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Lecture title: Glanders

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Summary:

Synonyms: Glanders (GL), Farcy, Malleus, مرض السقاوة او الرعام

Definition: GL is an acute or chronic highly fatal contagious disease of the equine and human caused by *Burkholderia mallei* formally (*Pseudomonas mallei*) and characterized by serial development of ulcerating nodules in the upper respiratory tract, lungs and skin.

History: GL was first described in 1882.

ETIOLOGY

- *Burkholderia mallei (B. mallei) formally (Pseudomonas mallei)*, small Gram-negative rods, non-spore forming, non-motile. The organism leads to formation of agglutinin, precipitin and complement fixing antibodies in affected animals.
- *B. mallei* grows aerobically on blood and serum agar. Glycerol supplementation is considered growth promoting.
- Readily destroyed by light, heat, and the usual disinfectants
- Unlikely to survive in a contaminated environment for more than 6 weeks

EPIDEMIOLOGY

1-*Distribution*: Sporadic cases occur in parts of Asia, North Africa and Eastern Europe, It has now been eradicated or effectively controlled in many countries.

2- Source of Infection and Transmission

A. The infection is introduced into horse populations by diseased or carriers that have made an apparent recovery.

B. Nasal discharges, sputum, oral and skin lesions discharges are considered the most important sources of infection.

C. Under natural conditions, infection typically takes place orally via the mucous membranes of the digestive tract.

More rarely infection occurs via conjunctiva, percutaneously via lesions or aerogenously via the respiratory tract.

D. Carriers can be clinically normal and shed the organism for years.

3. ***Susceptible hosts:***

A. The **horse** is the most commonly affected animal and the disease in this species is frequently **chronic** (latent infections dominate).

B. **Donkeys and mules** are susceptible to the **acute** form.

C. Dogs and cats are occasionally susceptible to the acute form.

D. Glanders occurs sporadically in humans in exposed occupational groups.

f. Of the laboratory animals, Guinea pigs and mice are highly susceptible.

Factors influencing susceptibility:

A. The disease is more likely when animals are in a stressed state from heavy work, animals that are badly fed, overcrowded and kept in a poor environment are more susceptible.
B. Higher incidence of the disease is observed in **autumn and winter.**

Economic importance of the disease:

- GL is a highly fatal disease in equines with public health importance.
- In humans, the infection may gain access through skin abrasions to produce granulomatous disease and pyemia.

PATHOGENESIS:

Invasion typically occurs through the intestinal wall and a septicemia (acute form) or bacteremia (chronic form) develops.

Localization always occurs in the lungs, but the skin and nasal mucosa are also common sites. Nodules may also develop in other viscera.

Terminal signs are usually those of bronchopneumonia and death is usually caused by anemic anoxia.

CLINICAL FINDINGS

i- The IP is variable (2 weeks to several months) and the course may be acute or chronic.
ii- The acute form is commonly seen in donkeys and mules and is characterized by a high fever, cough and nasal discharge with rapidly spreading ulcers appearing on the nasal mucosa and nodules on the skin of the lower limbs or abdomen. Death due to septicemia occurs in a few days.

iii- The chronic form is commonly seen in horses and three major manifestations are seen (**1**) **Pulmonary** (**2**) **Skin** and (**3**) **Nasal**, although the chronic nasal and skin forms commonly occur together.

iv- The pulmonary form manifests as a chronic pneumonia with cough, frequent epistaxis and labored respiration.

v- In the nasal form, lesions appear on the lower parts of the turbinates and the cartilaginous nasal septum. They commence as nodules (1cm in diameter), which ulcerate and may become confluent

vi- In the early stages there is a serous nasal discharge which may be unilateral or bilateral which later becomes purulent and blood stained.

vii- Enlargement of the submaxillary lymph nodes is a common. On healing, the ulcers are replaced by a characteristic **stellate scar**.

viii- The skin form (**Farcy glanders**) is characterized by the appearance of subcutaneous nodules (1-2 cm in diameter), which soon ulcerate and discharge pus of the color and consistency of **dark honey**

ix- In some cases the lesions are more deeply situated and discharge through fistulous tracts. Thickened fibrous lymph vessels radiate from the lesions and connect one to the other. Lymph nodes draining the area become involved and may discharge to the exterior. The predilection site for cutaneous lesions is the medial aspect of the hock, but they can occur on any part of the body.

x- Animals affected with the chronic form are usually ill for several months, frequently showing improvement but eventually either dying or making an apparent recovery to persist as occult cases.

NECROPSY FINDINGS

a- Lung lesions are found in almost all cases.

b- Nodules that are pea-size or smaller can be felt or seen. On section, these nodules are red in color in early stages, but later develop a yellowish center which increases in size until pearly-yellow lesions are formed Old nodules may have definite capsules.

c- Similar lesions may be found in the liver, spleen and other internal organs.

d- In the larynx, trachea and on the nasal mucosa, the characteristic lesions are ulcers and star shaped scars . Nodules and ulcers may sometimes be present in the skin and subcutis of the limbs.

e- Submaxillary, bronchial and thoracic lymph nodes may be enlarged and edematous. Lymphatic vessels may have similar lesions.

Diagnosis:

1. **Field diagnosis**: Clinical diagnosis is only possible when the characteristic symptoms of the nasal and cutaneous forms occur. The diagnosis is confirmed by the Mallein test, especially in suspicious cases. The intradermopalpebral test has largely replaced the ophthalmic and subcutaneous tests.

- The intradermopalpebral mallein test: 0.1 ml of concentrated mallein is injected intradermally into the lower eyelid with a tuberculin syringe.

A positive reaction results in local swelling and a mucopurulent discharge which reaches its peak within 48 hours and lasts for 3 days. The sensitivity of the test is 95%. However, animals in advanced stages may give false negative results. When a doubtful reaction occurs, the test can only be repeated in the same eye 4-6 days after the first investigation. The eye must be free from lesions during the investigation. Some infected animals exhibit a general hypersensitivity reaction after inoculation.

- Laboratory diagnosis: Specimens for laboratory use:
- A. Exudate from lesions should be sent under refrigeration in a screw cap bottle placed in a metal container that is labeled "suspected Glanders".
- Serum should be separated from the clot and refrigerated for the CFT.

Laboratory diagnosis depends on:

A. Isolation and identification of the causative agent.
B. Exudate and pus are inoculated intraperitoneally into male Guinea pigs, resulting in severe orchitis and inflammation of the scrotal sac This test is not highly specific for *Burkholderia mallei* (*Pseudomonas mallei*), it gives positive with *Corynbacterium pseudotuberculosis* as well as Brucella species.
C. The CFT has a sensitivity and specificity of 99%, however cross reaction with *P. pseudomallei* is possible.

Differential diagnosis:

- Cutaneous glanders can be confused with Epizootic Lymphangitis, Ulcerative Lymphangitis and Sporotrichosis.
- Acute Glanders can be confused with Strangles and Pneumonia. The use of the mallein test or demonstration of the causal organisms will differentiate these diseases

Treatment

A. The risk to both humans and animals has resulted in glanders being made a notifiable disease in most countries in the world. So, treatment of equine Glanders is forbidden in most countries.

C. In endemic areas, some success has been obtained by the use of sulfadiazine for 20 days, nitrofurans and polymyxin, but there is the danger that treated animals may be subclinical carriers.
D. The granulomatous nature of the disease likely requires prolonged administration of antimicrobials capable of penetrating abscesses.
E. Treatment protocol used:
F. Enrofloxacin (8 mg/kg IV or SC q24 h) and trimethoprim–sulfadiazine (32 mg/kg IV or IM q24h) for 7 days, followed by enrofloxacin (4 mg/kg IV q24h) and trimethoprim–sulfadiazine (16 mg/kg IV q24h) for 2 weeks, and then 6 mg/kg doxycycline PO q12h for 9 weeks.
G. Treated horses responded within 1 week to treatment.

H. Nodules on the legs had resolved by week 3 of treatment.

I. Treated horses recovered and did not have evidence of disease 1 year after the treatment.

Control and eradication programs are on:

A. Destruction of clinical cases: Carcasses of infected animals and contaminated or potentially contaminated bedding, feed, and tack that cannot be disinfected should be burned.

B. all in-contact equines must be quarantined and mallein tested at 28 day intervals. Reactors must be destroyed.

C. A vigorous disinfection program for food and water troughs and premises. . (e.g., benzalkonium chloride, 1% sodium hypochlorite, 70% alcohol)

D. The rational use of the mallein test with effective quarantine will result in the eradication of the disease any country.

E. No vaccines or bacterins are used. Immunity is predominately cell mediated.