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ORIGINAL PAPER



Haemorrhagic Septicaemia in Cattle and Buffaloes

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ABSTRACT

Hemorrhagic septicaemia (HS) is a highly fatal disease caused by *Pasteurella multocida subsp. multocida* that often cause outbreaks in buffalo and cattle in India, and thus is a major cause of production losses. It is one of the livestock diseases with the highest mortality, and despite available vaccines, outbreaks still occur. Cattle and water buffaloes are the principal hosts of hemorrhagic septicaemia, and it is widely considered that buffaloes are the most susceptible. *Pasteurella multocida* is transmitted by direct contact with infected animals and on fomites. Cattle and buffalo become infected when they ingest or inhale the causative organism, which probably originates in the nasopharynx of infected animals. The affected animals show more severe forms of disease with profound clinical signs such as fever, dullness, and reluctance to move, excessive salivation, serous nasal discharge, oedematous swellings in jowl and brisket region. Lesions observed were widespread haemorrhages, oedema with severe sepsis in the dead animals. Effective treatment and periodical vaccination are the ways to control this disease. Considering the importance of dairy production in India, and the dependence of the rural population on farming and livestock keeping, more extensive vaccination campaigns would be important.

key words: Cattle, Haemorrhage, Septicaemia, Vaccination

INTRODUCTION

Hemorrhagic septicemia is a bacterial disease that mainly affects cattle and water buffalo, and is an important cause of livestock mortality in tropical regions of Asia, Africa and the Middle East. The clinical signs usually progress rapidly from fever and depression to death, within hours to a few days. Because the disease course is so short, few animals can

be treated in time, and recovery is rare. Young animals are mainly affected in endemic regions, and outbreaks are particularly common during rainy weather, when the organism can spread readily. In areas where animals have no immunity, severe disease is expected to occur in all ages.

ETIOLOGY

Hemorrhagic septicaemia (HS) is caused by certain members of *Pasteurella multocida subsp. multocida*, a Gram-negative coccobacilli in the family Pasteurellaceae. *P. multocida* isolates are traditionally identified by a letter designating the organism's serogroup (A, B, D, E or F), based on the capsular antigen, and a number for the somatic antigen. Since the organisms are septicemic and cause widespread haemorrhages, the condition is known as haemorrhagic septicaemia.

EPIDEMIOLOGY

HS is a major disease of cattle and buffaloes characterised by an acute, highly fatal septicaemia with high morbidity and mortality. In many Asian countries, this disease outbreaks mostly occur during the climatic conditions typical of monsoon where as high humidity and high temperature.

HOSTS

Cattle and water buffaloes are the principal hosts of hemorrhagic septicaemia, and it is widely considered that buffaloes are the most susceptible. These species, as well as bison, appear to be the reservoirs of infection. Although outbreaks of HS have been reported in sheep, goats and swine, it is not a frequent or significant disease. Infrequent cases have been reported in deer, camels, elephants, horses, donkeys and yaks. Laboratory rabbits and mice are highly susceptible to experimental infection.

INCUBATION PERIOD

The incubation period is thought to be 3-5 days in most cases, although it can be much shorter (e.g., a few hours) in experimentally infected cattle or water buffalo that are inoculated with lethal doses. Some animals carry the organism asymptotically for varying periods before becoming ill.

TRANSMISSION

Pasteurella multocida is transmitted by direct contact with infected animals and on fomites. Cattle and buffalo become infected when they ingest or inhale the causative organism, which probably originates in the nasopharynx of infected animals. In endemic areas, up to 5% of cattle and water buffalo may normally be carriers. The worst epidemics occur during the rainy season, in animals in poor physical condition

Stresses such as a poor food supply are thought to increase susceptibility to infection, and close herding and wet conditions seem to contribute to the spread of the disease. *Pasteurella multocida* can survive for hours and possibly days in damp soil or water; viable organisms are not found in the soil or pastures after 2-3 weeks.

SOURCES

Blood: Septicaemia in HS occurs at the terminal stage of the disease, therefore, blood samples taken from sick animals before death may not always contain *P. multocida* Nasal secretions: Organisms are also not consistently present in sick animals.

CLINICAL SIGNS

Most cases in cattle and buffalo are acute or peracute. Buffaloes are generally more susceptible to HS than cattle and show more severe forms of disease with profound clinical signs such as fever, dullness, and reluctance to move. Salivation and a serous nasal discharge develop, and oedematous swellings become apparent in the pharyngeal region; these swellings spread to the ventral cervical region and brisket. Mucous membranes are congested. Respiratory distress occurs, and the animal usually collapses and dies 6–24 hours after the first signs are seen. Either sudden death or a protracted course up to 5 days is also possible. Animals with clinical signs, particularly buffalo, rarely recover. Chronic cases do not seem to occur in cattle and buffalo. In endemic areas most deaths are confined to older calves and young adults.



Fig 1: Congested conjunctival mucus membrane



Fig 2: Animal exhibiting hypersalivation



Fig 3: Submandibular edema (arrow)



Fig 4: Submandibular edema which extends up to brisket region (arrow)

In the recent past, HS has been identified as a secondary complication in cattle and buffaloes.

LESIONS

Widespread haemorrhages, oedema, and hyperaemia, consistent with severe sepsis. Oedema consists of a coagulated serofibrinous mass with straw-coloured or blood stained fluid. Swelling of the head, neck, and brisket occurs in nearly all cases. Similar swellings can also be found in the musculature. Subserosal petechial haemorrhages may occur throughout the body, and the thoracic and abdominal cavities often contain blood-tinged fluid.

GROSS LESION



Fig 5: Severe subcutaneous oedema and multifocal haemorrhage in submandibular



Fig 6: Severely congested pharyngeal lymph node

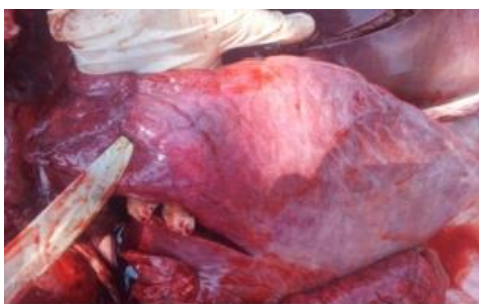


Fig 7: Severely congested lung



Fig 8: Lung showing thickened interlobular septa (arrowheads) due to oedema and fibrin and irregular areas of necrosis (arrows)



Fig 9: Petechial to ecchymotic haemorrhages on the heart and lung

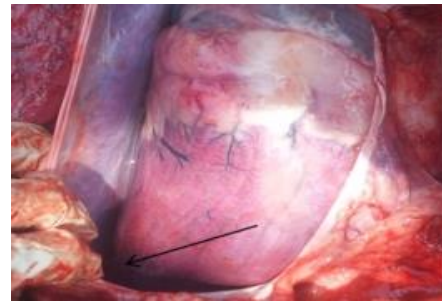


Fig 10: Pleural effusion

Scattered petechiae may be visible in the tissues and lymph nodes, particularly the pharyngeal and cervical nodes; these nodes are often swollen and hemorrhagic. Pneumonia or gastroenteritis occasionally occurs, but usually is not extensive. Atypical cases, with no throat swelling and extensive pneumonia, are sometimes seen.

MICROSCOPIC LESIONS

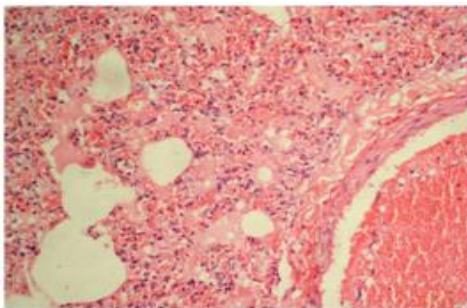


Fig 11: Lung showing fibrinous exudates in alveoli with infiltration of neutrophils (H&E x400)

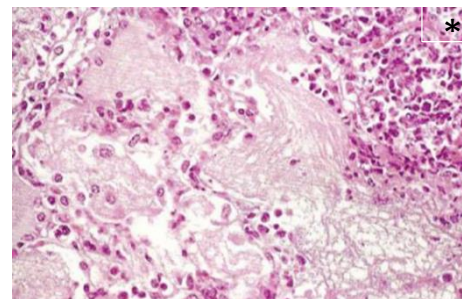


Fig 12: Alveoli filled with fibrin (center) and with neutrophils and macrophages (*) (H&E x400)

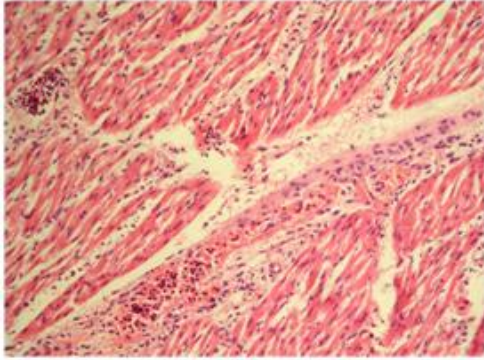


Fig 13: Heart showing infiltration of inflammatory cell in between myocardial fibres along with myocardial haemorrhages
(H&E x100)

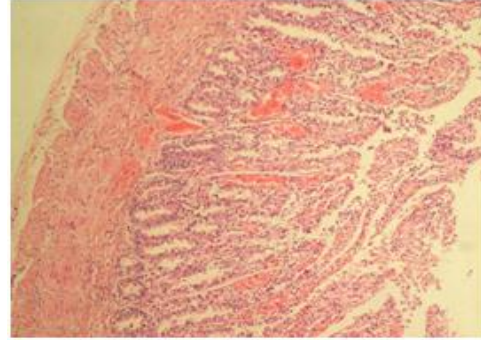


Fig 14: Small intestine showing vascular congestion and haemorrhages in mucosa and submucosa (H&E, x100)

There are no microscopic features that are specific for hemorrhagic septicaemia – all lesions are consistent with severe endotoxic shock and massive capillary damage.

DIAGNOSIS

- ◆ History
- ◆ Clinical signs
- ◆ Postmortem lesions
- ◆ In blood or tissue smears, *P. multocida* is a Gram negative, short rod or ovoid form with bipolar characteristics.
- ◆ A definitive diagnosis is usually made by isolation and identification of bacteria using proper culturing techniques.
- ◆ Serological tests used for serotyping include rapid slide agglutination or indirect hemagglutination assays for capsular typing, an agglutination test for somatic typing, agar gel immunodiffusion for both capsular and somatic typing.

DIFFERENTIAL DIAGNOSIS

- ✧ Black leg
- ✧ Anthrax
- ✧ Shipping fever
- ✧ Salmonellosis

- ✧ Mycoplasmosis
- ✧ Snake bite
- ✧ Poisoning

TREATMENT

Antibiotics are effective only if they are started very soon after the onset of clinical signs. A common practice during outbreaks is to monitor animals for fever and treat febrile animals immediately. Some drugs used to treat hemorrhagic septicemia include oxytetracycline, trimethoprim, sulfamethoxazole, a combination of penicillin and streptomycin, or sulphaquinoxaline. Antibiotic resistance has been reported in some endemic areas.

PREVENTION AND CONTROL

- ✧ Vaccination is routinely practiced in endemic areas.
- ✧ Avoiding crowding, especially during wet conditions, will also reduce the incidence of disease.
- ✧ Other preventive measures can include the removal of persistent carriers from an infected herd, and management to keep animals in good condition, which is thought to reduce shedding from carriers and decrease the risk that asymptomatic carriers will develop clinical signs.

CONCLUSION

Hemorrhagic septicemia (HS) is a highly fatal disease that often cause outbreaks in buffalo and cattle in India, and thus is a major cause of production losses. It is one of the livestock diseases with the highest mortality, and despite available vaccines, outbreaks still occur. Considering the importance of dairy production in India, and the dependence of the rural population on farming and livestock keeping, more extensive vaccination campaigns would be important.

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