
- Growth appear after more than 48 hours of incubation in 37c, colonies are first small, mucoid smooth, glistening whitish- yellow in color. It is non haemolytic on BA, some times may grow on MacConkey agar producing non fermenting colonies. B. mallei is non motile oxidase positive bacteria.

5.serology

- Complement fixation is accurate, although occasionally a false-positive result occurs.
- An ELISA has been shown to be more sensitive than complement fixation and it is comparable to the mallein test.
- PCR based on 16S and 23S rRNA gene sequences may be used for specific identification

6.Biological test(Strauss reaction):

- intra peritoneal inoculation of pus or bacterial broth to guinea pig/ male mice

→ orchitis

Fig. 4. Prova de Straus positiva. Cobaio apresentando aumento de volume testicular e severa congestão, confirmando o diagnóstico de mormo.

Prevention and Treatment:

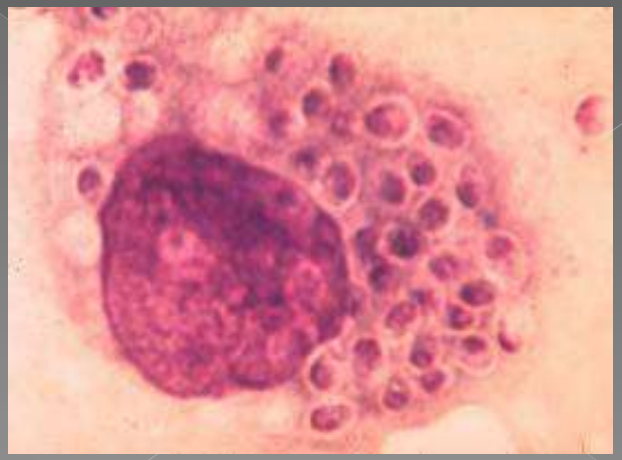
- There is no vaccine.
- Prevention and control depend on early detection and elimination of affected animals, as well as complete quarantine and rigorous disinfection of the area involved.
- Treatment is given only in endemic areas. Doxycycline, ceftrazidime, gentamicin, streptomycin, and combinations of sulfazine or sulfamonomethoxine with trimethoprim were found to be efficient in the prevention and treatment of experimental glanders.

Differential diagnosis

- 1. Strangles: More acute in nature, inflamed suppurated sub maxillary lymph nodes, mallein negative, direct smear from pus revealed large number of the causative agent(*S. equi*). Characteristic small B haemolytic colonies on blood agar.

Epizootic lymphangitis.

- Skin lesions are so similar to that of Glanders. Direct smear revealed large number of intra and extra- cellularly located yeast form of the dimorphic fungus*; Histoplasma farciminosum*

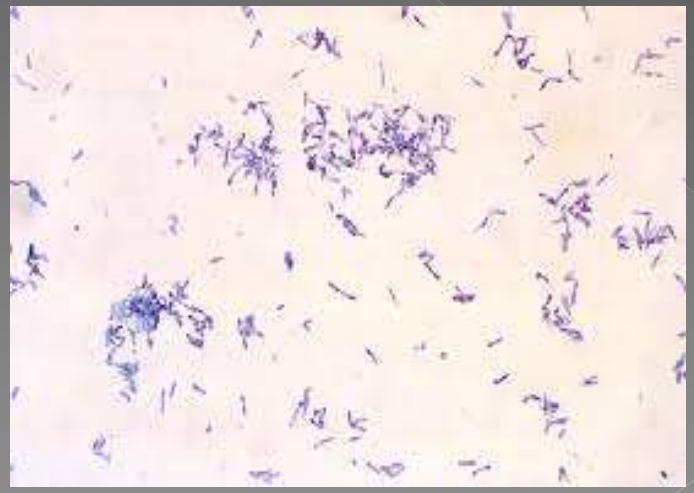


H. Farciminosum inside cytoplasm of a macrophage. Notice double contoured wall surrounding th e yeasts

Ulcerative lymphangitis

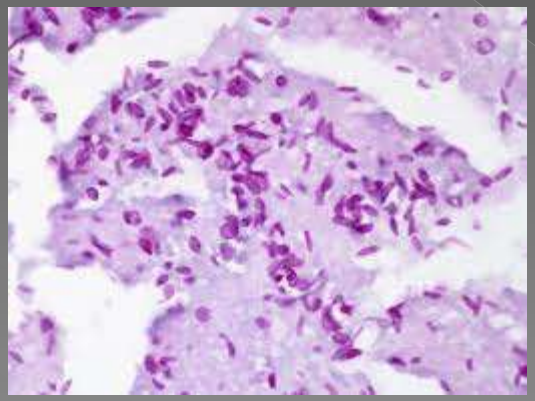
- Direct smear revealed large number of the causative bacteria; *Corynebacterium pseudotuberculosis(C. ovis). Bacteria easily grown on blood agar. Mallein negative.*

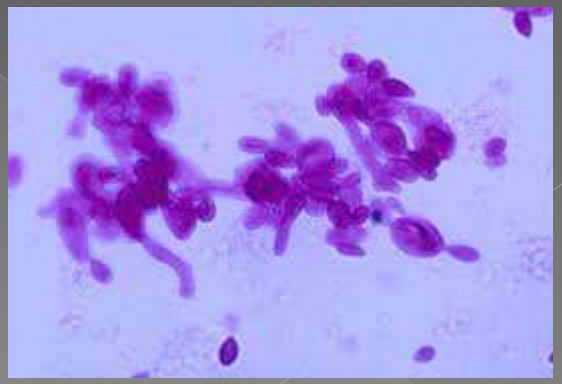
Gram positive pleomorphic rods swelled extremities and beaded appearance



Sporotrichosis

Small number of the dimorphic fungus *Sporotrichum schenchii.*





Important note

- It is not advisable to treat cases of glanders since all will mostly stay as carriers acting as a potential source of infection.

Thankyou