

**Canine  
Practice**

## Roundtable Discussion



### Clinical Management of Canine Parvovirus, Part 2

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**Polley:** What other disease entities might you consider if a clinically ill dog presented with a normal WBC that later dropped to 1,000 or 2,000, but then returned to normal? At this point you are certain that the dog does not have CPV. What other conditions mimic the symptoms of CPV and cause a drop in white blood cells?

**Aboud:** The symptoms associated with *Salmonella*, *Campylobacter*, or *Escherichia coli* might mimic CPV symptoms and also could cause the shift in white blood cells.

**Willard:** A dog with CPV and a dog with salmonellosis can present with the same symptoms and physical examination findings. The CBC results can also be identical. Fortunately for the practitioner, he or she can take into account that salmonellosis is much more rare than CPV, and be

5 for the dog that comes in after a day or two at home.

**Polley:** When is the optimum time to run the ELISA test to confirm a CPV diagnosis?

**Willard:** We usually perform the ELISA right after the physical examination when we suspect CPV. If the test is negative, but we still suspect CPV, we put the dog in isolation and run the test again in 48 hours.

**Dunn:** We do both a CBC and ELISA following the physical examination. If the ELISA is negative but we still suspect CPV, and particularly if the CBC indicates to us that it may be CPV, we will isolate the dog for 48 hours and then run both tests again. Usually at that time the ELISA is positive.

Have any of you ever considered outpatient care for a dog with CPV? Since I work in an emergency



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is to start aggressive IV fluid  
replacement.”**

— Dunn

fairly certain in making a CPV diagnosis. If neutropenia is associated with a bacterial enteritis, salmonellosis would be my first differential; *Campylobacter* and an array of gram-negative entities would be my next consideration. In general, if a dog has had diarrhea due to CPV for a couple of days, the fecal ELISA should be positive for CPV.

**Hoskins:** The virus is normally shed within 3 to 10 days, and by that time you will definitely pick up the antigen on the fecal ELISA. You will fare better in making a diagnosis based on the fecal ELISA when a client waits a few days and observes the dog at home before bringing it into the clinic. When the client first calls and says the dog has been vomiting and has diarrhea, you can advise them to watch the animal and if these GI disturbances become more severe or persist for more than 24 hours then bring the dog in. The problem is, most clients will want to bring the sick dog in right away, and that is why the average stay for a dog with severe CPV is 7 days at the clinic, as opposed to

facility, we have some clients who decline inpatient care, preferring to see their primary veterinarian. We let these clients take their pets home after initiating supportive care with subcutaneous fluids, antiemetics, and antibiotics. Nine times out of 10 they bring the dog back shortly thereafter and opt for inpatient care. Our outpatient recommendations include: offering small frequent amounts of fluid (preferably with electrolytes), bland food, and oral antibiotics. In addition, we strongly recommend the pet be re-examined and admitted for therapy if vomiting returns or anorexia persists. Has anyone had any better results with home care for dogs with CPV?

**Willard:** Only in the mildest of cases. We strongly recommend inpatient treatment for all CPV cases. Even the mildest case can suddenly take a turn for the worse. Dogs that were just mildly depressed can have a rectal temperature of 106°F and blood glucose of 20 mg/dL in 12 hours or less.

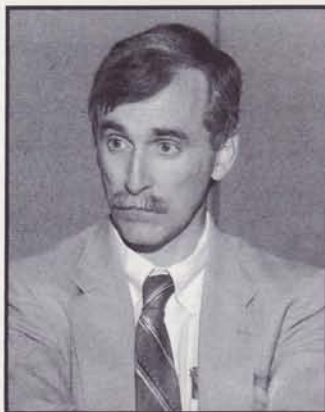
**Hoskins:** Several years ago I worked in a clinic where the clients would bring their dogs with CPV

into the clinic in the morning, before we saw any other patients, and we would administer these dogs their medications and then send them home where the owners observed them at regular intervals during the day. This seemed to work as well as having the dog stay at the clinic. It involved a lot of participation on the client's part, though.

**Polley:** We are very strict regarding home-care policy. We hospitalize all CPV patients, and only send them home after their WBC starts to rise, vomiting has stopped, and they have been able to

you have a sizeable amount of fluid that is ineffective. From that point I will estimate one-half to one times maintenance is contained in the GI tract. After I add up all the fluids that this animal needs by calculated method for 24 hours, I am often shocked at the calculated amounts I get. I total the amount of fluids lost through dehydration, maintenance, additional losses, and fluid in the GI tract to determine how much fluid in mL/day needs to be restored.

**Willard:** I recommend an aggressive approach to fluid therapy with constant reassessment. The



***"...monitor serum potassium  
in patients with marked  
vomiting and diarrhea."***

**— Willard**

hold down food for at least 12 hours. We have found that sending the dog home before it proves it can hold down food almost always results in the dog coming back to the clinic within a few hours, because the owner tries to feed the pet at home and the vomiting starts all over again.

**Dunn:** What course of inpatient treatment do each of you follow? At our hospital, the first action we take when we diagnose CPV is to start aggressive IV fluid replacement. Dehydration is one of the biggest challenges to overcome. I understand some practitioners disagree with this. Instead, they will place an IV catheter and start an IV drip with a balanced electrolyte solution and then set it at maintenance rate. We have found, though, that if you estimate a patient's dehydration level — how much fluid they have lost through vomiting and diarrhea — then you will want to try and bolus a portion of that fluid back and set a fluid rate that will correct the dehydration and provide maintenance within the next 18 to 24 hours.

**Hoskins:** I take into account dehydration level, maintenance, and an estimate of how much fluid was lost through vomiting or diarrhea while in the examination room. You also have to consider the fluid that is still in the stomach and the intestinal tract. If you can palpate a fair amount of fluid within the intestinal tract then you should assume that

most common mistake a practitioner can make regarding fluid therapy in these dogs is to not give enough fluids. I have rarely seen an animal "overhydrated." It is easier to underestimate the amount of fluids to give than to overestimate. In particular, calculations often are inadequate because half of the fluid you gave an animal is vomited, urinated, or passed as diarrhea.

**Hoskins:** It is possible to over-hydrate a dog, and for that reason it is important to monitor the dog's respiratory system during fluid therapy. One of the first signs of over-expansion with fluids is a change in the breathing pattern. If you notice this change, cut the fluid rate down immediately. We closely monitor for subcutaneous fluid accumulations or fluid accumulations within the dog's abdominal cavity. With osmotic diarrhea, the animal loses a great deal of protein. Albumen and globulins are being lost rapidly. If you notice the dog's legs or abdominal cavity swelling, the fluids you are giving need to be supplemented with plasma to re-establish the patient's osmotic gradient.

**Dunn:** I may have access to a larger supply of donated blood than most private practitioners because I work in an emergency setting. We have a large supply of plasma and are more apt to replace lost fluids with plasma than with any of the colloid expanders like dextran or hetastarch (Hespan®):

Dupont, Wilmington, DE). We monitor the dog's clinical signs and conduct a repeat physical examination to keep our fluid therapy in check. We also reassess the dog's blood glucose level and its total solids over a 24-hour period. Only a small amount of blood is necessary to measure serum glucose levels when using commercially available glucometers, and refractometers can be used to measure total solids. We compare these with the data taken at admission. Any patient whose total solids drop by 50% from admission or go below an

itoring period and show a profound depression on the next monitoring period. Hypoglycemia might contribute to that change in attitude. I will give glucose to any dog that experiences seizure activity. Many practitioners use the lactated Ringer's solution and 5% dextrose solution supplemented with additional potassium chloride, but I do not believe supplemental dextrose is always necessary.

**Polley:** We use the 5% dextrose much less now than we did 20 years ago. There are more cases that do not require added glucose than do.



***"[by] providing [them] supplemental magnesium... patients require less potassium supplementation"***

***— Abood***

absolute value of 2.0 g/dL indicates to us that we should supplement with plasma.

**Willard:** Hetastarch may stay in the circulation longer than albumen, which is an advantage. Unfortunately, we do not have enough hands-on experience working with hetastarch yet to precisely determine when to use hetastarch and when to not use it.

**Dunn:** Do you routinely make additions to IV fluids other than a balanced electrolyte solution?

**Willard:** We routinely add potassium. Potassium levels tend to drop rapidly. Some of the lowest serum potassium levels I have ever seen have been in dogs with CPV. These numbers have been as low or lower than 1.8 mEq/L (numbers with which we thought an animal could not survive). We routinely add 20 mEq of potassium per liter to begin with. One needs to monitor serum potassium in patients with marked vomiting and diarrhea.

**Hoskins:** Monitoring is key during any type of fluid replacement therapy. We also automatically supplement our CPV patients with potassium chloride. We commonly use lactated Ringer's solution and in most cases we will add the supplemental potassium chloride to that. I do not supplement glucose as much as I used to. I generally only give glucose to dogs that I notice have a sudden shift in attitude: those that are bright during one mon-

**Willard:** You can cause an osmotic diuresis if you administer 5% dextrose. If you are administering it at a maintenance rate, the blood glucose can be in the 150 to 200 mg/dL range. If the blood glucose goes up to 250 or 300 mg/dL, the dog can suffer urinary losses because of the subsequent osmotic diuresis. We usually make a 2.5% dextrose solution rather than a 5.0%.

**Abood:** If there were better, easier methods for monitoring magnesium, we might consider adding that as a supplement at this point as well. Currently we can not monitor magnesium in the small animal patient effectively, but this situation may change in the near future. Providing supplemental magnesium to animals with very low magnesium levels may help correct the levels of potassium and other electrolytes, such as calcium.

**Polley:** How can you tell if a dog has a low magnesium level?

**Abood:** Practitioners could evaluate a patient's magnesium status by requesting a serum  $Mg^{++}$  to be run as part of the serum profile (or SMAC); but unfortunately serum  $Mg^{++}$  concentrations are not an accurate measure of total body magnesium. Measuring ionized magnesium is more appropriate because the ionized fraction is thought to be the physiologically active portion, and represents intracellular  $Mg^{++}$  status. At this time, however, there are

very few veterinary teaching hospitals with the capability to measure ionized magnesium; hopefully, accessibility for this technique will increase in the next few years.

Studies have shown that by paying attention to magnesium status and providing supplemental magnesium when levels are low, patients require less potassium supplementation.

**Dunn:** Additional human literature on chronic intensive care unit patients indicates that long-term parenteral nutrition as IV supplementation cannot adequately regulate calcium and potassium levels in the body until the ion-specific measured ionized magnesium has been brought up to 2.0.

**Aboud:** Studies need to be conducted in veterinary patients, but this idea of magnesium supplementation may eventually apply to fluid therapy of critically ill small animals.

**Dunn:** I know of only two places in the entire state of Missouri where ion-specific electrode magnesium tests are performed: our facility and Washington University Medical Center in St. Louis, Missouri; however, serum magnesium testing is much more common.

**Hoskins:** At what point do you begin antibiotic treatment of dogs with CPV?

**Dunn:** In many cases, prior to initiating antibiotic therapy, we suspect that there is a gram-negative septicemia present. In fact, a few years ago there was a study in which *E. coli* was cultured from 90% of CPV infected dogs (Turk J, et al: Coliform Septicemia and Pulmonary Disease Associated With Canine Parvoviral Enteritis: 88 Cases. JAVMA 196[5]: 771-773, 1990). In these cases we use SEPTI-Serum™ (Immvac, Inc., Columbia, MO), an endotoxin neutralizing product. SEPTI-Serum binds endotoxin, so we administer it prior to initiating the antibiotic therapy (Dimmitt, Reed: Clinical Experience With Cross Protective Anti-Endotoxin Antiserum in Dogs With Parvoviral Enteritis. *Canine Practice*, Vol. 16, May/June 1991). Our rationale for using the SEPTI-Serum first is that if there is a gram-negative overload present and we start antibiotic therapy, we are going to kill the bacteria and shower the body with more endotoxin, which might make the CPV situation much worse. When we give the SEPTI-Serum first IV, and then start the antibiotics, we have noticed a reduction in the cases that go into endotoxic or septic shock.

**Hoskins:** Do you dilute the SEPTI-Serum with equal parts of the fluid solution when administering IV?

**Dunn:** Yes. We dilute SEPTI-Serum (2 mL/lb) with an equal volume of saline then administer the

solution IV over a 30- to 60-minute period. As long as it is diluted and administered slowly we have not seen any adverse protein-related reactions. First we administer the bolus of IV fluids, and when we get down to the last portion of that bolus, we add the SEPTI-Serum diluted with saline and let it drip into the last part of the bolus over a 30- to 60-minute period of time. We have never had any allergic or anaphylactic reactions, although I am aware of instances where a full-strength injection of SEPTI-Serum was given to an animal, without dilution, and a reaction occurred.

**Hoskins:** Diluting the SEPTI-Serum is the key. Also, practitioners should only use the SEPTI-Serum product for small animals, not the product marketed for large animals. Use the small animal version and dilute it with an equal part of normal saline solution.

**Dunn:** Yes. We dilute SEPTI-Serum (2 mL/lb) with an equal volume of saline then administer the solution IV over a 30- to 60-minute period.

**Willard:** The course of antibiotic therapy we will use depends on the animal. If the animal is neutropenic and at risk for infection, but is not febrile, we generally use a first generation cephalosporin. If the animal appears to be in gram-negative septic shock, we will use ampicillin plus amikacin (Fort Dodge Laboratories, Fort Dodge, IA). If the animal has a mild fever, we will usually use ampicillin plus amikacin. amikacin has a broader spectrum than gentamicin and less nephrotoxicity.

**Dunn:** We begin antibiotic therapy with ampicillin administered three times a day IV. Depending on the individual dog, we may or may not combine this with amikacin if we believe a more aggressive approach is needed. Usually, however, ampicillin is successful on its own.

**Hoskins:** We use cefazolin, a first-generation cephalosporin. This product has a very good gram-negative spectrum. We have had much success with this product. If we have absolute neutrophil counts less than 1,000, then we will also administer gentamicin along with the cefazolin.

**Polley:** We also use cefazolin, and have had excellent results with it.

**Dunn:** What course of treatment do you employ to stop the dog from vomiting? In some cases, you just can not get the dog to stop vomiting, and until you can do that, it is difficult to proceed.

**Willard:** In those cases the antiemetic of choice at our clinic is chlorpromazine (not approved for use in dogs). Because of this drug's vasodilatory properties, we do not use it until the animal's hydration status is up to par. If we have a case where

chlorpromazine is ineffective, we will try metoclopramide. I am cautious about using metoclopramide because I think I have seen it cause alimentary spasms in some dogs and trigger more vomiting. Overall, constant IV infusion over 24 hours with low-dose metoclopramide is more effective than intermittent bolus doses of metoclopramide. If an animal has very severe vomiting and I can not stop it, I will give a single injection of flunixin meglumine, to try to reduce intestinal inflammation and get the vomiting under control. I will never give more than a single dose of flunixin

**Willard:** It is difficult to establish whether a dog with CPV is in pain. Some of them are so depressed, it is difficult to determine if this is due to pain or not. If your pain-relieving drug causes the dog to become more depressed, it will be difficult to monitor its progress and determine how the animal is responding to the treatment for CPV.

**Polley:** We administer 0.1 mg/lb as needed of Torbugesic® (Fort Dodge Laboratories, Fort Dodge, IA) for pain. It does not seem to affect the dog's mental attitude. I have not noticed that the dogs recover faster because we administer a pain



**"...pain medication [seems to make] the animals...much more comfortable."**

**— Polley**

meglumine. Some people are now using Zofran® (Cerenex Pharmaceuticals, Research Triangle Park, NC; ondansetron — not approved for use in dogs, 0.1 mg/lb) and finding that it works when other antiemetics fail.

**Hoskins:** Giving more than a single dose of flunixin meglumine to stop vomiting can lead to numerous other GI complications that a dog suffering from CPV does not need.

**Willard:** The nonsteroidal anti-inflammatory drugs (NSAIDs) must be used with extreme caution because they can cause many GI disorders. One dose of an NSAID only in the most severe vomiting cases must be the limit. The most common GI disorder caused by NSAIDs is severe ulceration of the GI tract.

**Polley:** Does anyone administer any pain management medications to dogs with CPV? The GI inflammation can be quite painful to these dogs.

**Hoskins:** Pain management research is just beginning. In the future we will probably rely more on transdermal patches containing medications to reduce pain as opposed to injectable drugs we use now. The transdermal patches will prove beneficial on a number of fronts, including allowing practitioners to deliver a specific amount of an analgesic agent over time.

medication along with our other antibiotic therapy, but the animals do seem much more comfortable.

**Dunn:** One aspect of pain management that can not be overlooked is that, with CPV, we are already dealing with ileus, and a vast majority of pain medications create ileus. With pain management, you must take care not to make a bad situation worse.

Part 1 of the roundtable discussion appeared in the September/October 1995 issue of *Canine Practice*. Succeeding parts will appear in future issues of the journal.

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