Canine parvovirus

Canine parvoviral enteritis is caused by any one of the three variants of canine parvovirus type 2 (CPV-2a, CPV-2b, and CPV-2c) of the genus Protoparvovirus. This single-stranded DNA virus is highly infectious, has a tropism for rapidly dividing cells, and can cause severe illness and death in puppies and young dogs lacking immunity. The virus can persist for many months in the environment.

How is CPV acquired and transmitted?

Following oronasal exposure, the virus infects and replicates within the oropharyngeal lymphoid tissue. In most dogs (i.e. those with protective immunity), an appropriate immune response is mounted, and they clear the infection at this stage without demonstrating any clinical signs. In a small number of dogs (typically those that are naive or have had an inadequate response to vaccination) viraemia occurs 1 to 5 days following exposure, with clinical signs apparent from 4 to 14 days.

Faecal shedding of virus is short-lived (typically for less than 2 weeks following infection), and usually reaches its peak around 4 to 7 days. Infectious viral particles may also be present in vomitus. However, these viruses are hardy, persisting for extended periods of time in the environment (for more than a year under favourable conditions) and therefore fomites, and people, also play a role in the transmission.

What are the clinical signs of CPV infection?

Early signs include fever, depression, and loss of appetite. This is followed by abdominal pain, diarrhoea, and vomiting. Initially the diarrhoea is characteristic of small bowel diarrhoea followed by melaena and then haemorrhagic diarrhoea. Bone marrow infection can cause bone marrow necrosis which leads to leukopenia (mainly neutropenia) and can also contribute to the anaemia seen in some cases. The ultimate cause of death in acute CPV infection is septicaemia (as a result of Gram-negative bacterial translocation from the gut), endotoxemia, and shock.

If infected during pregnancy, fetal death occurs in some cases (especially early in gestation), while if infected during the latter stages of gestation (or as a neonate) fetal myocarditis can develop.

Canine parvovirus

How do I diagnose CPV infection?

A presumptive diagnosis can often be tentatively made on history (e.g. unvaccinated dog), physical examination, and clinicopathological results (e.g. profound neutropenia often alongside lymphopenia and hypoalbuminaemia). However, confirmation of a diagnosis should be attempted.

All sick young dogs (i.e. before their first booster vaccination) should have a faecal antigen test performed at point of admission.

CPV faecal antigen test: In clinically suspected cases, a faecal parvoviral antigen enzyme-linked immunosorbent assay (ELISA) or immunochromatographic (i.e. lateral flow) test can be performed. These tests detect virus shed in faeces and are highly specific for parvoviruses. They can be used to detect active parvoviral infection in both dogs and cats. False-positive results can occur following recent administration of modified live CPV vaccines; however, a positive result in a dog showing appropriate clinical signs, even if recently vaccinated, should be assumed to have parvoviral enteritis. False negative results can also occur (e.g., intermittent shedding) and results should be interpreted alongside the full clinical picture. Where suspicion for CPV infection remains repeated antigen testing should be repeated after 1-2 days or parvoviral PCR performed.

Quantitative polymerase chain reaction (PCR): This is a highly sensitive and specific test for the presence of CPV. It is most frequently performed on faecal samples, and less frequently on dorsal tongue / oropharyngeal swabs. This test allows identification and amplification of small amounts of viral DNA. Due to the higher sensitivity, PCR assays may be useful when faecal antigen tests are negative but parvoviral infection is still suspected. However, as this is not a point-of-care test, it does not replace the faecal antigen test as the screening test of choice. PCR can infrequently detect modified live CPV vaccine strains in the faeces of dogs up to 28 days after vaccination, but low viral load would be expected.

Serology (antibody testing): This test detects IgG and IgM anti-CPV antibodies. It should not be used in the diagnosis of CPV infection. Serum antibodies against CPV are detectable in the majority of dogs with active CPV infection, as well as those with vaccinational and maternally derived antibodies. A negative result in a dog with appropriate clinical signs makes CPV unlikely as the cause.

How is CPV prevented?

Vaccination against CPV when administered appropriately, can provide excellent immunity to all variants of the canine parvovirus. A variety of multivalent modified-live vaccines are available on

Canine parvovirus

the market that include attenuated canine parvovirus-2. However, maternally derived antibodies can interfere with the development of an appropriate adaptive immune response. The WSAVA recommend that the primary vaccination course includes administration of a dose on or after 16 weeks of age, with a booster at 6 months of age. Alternatively, pre-vaccination serology can be performed to determine whether an appropriate response has developed or whether further vaccination is indicated.

How do I treat parvovirus enteritis?

Treatment entails correction of fluid deficits, management of hypoglycaemia (if present), broad-spectrum antimicrobials (especially if neutropenic) due to the risk of bacterial translocation, and nutritional support (including placement of a naso-oesophageal feeding tube if required). Early in the course of treatment, some dogs benefit from interferon-omega. Early and aggressive intervention can really improve outcome – increasing survival from 10% to 90%.

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