

Parvovirus and distemper virus outbreak in puppies bred in a military kennel

Surto de parvovirose e cinomose em cães filhotes criados em um canil militar

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RESUMO

A parvovirose e a cinomose são enfermidades infecciosas virais comuns da espécie canina no Brasil, ambas resultando em alta taxa de mortalidade por conta de sua severidade e aparecimento abrupto. Cães de trabalho são utilizados por instituições militares no Brasil desde o início do século passado, ganhando importância nas últimas décadas principalmente pelo fato de nosso país sediar alguns dos eventos esportivos mais importantes do mundo. Neste contexto, os canis militares, normalmente com concentração significativa de animais, estão sujeitos à ocorrência destas enfermidades infectocontagiosas. O objetivo do presente estudo é relatar um surto ocorrido em uma unidade militar e discutir os fatores que levaram ao seu surgimento. Para tanto, foram analisadas as informações obtidas nos prontuários dos animais e em relatos de médicos veterinários e auxiliares que participaram de todas as atividades no momento do surto. Inicialmente, quatro dos 34 filhotes presentes no canil apresentaram sinais de gastroenterite e receberam terapia de suporte de acordo com as alterações expressadas. Depois de dois dias e com a confirmação laboratorial do diagnóstico de parvovirose, os animais tiveram sua terapia alterada e foram isolados do restante do plantel. Neste momento, todos os filhotes restantes começaram a receber vacinação em esquema para plantéis em risco. Após sete dias do início do surto, outros 12 filhotes começaram a apresentar sintomas semelhantes, sendo também isolados e tratados. Destes animais, quatro vieram a óbito. Após 25 dias do início do surto, outros seis filhotes, mais jovens, começaram a apresentar sintomas gastroentéricos e neurológicos e foram posteriormente confirmados laboratorialmente como infectados pelos vírus da cinomose e parvovirose simultaneamente, sendo tratados para tais. Todos

estes animais vieram a óbito. Ao final do surto, contabilizou-se 22 animais acometidos, sendo seis por cinomose e parvovirose concomitantes e 16 somente por parvovirose. Algumas hipóteses em relação à epidemiologia dos vírus no canil foram levantadas e várias medidas profiláticas foram tomadas a fim de se evitar novos surtos. A partir do ocorrido pode-se concluir que estas enfermidades tem grande potencial de prejuízo tanto para a saúde do plantel, quanto para recursos materiais e pessoais em canis militares. Este potencial sugere a necessidade de medidas profiláticas robustas e constantes para evitar/mitigar tais prejuízos.

Palavras-chave: Cão de trabalho militar, Serviço Veterinário Militar, Doenças infecciosas virais, CPV-2, CDV.

ABSTRACT

Parvovirus and canine distemper are viral infectious diseases common for the canine species in Brazil, both resulting in high mortality rate because of their severity and sudden appearance. Working dogs are used by military institutions in Brazil since the beginning of the last century, gaining importance in the last decades mainly by the fact that our country hosted some of the most important sport events in the world. In this context, military kennels, normally with significant concentration of animals, are subject to occurrence of these infectious-contagious diseases. The purpose of the present study is to report an outbreak in a military unit and discuss the factors that have led to its surge. For this purpose, information obtained from the animals' sheets and reports of veterinarians and assistants, who participated in all activities at the time of the outbreak, was analyzed. Initially, four out of the 34 puppies in the kennel shows signs of gastroenteritis and underwent supporting therapy according to the expressed alterations. In two days, and upon laboratory confirmation of the parvovirus diagnosis, the therapy of the animals was changed and they were isolated from the rest of the stock. At that moment, all puppies left were vaccinated according to a schedule for stock at risk. In seven days from the beginning of the outbreak, 12 other puppies presented similar symptoms and were isolated and treated as well. Four of these animals died. In 25 days from the beginning of the outbreak, six other puppies, younger ones, presented gastrointestinal and neurological symptoms and were later confirmed in laboratory as infected by the canine distemper and the parvovirus virus simultaneously, and threatened for these diseases. All of these animals died. At the end of the outbreak, 22 animals were accounted for as sick, six by canine distemper and parvovirus concomitantly, and 16 by parvovirus only. Some hypotheses regarding the epidemiology of the virus in the kennel were raised, and several prophylaxis measures were taken to avoid other outbreaks. Based on the event, it can be concluded that these diseases have great potential of loss both for the stock health and material and people resources in military kennels. This potential suggests the need of robust and constant prophylaxis measures to avoid/mitigate such loss.

Keywords: Military working dog, Military Veterinarian Service, Viral infectious diseases, CPV-2, CDV.

1 INTRODUCTION

Although the loss caused by viral diseases are relatively frequent in dogs, which live in kennels, the scientific reports on outbreak situations and their consequent discussion are still scarce (PARKER *et al.*, 2017).

Parvovirus (Canine Parvovirus - CPV-2) is a highly contagious disease caused by DNA-virus which belongs to family Parvoviridae, genus Parvovirus. Canine distemper is caused by the

(Canine Distemper Virus - CDV), an RNA-virus which belongs to family Paramyxoviridae, genus Morbillivirus (ANGELO; CICOTI; ZAPPA, 2009; STROTTMANN *et al.*, 2008). prevention, treatment and death pursuant to both diseases are still important factors for expenses in Brazil and other countries, even after several years of scientific reports (TRAPP *et al.*, 2010; ZACARIAS *et al.*, 2016).

Military working dogs are animals with different management, training, work and displacement routine from campaign dogs and shelter dogs, and the literature about the influence of these particularities on the behavior of the infectious diseases in this population is particularly scarce (DA SILVA ARAÚJO *et al.*, 2020).

The purpose of the present paper was to describe an outbreak of parvovirus and canine distemper which affected puppies of dogs born and bred in a military kennel in December 2017 and January 2018.

2 CASE REPORT

Ten females of the breeds German Shepard and Belgian Malinois Shepherd owned by the Federation, duly vaccinated (polyvalent, anti-rabies and canine flu), clean of worms and clinically healthy, were kept in one of the military kennel pavilions. Five of these female animals had natural or artificial insemination pregnancy in the second half-year 2017 and delivered between September and November that year, producing 34 healthy puppies.

The animals were breastfed for 21 days, and after that period, pasty food was given, gradually followed by dry animal feed. The accommodation was cleaned once a day using disinfecting material, soap and sodium hypochlorite, in order to assure good health hygiene of the environment. The vaccination protocol for puppies was composed of polyvalent vaccines (45, 75 and 105 days of life) and anti-rabies (120 days of life).

On December 6, 2017 (D0), four puppies (two 70-day puppies and two 60-day animals) started presenting gastrointestinal symptoms, such as diarrhea, vomiting and anorexia. Anamnesis and physical exam were made, not revealing anything abnormal. By the history of the unit and the clinical signs, the main differential diagnosis suggested at that moment was giardiasis. These animals were submitted to conservative treatment with the intention to eliminate agents that might have caused the condition using vermifuge and antibiotic, promote gastric support with anti-emetic and mucosa protecting agents (Febendazole + Praziquantel – Vermegard®, SID PO for three days; Metronidazole 15mg/kg BID PO; Ranitidine hydrochloride 2mg/kg BID SC; Metoclopramide 0.3 mg/kg TID SC) and to reestablish the hydroelectrolytic balance (intravenous fluid therapy with physiological solution), in addition to nutritional therapy to assure adequate nutrition (Recovery®

2ml at every 2h; Glicofarm® 0.5 mL/kg BID PO Glucose 50% 2ml BID PO, Hidraplex® ad libitum).

On the following day, the animals were reassessed and the symptoms remained unchanged, in addition, five more animals showed the same clinical manifestation. Based on a new physical exam which revealed symptoms of slight dehydration suggesting infection by the disease, parvovirus was considered differential diagnosis. So, feces were collected and sent to the laboratory for viral pathogen search.

The parvovirus diagnosis was confirmed, and thus, new therapeutic measures were adopted to provide support to the animals: change of antibiotics (Ceftriaxone 25 mg/kg BID IV; Sulfamethoxazole + Trimethoprim 15 mg/3 mg/kg BID PO), addition of anti-emetic agent (Ondansetron hydrochloride 0.2 mg/kg BID IV) and change of fluid therapy (Ringer Lactate 20 ml/kg/h with addition of Vitamin C).

In association with the therapy, the animals were isolated and assisted full time, in addition to being supervised regarding nutrition.

On day seven from the beginning of the outbreak, the puppies had clinical symptoms compatible to parvovirus and between day eight and fifteen, five puppies also revealed clinical manifestations of the disease. Only in one litter, at that time already above 120 days of life, there were no sick animals.

Based on that, as preventive method for the supposedly healthy puppies, a vaccine protocol for high-risk stock was adopted according to the world guidelines (DAY *et al.*, 2016), where doses of polyvalent vaccines were administered at every two weeks, considering the potential of high pressure of the infectious disease in the environment in the kennel.

In 28 days' outbreak, twelve animals showed significant improvement of the condition, while four did not respond the treatment adequately and died. In addition, six puppies, the entire youngest litter in the kennel, 44 days old at that time, showed severe clinical manifestations of parvovirus and were diagnosed in laboratory, then, they were submitted to the same therapeutic protocol established above.

On day 30 of the outbreak, the same animals, the last that got sick, started showing neurological symptoms including: focal and generalized seizure, horizontal nystagmus, pedaling movement, pre ictus, sialorrhea and opisthotonos, sign compatible to canine distemper, which was later confirmed in viral antigen detection serological exams by immunochromatographic method.

Based on that, the therapeutic protocol for these animals was altered, antibiotics were changed and antiviral and anticonvulsant agents were added (Ceftriaxone 25 mg/kg BID IV;

Imipenen 5 mg/kg TID SC; Ribavirine 30 mg/kg SID PO; Phenobarbital 3 mg/kg BID PO; Diazepam 2mg/kg IV when necessary).

Between days 38 and 45 of the outbreak, after little response of the animals to the therapeutic protocol, all six animals died.

Figure 1 synthesizes the outbreak chronology graphically containing the most common events, and figure 2 describes the occurrence of sick animals per litter.

Figure 1. Graphic representation of the outbreak of parvovirus and canine distemper in a military kennel between December 2017 and January 2018 containing the main events.

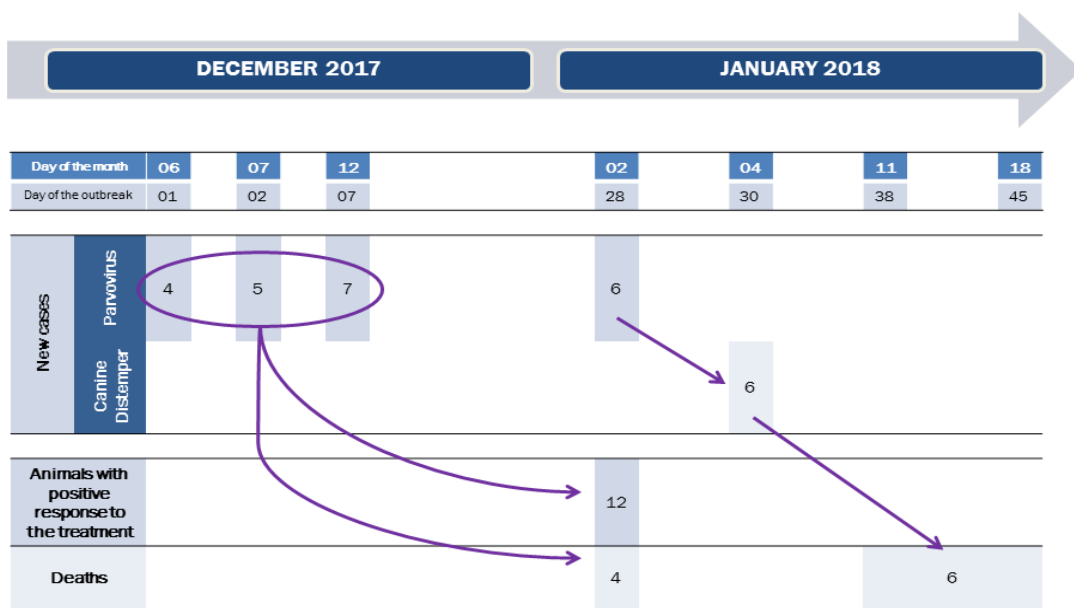
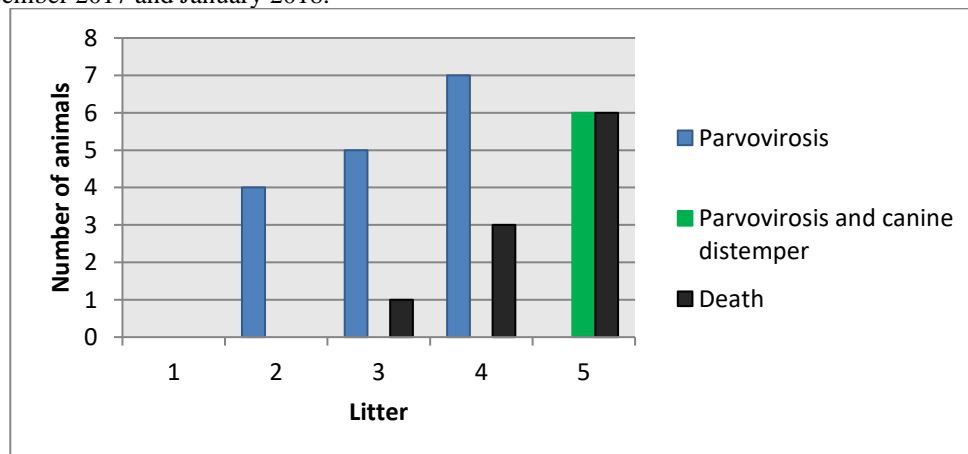


Figure 2. Graph of the distribution of parvovirus and canine distemper cases in the different litters in the military kennel between December 2017 and January 2018.



3 DISCUSSION

Parvovirus presented in the present report was in its classical form, namely, severe gastroenteritis, as reported in literature (LOPES, 2014; VIHINEN-RANTA; SUIKKANEN; PARRISH, 2004). The age of onset of the disease corroborates another study (KELMAN *et al.*, 2020), who affirms that dogs aged less than six months are most susceptible. In this context, and for having received prior polyvalent vaccine (two vaccination doses), the puppies from the older litter (Litter 1) were not affected. In the other litters, all became sick, with higher impact on litter five, the youngest at the time of the outbreak onset (PINTO *et al.*, 2012).

Most animals with parvovirus showed regression of the conditions (12 out of 16 sick animals), recovering the good general state, and finally, they were distributed to the other battalions of the Brazilian armed forces.

Canine distemper may cause systemic, respiratory, skin, bone and/or nervous symptoms (GREENE; DECARO, 2012); however, in the present study, only the neurological symptoms were observed, such as focal and generalized seizures, nystagmus and pedaling movement. In addition, canine *Morbilivirus* is extremely lymphotropic and immunosuppressive for binding to CD150 receptors or SLAM (signaling lymphocytic activation molecule) of lymphoid cells, which frequently results in association with opportunist infections, such as parvovirus (CASWELL; WILLIAMS, 2016; HEADLEY; SAITO, 2003).

In the work of Headley *et al.* (2015), the observed dogs had CDV concomitant to CPV-2, and in the same study, it was possible to find out that co-infection of canine distemper and other diseases occurs mainly in dog puppies, which contributes to the present report. Headley *et al.* (2018) also suggest that the concomitant occurrence of these diseases causes high mortality due to the multiple organ failure.

Based on the particularities of the kennel and activities carried out in that military unit, it is possible to suppose about the epidemiology of the referred virus on site, suspecting (HEADLEY; GRAÇA, 2000):

1. Through external visiting dogs;
 - a. Seven visiting animals, which were participating in a course at the unit in the period from October to December 2017, for which, despite of their vaccine certificates, it was not possible to prove individual immunity;
 - b. Four dogs, which visited the unit for some days during a training for sniffer dog certification between October and November 2017, also with vaccine certificates;
 - c. Twenty dogs, which were at the unit for two days during a test for detection dog certification between in December 2017, also with vaccine certificates;

2. Through fomites justified by the contact of veterinarians, assistants and trainers of the unit with a dog from a prison unit with symptoms of parvovirus, which died in October 2017;

3. Through external wandering dogs, which had access to the military unit area occasionally.

Other factors can be indicated as possible facilitators of the outbreak:

1. The increase of the demand stipulated for reproduction and production of puppies in the year before the outbreak;

2. The lack of an isolated maternity pavilion for the pregnant dogs and the produced puppies;

3. The lack of exclusive management care team for reproduction animals.

Some prophylaxis measures were established at the end of the outbreak, such as building and implementation of foot-bath at the entrance of the kennel and sanitary void for about 6 months. New efforts to build a maternity pavilion isolated from the other facilities were also made.

Another factor that could contribute to the prevention of the outbreak or minimize the sequences therefrom would be preventive effort for vaccination against infectious diseases in pregnant dogs, once studies report that there is increase of maternal immunity transmitted to the puppy through the colostrum, when instituted prior to the fecundation (SÁ, 2002).

Therefore, vaccination is the main effective way to prevent these infectious diseases (SÁ, 2002). However, in case of early vaccination, the maternal antibodies may neutralize the vaccine virus, thus, reducing the efficiency of the development of acquired immunity (DECARO *et al.*, 2005).

4 CONCLUSIONS

As reported and discussed, the animals with viral diseases in the kennel had symptoms compatible to those described in literature for parvovirus and canine distemper, which suggested their early diagnosis and could be confirmed by means of laboratory exams. From this outbreak, possibly pursuant to introduction of the virus by external animals or fomites, and aggravated by the increase in the population density on site, prophylaxis measures were adopted to avoid another exposure of the animals to the virus.

This outbreak report confirms the idea that young and immunodeficient dogs are highly susceptible to canine distemper and parvovirus, and often, both diseases concomitantly. Correct use of polyvalent vaccines in both adult dogs and puppies is extremely important, especially vaccine reinforcement in pregnant dogs.

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