



SHORT COMMUNICATION

Peracute Infectious Canine Hepatitis

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ABSTRACT

Peracute infectious canine hepatitis (ICH) was diagnosed in two young male dogs out of 56 dead canines presented for necropsy examination during the period of April 2009 to June 2010. These dogs were purebred, one-month old Alsatian and 5-month old Labrador. None of the dogs had received any vaccination or deworming treatment; both had died after illness lasting for six hours and twenty four hours respectively. The dogs had shown signs of depression, anorexia and fever. At necropsy, lymph nodes were swollen, edematous and congested; livers were enlarged, bright red and mottled with numerous small white foci. Petechial hemorrhages were seen in the mucosa. Excessive serosanguinous fluid was present in the abdominal cavities. Histologically, the most significant lesion was necrohemorrhagic hepatitis with single cell necrosis of hepatocytes, lacunose dilation of sinusoids filled with blood and numerous large, solid intranuclear inclusion bodies (IIBs) in the hepatocytes and macrophages. Both eosinophilic and basophilic (amphophilic) inclusions were seen. It has been observed that ICH is re-emerging in some endemic countries. Pet dogs should be regularly protected by effective vaccination.

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INTRODUCTION

Infectious canine hepatitis (ICH) is a systemic viral disease caused by canine adenovirus-1 (CAV-1). Effective vaccination has greatly reduced its incidence although it is re-emerging in some endemic countries like Italy causing outbreaks in animal shelters, breeding kennels and pet shops (Decaro *et al.*, 2007). Mortality due to ICH occurs only in young dogs (under 2 years age) and disease occurs naturally in wolves, foxes, skunks and raccoons also (Akerstedt *et al.*, 2010; Thompson *et al.*, 2010). Mild, acute and peracute clinical forms of ICH have been described (Stalker and Hayes, 2007). The mild form is seen in areas where the disease is not controlled by vaccination. Most of the dogs in these areas are infected by CAV types 1 and 2 in the first two years of life and suffer from a mild febrile illness with pharyngitis and tonsillitis. The acute cases are more severe with vomiting, melena, high fever and abdominal pain. Petechial hemorrhages occur on the mucous membranes; there is slight jaundice and non-specific nervous signs. In the peracute form of disease sporadic cases are found dead without any sign of illness or after an illness of few hours with anorexia and high fever. Unilateral or bilateral

corneal opacity occurs in convalescent stage; it disappears spontaneously. CAV-2 causes infectious canine laryngotracheitis and it is also used for production of a safe vaccine against ICH (Decaro *et al.*, 2007; Gur and Acar, 2009). Recently, a canine hepatitis DNA vaccine was also developed (Liu *et al.*, 2008).

CAV-1 has affinity for vascular endothelium; mesothelium and hepatic parenchyma and the main pathological features of ICH are edema, hemorrhages and focal necrosis (Chouinard *et al.*, 1998). The histological specificity of the lesions depends on the demonstration of large solid intranuclear inclusion bodies (IIBs) in many organs, most consistently in the sinusoidal endothelial cells, Kupffer cells and parenchymal cells of liver, histiocytes in the spleen and endothelial cells in renal glomeruli (Stalker and Hayes, 2007). To the best of our knowledge ICH has not been reported from Pakistan so far. The objective of this paper is to report two cases of spontaneous peracute infectious canine hepatitis.

MATERIALS AND METHODS

Carcasses of 56 dogs were received for examination at the necropsy room of the Department of Pathology,

UVAS, Lahore, during April 2009 to June 2010. Two of these were diagnosed as spontaneous cases of peracute infectious canine hepatitis on histopathological examination.

The first dog was received in April 2009. It was a one month old male Alsatian. The dog became depressed and anorexic and died within six hours of illness without receiving any treatment or vaccination. Its female littermate had died similarly two days earlier. There was a history of insecticide spray in the house. The carcass of second dog was received in May 2010. It was a 5-month old male black Labrador. The animal had not received any vaccination and deworming. There was a history of illness for 24 hours with anorexia, mild fever and passing of red colored urine.

Detailed postmortem examination was performed on both carcasses. The gross lesions were recorded and 0.5 to 1.0 cm thick tissue specimens were saved in 10% buffered formalin. The tissues were routinely processed for fixation, dehydration and clearing and embedded in paraffin. The tissue sections were cut at 5 μ m and stained by hematoxylin and eosin method (Ahmad *et al.*, 2011).

RESULTS

Both the carcasses were in good condition of flesh. The livers were swollen, friable and bright red; strands of fibrin were attached to the surface. Small white foci up to 2mm in size were scattered throughout liver in the Labrador dog. The gallbladder was enlarged and its wall was thickened due to clear gelatinous edema. The Alsatian dog also had petechial hemorrhages in the lymph nodes and thymus and its lungs were edematous with white frothy material in the trachea, bronchi and bronchioles. The large intestine of Labrador dog had linear hemorrhages.

The most severe and consistent lesions were observed in the liver in both animals. There was advanced degeneration and necrosis of individual liver cells scattered throughout the organ in the form of small foci, predominantly in periacinar areas. The affected hepatocytes were enlarged with clear cytoplasmic vacuoles, cytolysis and karyopyknosis. Many hepatocytes, sinusoidal endothelial cells and Kupffer cells contained large, round intranuclear basophilic or acidophilic inclusion bodies. The inclusion bodies and the affected cells showed variations in staining and morphological characteristics. Typically, inclusion bodies (IBs) in the hepatocytes were round and basophilic and had a halo around them due to margination of chromatin (Fig. 1). However many inclusions had various shades of red colors (amphophilic) and had ovoid or elongated shapes, especially those in the Kupffer cells and sinusoidal endothelial cells. Margination of chromatin had occurred partially or not at all, so that in some cases the inclusions had completely filled the nucleus with no halo around them (Fig. 2). The sinusoids were distended into large round spaces (lacunose) filled with blood and the hepatic cords were compressed especially in the Labrador dogs. A mild infiltration by neutrophils, lymphocytes and plasma cells had occurred especially in the portal areas. The wall of the gallbladder was thickened due to presence of fibrinous material and congestion of

blood vessels. Inclusions were not observed in the gallbladder.

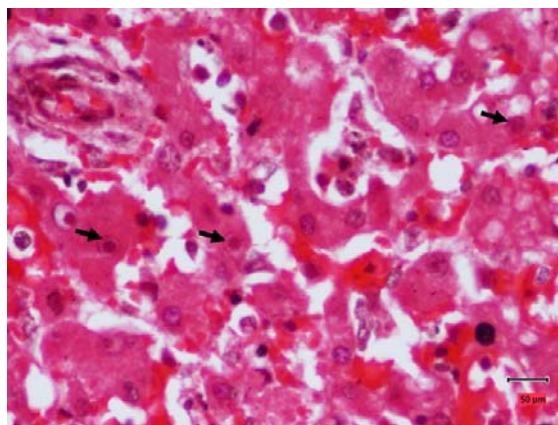


Fig. 1: Liver tissue section from Alsatian dog, hepatocytes contain eosinophilic intranuclear inclusion bodies with halos (arrows). H&E.

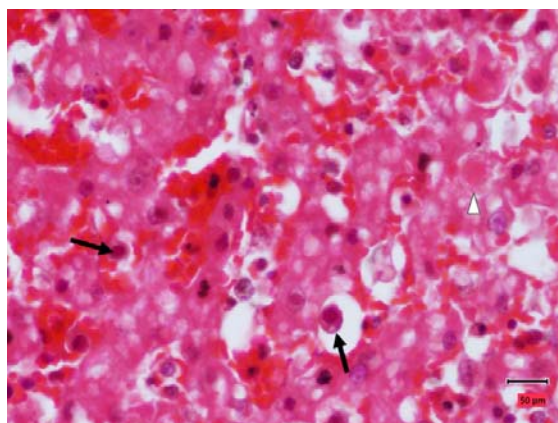


Fig. 2: Liver section from Alsatian dog showing amphiphilic intranuclear inclusion bodies without halo (arrow) and single cell necrosis (arrow head). H&E.

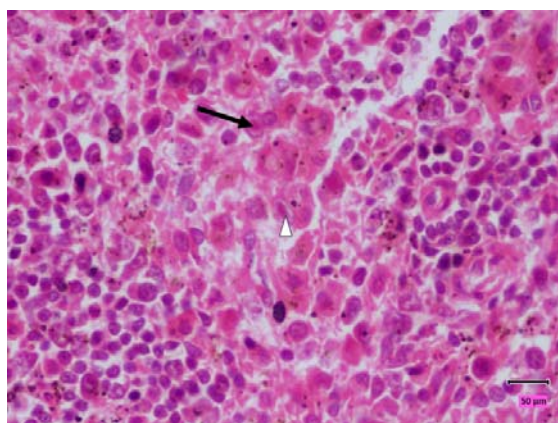


Fig. 3: Tissue section from spleen of Labrador dog with intranuclear inclusion bodies of different shapes, round eosinophilic with halo (arrow) and elongated eosinophilic (arrow head). H&E.

Besides liver, most remarkable changes were observed in the lymph nodes and spleen. Destruction and depletion of lymphocytes and proliferation of

lymphoblastic cells was noticed in both organs. There was pronounced congestion and erythrophagocytosis. The germinal centers in the lymph nodes were devoid of lymphoid tissue and were filled with blood. Heavy infiltration by mixed population of inflammatory cells had occurred in the capsule of lymph node which was interpreted as reactive lymphadenitis. Red pulp in the spleen was distended and filled with large histiocytic cells with large round or ovoid, vesicular nuclei and abundant cytoplasm. Many splenic histiocytes in the Labrador dog had large acidophilic IIBs, with or without halos (Fig. 3). Some histiocytes were undergoing necrosis.

DISCUSSION

ICH was diagnosed in two pet dog carcasses out of 56 (3.57 %) during April 2009 to June 2010. Most of the owners in Pakistan get their pet dogs vaccinated against ICH and other common canine infectious diseases. Compared with the pet dogs there is an overabundance of stray dogs in Pakistan which are not vaccinated against any disease. However, outbreaks of ICH have not come in the notice of the authors. We tend to agree with the observation of Decaro *et al.* (2007) and Stalker and Hayes (2007) that most dogs in the non-vaccinated areas get infected by CAAdV-1 in the first two years of their life and suffer either inapparent or mild febrile illness.

Some variation in the staining and morphological characteristics of IIBs was noticed in the present study. In the Alsatian dog the inclusions were observed only in the liver where they appeared to be basophilic, round and solid with margination of nuclear chromatin and formation of a halo around them (Owl's eye appearance). In the Labrador dog, inclusions were seen in the spleen as well as in the liver. Besides the owl's eye shape, there were larger, denser inclusions which completely filled the nuclei without chromatin margination in the Labrador dog. Intermediate forms between the two types of inclusions were also observed. Elongated inclusions were seen in the nuclei of cells believed to be endothelial cells. Staining differences in the IIBs have been noticed by other researchers as well (Karstad *et al.*, 1975). Stalker and Hayes (2007) have described IBs in ICH as deeply eosinophilic with a blue tint.

The most significant lesion reported in the literature and observed in this study has been described as necrohemorrhagic hepatitis (Chouinard *et al.*, 1998). There were numerous small foci of coagulative necrosis, dilatation of sinusoids and filling with blood and compression of hepatic cords. The sinusoidal endothelial cells and Kupffer cells were swollen and contained

amphophilic IBs with margination of chromatin. Variable numbers of IBs in endothelial cells and mesangial cells have been reported in the glomeruli. Hervas *et al.* (1997) and Wright (2008) reported focal mesangial sclerosing glomerulonephritis and interstitial nephritis in acute spontaneous cases of infectious canine hepatitis. Glomerulonephritis, interstitial nephritis and IBs were not observed in the kidneys of two dogs examined in this study. Next to liver, most important changes were observed in the spleen which included smaller size of lymphoid follicles, severe congestion, prominent erythrophagocytosis and large population of histiocytic cells with prominent IBs.

This study has indicated the presence of ICH in Pakistan. The extent of its prevalence is only speculative. There is need to conduct a serum survey, especially in the stray dogs. It is stressed that pet dogs should be regularly vaccinated.

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