

CASE REPORT

A CASE OF SEPTICAEMIC PASTEURELLOSIS IN CAPTIVE SAMBAR DEER, *CERVUS UNICOLOR*

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ABSTRACT. Septicaemic pasteurellosis is a fatal, sometimes epidemic, bacterial disease of domestic and wild animals including deer, bison, elk, and pronghorn antelope caused by *Pasteurella multocida*. This is the case report of septicaemic pasteurellosis in a captive sambar deer. The carcass was sent from Royal Endurance Stable, Bachok, Kelantan to the Kota Bharu Regional Veterinary Laboratory for post-mortem. Gross examination of organs was followed by collection of specimens from lung, kidney, liver, spleen and heart for histopathology and bacterial examination. Pooled organ samples with rumen content were collected and sent to the nearest Chemistry Department for investigation. For histology, the liver, lung, spleen, kidney, and heart specimens were fixed in 10% neutral formalin, and routinely embedded in paraffin. Five-micrometer sections were stained with H&E. Other tests such as worm and ectoparasite identification were conducted to identify the parasites. Post-mortem lesions revealed generalised haemorrhage in the organs. *Pasteurella multocida* serogroup B and *E. coli* were isolated from multiple tissues of the animal. Histological examination also revealed severe congestion and haemorrhage

of multiple tissues with infiltration of the inflammatory cells. The most likely mode of transmission of these bacteria is through an infected wound and into the bloodstream, thereby causing severe septicemia and death to the animal.

Keywords: septicaemic pasteurellosis, *Pasteurella multocida*, multiple haemorrhages, captive sambar deer

INTRODUCTION

Septicaemic pasteurellosis, an infectious bacterial disease has been reported in many wild animals including several species of deer (Chakarborty *et al.*, 1995). Systemic pasteurellosis has been reported in various species of deer including fallow deer (*Dama dama*), sika deer (*Cervus nippon*) and chital deer (*Axis axis*), as well as elk (*Cervus elaphus canadensis*).

Septicaemic pasteurellosis is a fatal, sometimes epidemic bacterial disease of domestic and wild animals including deer, free-ranging bison (*Bison bison*), elk (*Cervus canadensis*) and pronghorn antelope (*Antilocapra americana*) (Dumbar M.R. *et al.*, 2000; Franson J.C. *et al.*, 1988; Heddleston K.L. *et al.*, 1972). The disease is caused by various

types of *Pasteurella multocida* classified according to the Carter-Heddlestone system of classification by capsular group letter and somatic type number, e.g. A:2 (Carter G.R., 1955; Heddlestone K.L. et al., 1969). *Pasteurella multocida* serotypes B:2 and E:2 have been identified with haemorrhagic septicaemia (septicaemic pasteurellosis) in domestic water buffalo (*Bubalis bubalis*) and cattle (*Bos taurus*) (Carter G.R., 1955) and types A:2, A:3,4, B:1 and B:3,4 have caused epidemics in various wild ruminants (Miller M.W., 2001). Outbreaks have been reported in farmed fallow (*Dama dama*) and chital deer (*Axis axis*) in Denmark, the United Kingdom, and Australia (Eriksen L. et al., 1999).

CASE HISTORY

The carcass was sent from the Royal Endurance Stable, Bachok, Kelantan to the Kota Bharu Regional Veterinary Laboratory for post-mortem and immediately necropsied after physical examination. Gross examination of organs was followed by collection of specimens from lung, kidney, liver, spleen and heart for histopathology and bacterial examination. Pool organs with rumen content was collected and sent to the nearest Chemistry Department for investigation.

For histology, the liver, lung, spleen, kidney, and heart specimens were fixed in 10% neutral formalin, and routinely embedded in paraffin. Five-micrometer sections were stained with H&E. Other tests such as worm and ectoparasite identification were conducted to identify the parasites.

The carcass came with the history of sudden death one day after sedation for

wound inspection. Physical examination revealed an open dry wound on the right hind limb, and numerous ticks on the skin. Gross examination of organs revealed severe hemorrhagic trachea, pneumonia and hemorrhagic lungs, severe epicarditis with petechial hemorrhage on its surface and atria wall, with thickening of left ventricles wall, which is filled with unclotted frothy blood. The liver was swollen with congestion and hemorrhages, while the kidney was severely hemorrhagic and tiny roundworms were found in the abomasum. There was also enteritis. Overall, gross lesion showed generalised hemorrhage and septicemia.

Bacterial culture showed isolation of *Pasteurella multocida* from lung, kidney and heart, with *E.Coli* isolated from liver, and *Pasteurella sp.* isolated from spleen. Results from the histological examination showed severe pulmonary hemorrhage and congestion with inflammatory cells at alveolar septa and bronchioles and presence of fibrin in alveoli space. Severe congestion and hemorrhage of liver cells with interstitial hepatitis, interstitial nephritis mainly with lymphocytes, necrosis of glomeruli and hemorrhage. congestion and hemorrhage of myocytes with myocarditis.

The Figures 1 to 5 show the histopathology lesion of each organ.

The tiny roundworm *Haemonchus contortus* and the tick *Rhiphicephalus microplus* were also identified.

DISCUSSION

The laboratory results (bacteriology) confirmed that *Pasteurella multocida* and *E. coli* were the causative agents of severe

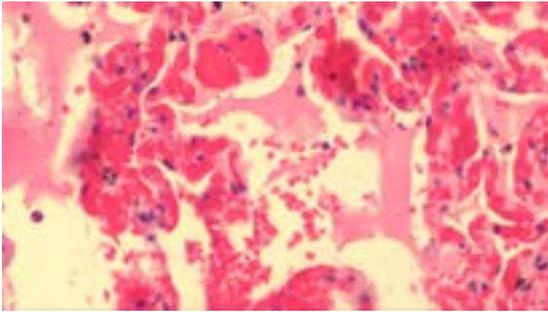


Figure 1. H & E staining, 20× magnification. Lung: presence of fibrin in the alveolar space, severe pulmonary haemorrhage and congestion with inflammatory cells at alveolar septa.

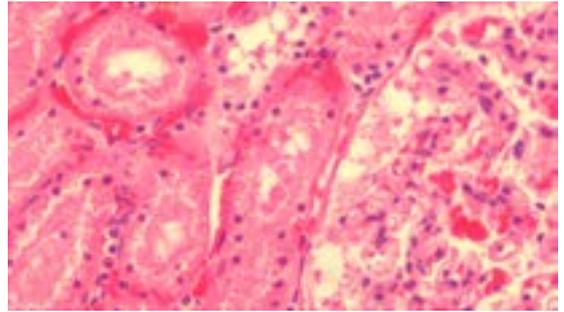


Figure 2. H & E staining, 20× magnification. Kidney: interstitial nephritis mainly with lymphocytes, necrosis of glomeruli and haemorrhage.

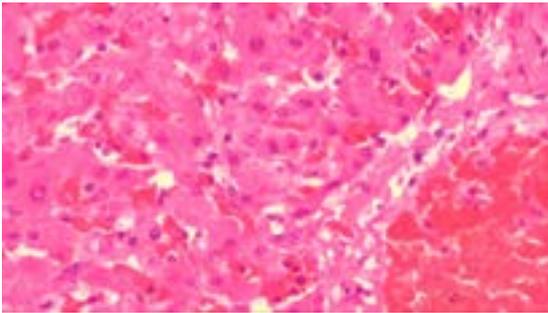


Figure 3. H & E staining, 20× magnification. Liver: severe congestion and haemorrhage of liver cells with interstitial hepatitis.

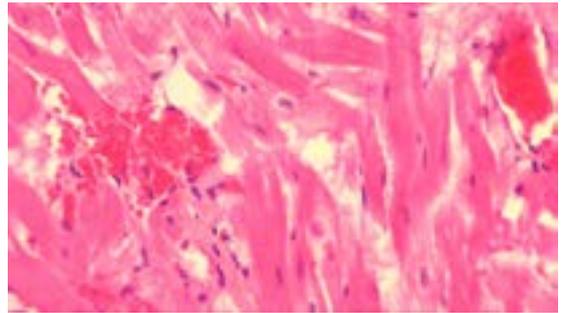


Figure 4. H & E staining, 20× magnification. Heart: congestion and haemorrhage of myocytes with myocarditis.

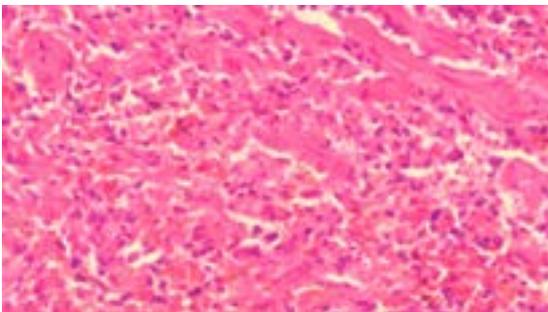


Figure 5. H&E staining, 20× magnification. Spleen: haemorrhage.

haemorrhagic septicaemia lesions and death to the animal. Histologically, the most significant lesions were present in the lung, liver and kidney which are severe congestion and haemorrhage with the presence of inflammatory cells in the tissues. The gross lesions which were generalised congestion and haemorrhage of the organs also clearly suggest the haemorrhagic septicaemic condition.

Pasteurella multocida is a small, gram-negative, bipolar, ovoid rod that inhabits the pharynx of healthy ruminants. It can survive in soil and water for a various period after contamination with ruminant nasal secretions. Disease occurs when bacteria colonise the lower respiratory tract or enter the bloodstream. Risk factors for pulmonary and systemic infection include viral or mycoplasmal respiratory diseases, temperature extremes, respiratory tract irritants, transport, overcrowding, changes to higher-energy feeds, and handling stress.

The animal could have been infected with the agent through an untreated wound at the right hind limb. The animal was wounded at about seven days prior to death. The disease might have occurred when bacteria entered through the infected wound and entered the bloodstream, causing severe haemorrhagic septicaemic lesions and death to the animal. (This is the most likely route of transmission in this case plus handling stress factor). *P. multocida* infection usually presents as an infection that complicates an animal bite or injury. *Pasteurella* species are commonly isolated pathogens in most animal bites. These injuries can be aggressive, with skin

manifestations typically appearing within 24 hours following a bite. These wounds can exhibit a rapidly progressive soft-tissue inflammation that may resemble group A β -haemolytic *Streptococcus pyogenes* infections. Deeper soft tissue can also be affected, manifesting as tenosynovitis, septic arthritis, and osteomyelitis. More-severe disseminating infections may also develop, including endocarditis or meningitis. Fortunately, *Pasteurella* species are fairly sensitive organisms and can be treated with a penicillin-based regimen.

In humans, *P. multocida* is the most common cause of infection from wound infections after dog or cat bites. The infection usually shows as soft tissue inflammation within 24 hours. High leukocyte and neutrophil counts are typically observed, leading to an inflammatory reaction at the infection site (generally a diffuse, localised cellulitis). It can also infect other locales, such as the respiratory tract, and is known to cause regional lymphadenopathy (swelling of the lymph nodes). In more serious cases, a bacteraemia can result, causing an osteomyelitis or endocarditis. The bacteria may also cross the blood-brain barrier and cause meningitis.

Thus, in conclusion, any wound bites or injuries should be treated as soon possible to avoid any infection that can cause severe conditions like septic shock in wild animals. Care must be taken during treatment to avoid handling stress as this factor can worsen the animal's condition.

REFERENCES

1. Chakraborty A., Chaudury B. and Sharma D.K., (1995). Pneumonia as the cause of death in deer. *Indian Journal Of Veterinary Pathology*, **19(1)**: 30-34.
2. Dunbar M.R., Wolcott M.J., Rimler R.B. and Berlowski B.M., (2000). Septicemic pasteurellosis in free-ranging neonatal pronghorn in Oregon. *J Wildl Dis.* **36**: 383-388.
3. Franson J.C. and Smith B.L., (1988). Septicaemic pasteurellosis in elk (*Cervus elaphus*) on the United States National Elk Refuge, Wyoming. *J Wildl Dis.*, **24**: 715-717.
4. Heddlestone K.L. and Gallagher J.E., (1969). Septicaemic pasteurellosis (haemorrhagic septicaemia) in the American bison: a serologic survey. *J Wildl Dis.* **5**: 206-207.
5. Carter G.R., (1955). Studies on *Pasteurella multocida*. I. A haemagglutination test for the identification of serological types. *Am J Vet Res.* **16**: 481-484.
6. Heddlestone K.L., Gallagher J.E., Rebers P.A., (1972). Fowl cholera: gel diffusion precipitin test for serotyping *Pasteurella multocida* from avian species. *Avian Dis.* **16**: 925-936.
7. Miller M.W., (2001). Pasteurellosis. In: *Infectious Diseases of Wild Animals*. Williams E.S. and Barker I.K. (eds). Ames, Iowa: Iowa State University Press
8. Eriksen L., Aalbaek B., Leifsson P.S. et al., (1999). Haemorrhagic septicaemia in fallow deer (*Dama dama*) caused by *Pasteurella multocida multocida*. *J Zoo Wildl Med.* **30**: 285-292.
9. Townsend K.M., Boyce J.D., Chung J.Y., Frost A.J. and Adler B., (2001). Genetic organisation of *Pasteurella multocida* cap loci and development of a multiplex capsular PCR typing system. *J Clin Microbiol.* **39**: 924-929.
10. Pritpal S. Malhi, Musangu Ngeleka, Murray R. Woodbury, (2016). Septicaemic pasteurellosis in farmed elk (*Cervus canadensis*) in Alberta. *The Canadian Veterinary Journal* **57(9)**: 961-963.