

Scientific Report

The first report of concurrent detection of canine parvovirus and coronavirus in diarrhoeic dogs of Iran

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Summary

Two male dogs at the age of 3 and 5 months of Doberman pinscher and German shepherd breeds were referred to the Veterinary Hospital of Ahvaz University with clinical signs of depression, vomiting, haemorrhagic diarrhoea, profound dehydration, fever and anorexia. The affected dogs had not the history of vaccination. Concurrent infection of canine parvovirus and coronavirus was detected in dogs by means of immunochromatography assay. The haemogram showed lowered white blood cell counts as leukopenia, neutropenia and lymphopenia. The dogs received supportive treatment to correct the life-threatening dehydration and prevention of secondary bacterial infections. Despite treatment, one dog (Doberman pinscher) died within 3 days after the onset of clinical signs, and the second dog recovered after 4 days. To the best of our knowledge, this is the first report of concurrent infection of canine parvovirus and coronavirus in diarrhoeic dogs in Iran.

Key words: Parvovirus, Coronavirus, Diarrhoea, dog, Iran

Introduction

Canine parvovirus type 2 (CPV-2) is one of the most common viruses responsible for acute haemorrhagic enteritis and diarrhoea in susceptible dogs (Carmichael, 1994). In succeeding years, the enteric form of the disease has predominated, and it persists as a serious problem in breeding kennels, or where vaccination is not widely practised. Canine coronavirus (CCV) is highly contagious, too. Neonatal pups are more severely affected by CCV than adult dogs. Many reports have emphasized on fatal coronavirus infection following CPV infection (Pratelli *et al.*, 1999). In pups, sometimes in combination with other enteropathogens, particularly parvovirus and other agents such as *Clostridium perfringens*, *Campylobacter* spp., *Helicobacter* spp., and *Salmonella* spp.,

CCV infection may cause severe diarrhoea, vomiting, dehydration, loss of appetite, and occasionally death. Faeces are characteristically orange in colour, very malodorous, and infrequently contain blood in CCV infections (Hoskins, 1998; Evermann *et al.*, 2005; Buonavoglia *et al.*, 2006). The high sensitivity and specificity of immunochromatography assay and its simplicity led the veterinarians to use this practical method for evaluation of parvovirus and coronavirus infection. To the best of our knowledge, this is the first report of concurrent infection of canine parvovirus and coronavirus in dogs in Iran.

Materials and Methods

Two male pups at the age of 3 and 5 months of Doberman pinscher and German shepherd breeds were referred to the

Veterinary Hospital of Ahvaz University in spring 2007. The clinical signs were depression, vomiting, severe haemorrhagic diarrhoea, profound dehydration, fever and anorexia. Faecal samples were collected from diarrhoeic dogs. The samples of the affected dogs were tested by means of immunochromatography (IC). Commercial rapid CPV and CCV Ag test kits were used following the manufacturer's instructions (Manufactured by Antigen, Animal genetics, Inc., Korea). The presence of only one band within the result window indicates a negative result. The presence of two colour bands (T and C) within the result window, without considering which band appears first, indicates a positive result. The Rapid Antigen test kits have been found to be highly specific (98.8%) and sensitive (100%) (Esfandiari and Klingeborn, 2000). These kits detect the pathogenic CPV subtypes, CPV-2a or CPV-2b and CCV. Stool samples were examined for other pathogenic bacteria, viruses and parasites. Finally, the dogs received supportive treatment to correct the life-threatening dehydration and prevention of secondary bacterial infections.

Results

Concurrent infection of canine parvovirus (CPV-2a or -2b) and coronavirus was diagnosed in the affected dogs using Rapid Antigen test kits. The haemogram showed lowered white blood cell counts as leukopenia, neutropenia and lymphopenia. Despite immediate treatment, one dog (Doberman pinscher) died within 3 days after the onset of clinical signs, and the second dog recovered after 4 days. Parasitological examination was negative, and bacteriological cultures revealed no significant bacterial pathogens such as *Salmonella*, *Campylobacter*, Enterotoxigenic *E. coli* and *Clostridium perfringens*. The samples were also negative for canine distemper virus (CDV). Both male dogs were less than 6 months. The dead dog was autopsied. At autopsy, the intestinal wall was thickened and discoloured, with denudation of intestinal mucosa and the presence of dark, bloody and watery

material within the stomach and intestinal lumen. Also, the intestinal lesions were characterized by necrosis of the crypt epithelium in the small intestine. Intranuclear viral inclusion bodies were seen in these epithelial cells. The villi were shortened owing to lack of epithelial replacement by maturing crypt cells.

Discussion

The present study is the first report on concurrent occurrence of CPV and CCV infections in dogs in Iran. Differential diagnosis of bloody diarrhoea is very important in dogs, because the causes of disease and treatment methods are different. The results of this study showed that CPV and CCV were the main reasons of bloody diarrhoea in our cases, because the bacteriologic cultures were negative for significant bacterial pathogens. They were negative for other parasites and viruses, too. Both dogs belonged to rural areas of Ahvaz, were in open environment and had not the history of vaccination. There are many stray and rural dogs that are not vaccinated and haemorrhagic diarrhoea is relatively common in dogs, particularly in rural areas.

It has been reported that pups between 6 weeks and 6 months of age have an increased risk of canine viral enteritis (Hoskins, 1998). In our study, the affected dogs were less than 6 months. For unknown reasons, Doberman pinschers, Rottweilers, Labrador retrievers, American Staffordshire terriers, German shepherds and Alaskan sled dogs seem to have an increased risk of the disease (Hoskins, 1998). In this study, Doberman pinscher died, probably because of breed-related susceptibility. Another dog survived and recovered after 4 days. It was shown that leukopenia ($WBC < 6000 \text{ cells}/\mu\text{l}$) was an important paraclinical sign in the affected dogs, because both of them had abnormal CBC.

The proportions of the new antigenic types of CPV vary in different countries. The first report of CPV-2c has stated in the South American continent (Ruben *et al.*, 2007). Both CPV-2a and 2b are present in the UK, Germany and Spain with similar frequencies of isolation (Ybanez *et al.*,

1995; Bohm *et al.*, 2004). Our study showed that there are subtypes 2a or 2b of CPV in Iran, because our kits could detect these two pathogenic CPV subtypes. In 1971, CCV was first isolated from diarrhoeic specimens of American military dogs (Hoskins 1998). In a study in USA, 2 cases were found with canine coronavirus, one case was a 7-week-old Chihuahua puppy which died within 12 h of admission. The second case was an 8-week-old Shih tzu puppy that was euthanized by the referring veterinarian (Evermann *et al.*, 2005).

Our study showed that, simultaneous infection by CPV and CCV in dogs can enhance the severity of the diseases and sometimes lead to death. In conclusion, we emphasize that vaccination and hygienic procedures are important in prevention of CPV and CCV infections in dog populations.

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