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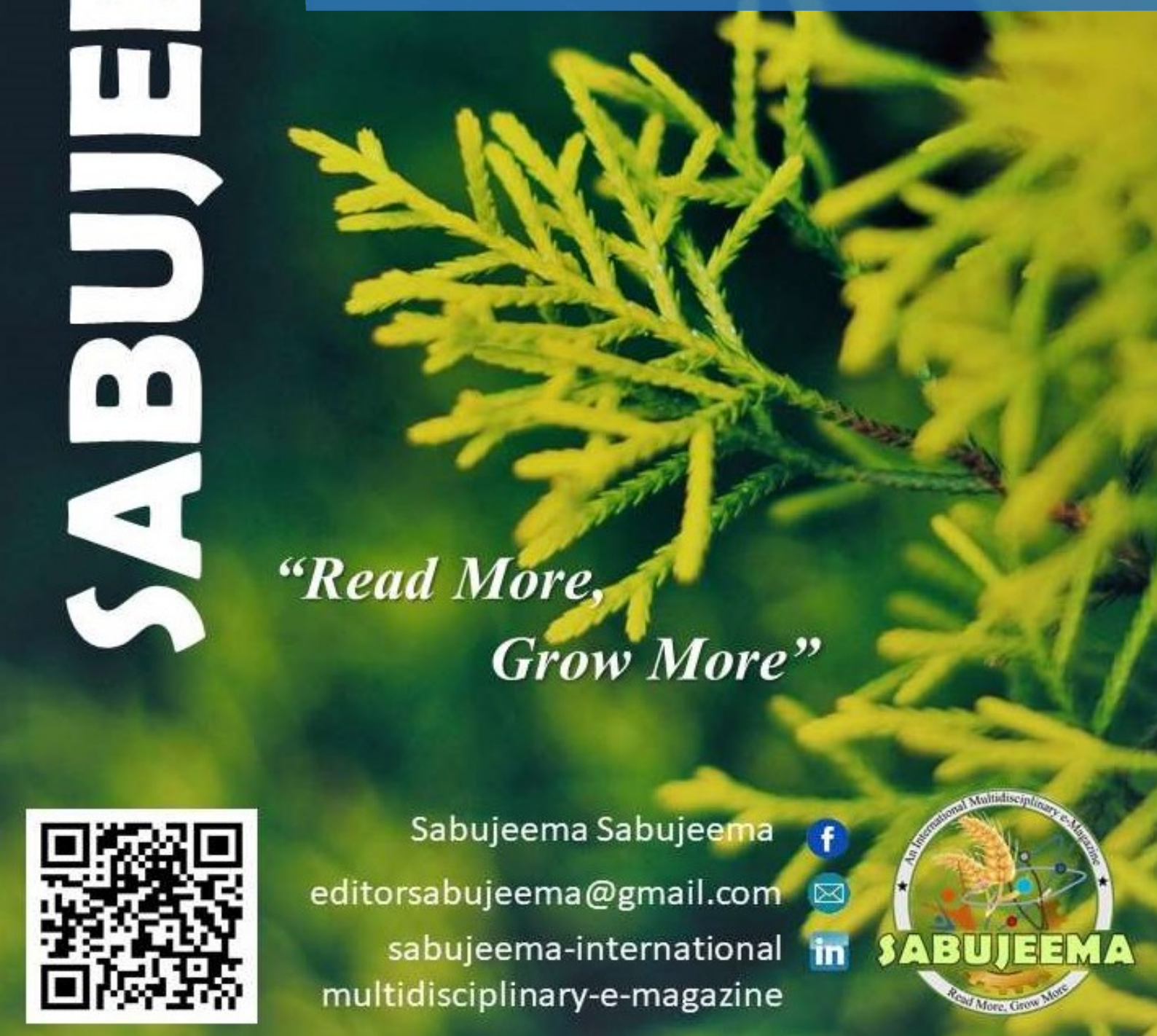

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RECENT UPDATES OF CANINE PARVOVIRUS -2 WITH RESPECT TO ITS THERAPEUTIC MANAGEMENT

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INTRODUCTION

Canine parvovirus type 2 (CPV-2), a member of the genus Parvovirus and family Parvoviridae is a highly contagious disease and leading cause of diarrhea in puppies in several parts of the world causing heavy morbidity (100%) and mortality up to 91% in pups. (Decaro and Buonavoglia, 2012). The disease is enzootic in India as reported by many authors (Behera et al., 2020) from different parts of the country. Acute CPV-2 enteritis can manifest in dogs of any breed, age or sex, but puppies between 6 weeks and 6 months appear to be more susceptible (Nelson and Couto, 2014). Principal clinical manifestations are anorexia or lethargy, weakness, depression, vomiting (Fig. 1), foul-smelling diarrhea which may range from mucoid to purely hemorrhagic (Fig. 2), dehydration, fever, metabolic acidosis (or alkalosis), endotoxemia, systemic inflammatory response syndrome (SIRS), hypercoagulability, multiorgan dysfunction and death.

Recent developments with respect to therapeutic management of CPV-2 in dogs

CONVENTIONAL THERAPY

FLUID THERAPY

- Fluid and electrolytes have remained the cornerstones of therapy against CPV-2 enteritis. Parenteral fluid and electrolytes are administered to correct dehydration and electrolyte imbalance.
- As a rule, a balanced isotonic crystalloid solution (e.g., Lactated Ringers) is the fluid of choice for initial restoration of intravascular volume and rehydration. Typically, the canine shock dose (80–90 mL/kg) is split in consecutive boluses of 15–20 mL/ kg given over 15 minutes until improvement of the perfusion status is achieved.
- If the administration of 50% of the calculated shock volume of isotonic crystalloids has failed to achieve sufficient improvement, adding a colloid should be considered.
- The daily fluid allowances should incorporate the maintenance requirements (40–60 mL/kg), the current fluid deficits (body weight in kg × % dehydration = volume [L] to correct), and the ongoing losses (might be subjectively estimated to 250 mL).
- Parvoviral enteritis may be associated with hypoproteinemia. Therefore, colloidal support (e.g., 6% hetastarch) should be provided if hypoalbuminemia (<2 g/dL) or hypoproteinemia (<4 g/dL) occurs.

- To correct hypokalemia, maintenance fluids are supplemented with ≥20 mEq/L of potassium chloride. The rate of potassium administration should not exceed 0.5 mEq/kg/h.
- To correct hypoglycaemia, supplementation of the maintenance fluids with 2.5%–5% dextrose is required (Nelson and Couto, 2014).

ANTIBIOTIC TREATMENT

Parenteral administration of broad-spectrum bactericidal antibiotics is warranted in dogs with severe infection due to the high risk of septicemia associated with the disruption of the mucosal barrier and the concurrent profound neutropenia. Ceftriaxone-tazobactum, Ampicillin and cefoxitin as single-agent treatments or in combination with enrofloxacin are rational empirical choices offering protection against Gram-positive, Gram-negative, and anaerobic organisms. Aminoglycosides may also be considered in well-hydrated animals (Mylonakis *et al.,* 2016).

ANTIEMETIC TREATMENT

Metoclopramide @ 1–2 mg/kg/24 hours constant-rate infusion (CRI) or @ 0.2–0.4 mg/kg/6–8 hours IV, IM, SC as bolus infusion can be given. Ondasetron may be given as a bolus or as a constant-rate infusion in dogs with severe vomiting @ 0.1 to 1.0 mg/kg IV. Maropitant, has improved substantially the efficacy of antiemetic treatment in dogs to be given@ 1 mg/kg/24 hours SC (Mylonakis *et al.,* 2016).

ANTIHEMORRHAGIC TREATMENT

In case of severe bloody diarrhea, Tranexamic Acid@ 10 mg/kg IV twice to thrice a day, vitamin K @ 1-5mg/kg BID or Ethamsylate @ 5 to 10 mg/kg bw BID can be used.

NUTRITIONAL SUPPORT

Enteral nutrition via nasoesophageal catheter starting 12 hours post-admission is associated with improved mucosal integrity, faster repair, and as a result, reduced possibilities for bacterial translocation (Mylonakis *et al.,* 2016).

ANTIVIRAL TREATMENTS

- Use of convalescent serum from dogs that have recovered from CPV-2 infection as a means of providing passive immunization.
- Recombinant feline interferon-ω (rFeIFN-ω) has been promising but is cost-prohibitive.
- Oseltamivir, a neuraminidase inhibitor @ 2 mg/kg, PO, for 5 days has been advocated but lacks clinically relevant benefit (Mylonakis *et al.,* 2016).

PAIN MANAGEMENT

- To prevent abdominal pain, analgesic such as butorphanol @ 0.1–0.2 mg/kg/4–6 hours IV or buprenorphine @ 0.01 mg/kg/6 hours IV can be tried.

MISCELLANEOUS TREATMENTS

- Antioxidants such as N-acetylcysteine, Vitamin-C and Vitamin E could be considered as potential additional treatment options to improve the health condition and minimize the duration of hospitalization in case of canine parvoviral diarrhea (Gaykwad et al., 2018; Kataria et al. 2020).

ALTERNATIVE THERAPIES

- Nitazoxanide, Closantel Sodium, and Closantel promise to be future potential broad-spectrum antiviral agents against canine parvovirus (Zhou *et al.,* 2019).
- Hemeopathic treatments such as Arsen alb. (6C), Verat. alb. (6C), Belladonna (30C) and Parvo (30C) can be tried against CPV-2 infection but need further scientific evidence.

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Fig. 1: Watery vomitus in a 2.5-month old Labrador pup with CPV-2

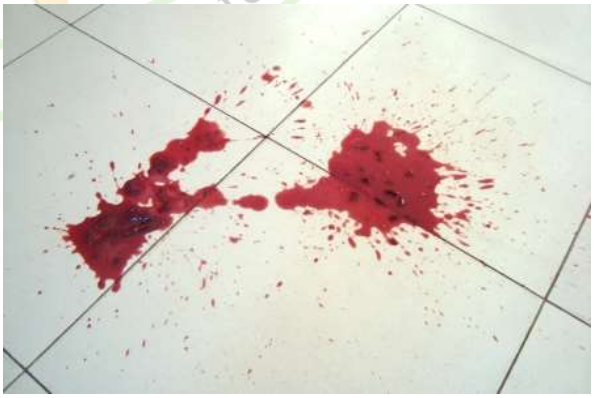

Fig. 2: Haemorrhagic fetid diarrhoea in a 2.5-month old Labrador pup with CPV-2