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Popular Article

GLANDERS: a disease of Horse

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Introduction

It is a highly contagious malady of soliped animals, usually chronic in nature characterized by formation of nodules and ulcers involving upper air passage, lungs and cutaneous tissues. The disease is communicable to man.

Distribution

This disease was first identified by Hippocrates in the 4th century BC (Colhan et al. 1999). Following that Aristotle named the disease as malleus, which being a latin word depicted the meaning malignant disease. William Shakespeare mentioned about it in his book. "The taming of the shrew".

Glanders is prevalent in most equine rearing countries. The disease is common in Asia, Africa, South America, Eastern Europe and middle east. (Arun et al. 1999). From 1998 to 2007, glanders were reported from Brazil, Ethiopia, former USSR, Iran, Iraq, Mongolia, Turkey and United Arab Emirates (OIE, 2008). In 2010, Bahrain recorded the first occurrence of this disease. In Brazil, the disease reappeared in 2009 (Van Zandt et al. 2013).

India, during 1808, East India Company appointed Dr. William Moorcroft to study and diagnose the disease like glanders, strangles, anthrax and bursati in horses (Gulati and Gautam, 1962). Verma reported Glanders in Bareilly cantonment during 1881-84. An outbreak of Glanders



was reported in and around Bombay, this has paved the way for enactment of Glanders and Farcy Act, 1899, this act is still in vogue (Singh, 1964).

The last three documented out breaks were from Saharanpur, Hissar and Karnal in horse in 1984. There was resurgence of Glanders i.e. re-emerging of it in 2006 at Pune and Panchgam area of Maharashtra. In 2007, disease outbreak occurred at Gautam Budha Nagar (Anantpur) and Meerut, Uttar Pradesh and Kathgodam area in Nainital district of Uttarakhand (Malik et al., 2009, 2010, 2012).

Etiology

Glanders is caused by *Actinobacillus mallei* (*Pseudomonas mallei*; *Malleonyces mallei*; *Pfifferella mallei*, *Leofferella mallei*). But, at the present the organism is known as *Burkholderia mallei*. It is a gram negative, straight or slightly bent, non-spore forming, facultative, intracellular, rod-shaped bacteria (Malik et al. 2010). The bacteria grow aerobically and prefer media that contain glycerol as enrichment agent (Events, 1966). Branching filaments are observed on the surface of broth cultures (Neubauer et al. 2005) The organism can survive for 3-5 week in damp media and decomposing materials. It may survive in clean water for 4-0 weeks and in contaminated stable for 6 weeks (Silva and Dow, 2013).

Susceptible Hosts

Horse, mules and donkeys are highly susceptible. Feline lion may be infected by eating meat. Laboratory animals like Guinea pig, rabbit, hamster and field mice may be infected artificially. They help in 'strauss reaction" that is a diagnostic aid for glanders. Veterinarian, Animal workers, and Farmers are susceptible. Prognosis in them is mostly used to end fatally (Srinivasah et al., 2001). Both acute and chronic forms as well as latent infection are observed in mules (OIE, 2004).

Man used to acquire the infection during work in Glanders laboratory or while treating sick patient or handling materials of such patient (Professional hazard). Cattle, pig, rat and fowl are absolutely resistant.

Mode of Transmission

- The infection is transmitted directly or indirectly from secretion or excretion of infected animals.
- The organisms remain in the discharges of the skin and nasal mucosa (OIE, 2004, 2008).



- In acute form (mules, donkeys) the organisms are excreted in faeces, urine, saliva and tears. (Gulati and Gautam, 1962).
- Most common route of transmission is respiratory route. Organisms may enter the respiratory tract through inhalation.
- Natural infection takes place through alimentary tract due to ingestion of feed and water contaminated by nasal discharge sputum.
- Dogs, cats, and wild zoo carnivores acquire the infection from ingestion of infected horse meal.
- Organisms may get entry through inoculation.
- Organisms may localize through skin invasion.
- Healthy horse may acquire the infection from other infected animals or carrier animals.

Clinical Findings

The incubation period of the disease varies from few days to several months. There is chronic nasal discharge from one or both nostrils. The discharge is grey in colour and catarrhal in nature. There is formation of small grey or yellowish nodules about the size of millet seed on the mucosa of upper respiratory tract. Submaxillary lymph nodes are edematous in nature. There is formation of nodules and ulcers along the lymphatic channels of the skin. The skin of the lower limbs and abdomen are mostly affected. The skin affection is ascribed as FARCY.

The acute form of the disease will show high rise of temperature along with ocular and nasal discharges. The animal will suffer from dyspnoea due to swelling of nasal mucosa and oedema of glottis. The ulcers thus formed due to infection is very much refractory to healing; animal will die due to anoxia or septicemia.

The chronic glanders may persist for few months or even a year. This is characterized by intermittent fever, cough and respiratory distress. The lymph nodes of the mandible turn firm and nodular. The affected animals gradually lose their condition with poor hair coat. There is oedema of the hind limbs down upto the hock accompanied with discharges from lymph nodes. The ulcer of the skin gradually heals up leaving an irregular star shaped scar.

In man, the disease is characterized by swelling and pain, usually on the hands, lip or eyes along with swelling of neighboring lymph nodes. Ulcer may develop on the nose and mouth in some cases. Development of abscess and pustules on the skin are the important features of the disease. The symptoms are always preceded by high rise of temperature.



Diagnosis

It is based on the followings:

- Clinical signs - Very much characteristic
- Isolation and identification of organism
- Clinical test (Allergic test)
- Animal inoculation test.

Isolation and identification of organism

Pus is the materials for demonstration of organism. Smear is to be prepared from pus materials. Organisms are present in good number in pus. Smear should be stained by methlene blue or gram stain. Bacteria are gram -ve rods with rounded ends. To grow the bacteria, it requires 72 hours incubation on glycerol agar.

Clinical Test (Mallein test)

Allergic test: Mallein is used for the allergic test. Mallein is used in three ways.

1. **Subcutaneous or Thermal test:** In this test, one ml. of ordinary or dilute mallein is injected beneath the skin. A positive reaction is obtained by swelling at the point of injection and an increase in temperature. The temperature is recorded in every three hours from 9th hour following injection till 24-48 hours. A rise of temperature of 2°F or above denotes a positive reactor.
2. **Ophthalmic test:** This test consists of instillation of a drop or two concentrate mallein into the conjunctival sac. A positive reaction is judged based on painful swelling and reddening of the mucous membrane accompanied by purulent yellow exudate within 6-8 hours following instillation of mallein. The swelling used to persist in 2 to 3 days.
3. **Intrapalpebral or Intradermo Palpebral Test (IDP):** This test is used as routine test for glanders. 0.1 ml of mallein is injected intra dermally into the lower eyelid with tubercullin syringe (Blood et al. 1983) and the test is read at 36 and 48 hours. A positive reaction is characterized by extensive oedema of the eye lid, congestion of the conjunctiva and mucopurulent secretion. The swelling persists for 2-3 days. The test may be repeated after 2 to 3 days using opposite eye.

Serological tests

(a) **Complement fixation test.** This is the most accurate method of sero-diagnosis. By this test, it is possible to detect antibodies earlier in the course of the disease and to demonstrate their presence for a longer period of time. It helps to know inapparent carrier and chronically infected horse (Neubauer et al., 2005). This test is prescribed for international trade of equines.



(b) **Indirect haemagglutination test.** This test has been recommended using mallein (Gangulee et al., 1996)

(c) **Conglutin complement absorption test.** This test has been successfully used to detect glanders (Sen et al., 1968)

(d) **ELISA.**

Molecular tests

A. PCR

B. Real time PCR

The above tests are found suitable for determination of generic, inter and intra species characteristics of bacteria.

"Strauss reaction"

Male guineapig when inoculated intraperitoneally or subcutaneously with suspected materials, a local reaction takes place involving the serotal sac in positive case leading to painful orchitis. This is known as "strauss reaction".

Treatment

It is a notifiable disease (Malik et al., 2010), According to Glander and Farcy Act, 1899, affected animals must be destroyed and disposed off safely. For eradication, affected animals should not be treated because it may result a carrier state.

However, treatment with sodium sulfadiazine has been found to be effective.

In precious horses, treatment with ceftazidime, sulphadiazine, gentamicin, mipenan can be tried (Lehavi et F al., 2002).

Public Health (Zoonotic) aspects

In 1793 Ist human case of glanders was reported in a C French veterinarian.

Srinivasan et al. (2001) mentioned about the disease from India in man. Gaizer (1913) a Veterinary pathologist from Punjab Vaeterinary College, Lahore who during post- mortem examination contracted the disease and died.

Occupational exposure is the main risk factor to veterinarians, farmers, horse traders, laboratory workers and other persons working in stables.

Transmission of *B. mallei* from animals to man occurs through direct invasion of cut, abraded or lacerated skin or inhalation or by attack to mucous membrane (nasal, oral or conjunctival).



Control

To control and eradication of glanders, every animal with clinical evidence of the disease and each one eliciting a positive reaction to mallein or under serology must be regarded as diseased and should be destroyed.

- In case of death carcass should not be opened.
- The carcass should be buried or incinerated.
- Adequate compensation to the owner for destroying the horse to be given.
- Mannure, bedding and feed residue should be burnt or burried.
- The premises should be vigorously disinfected.
- Feeding utensil and water trough should be properly disinfected.
- All the incontacted, suspected and imported animal must be isolated, properly tested and all the positive reactors must be slaughtered.

Glanders and Farcy Act

In 1899, March 20, Governor General of India passed Glanders and Farcy Act, 1899 (Act 13 of 1899) for testing and destruction of diseased horses. Outbreak is to be notified by veterinary authority. It was the first Act on animal diseases to be propagated in India. It has now been substituted by prevention and control of infectious and contagious diseases affecting animals and to meet the international obligations of India for fascilitating the importation and exportation of animal products as well as to save the human life by Quarantine and elimination of infected animal

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