CASE REPORT
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LATERAL FLOW ASSAY AND POLYMERASE CHAIN REACTION BASED DIAGNOSIS AND MANAGEMENT OF FELINE PARVOVIRAL INFECTION IN A PERSIAN KITTEN

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ABSTRACT

Feline parvoviral infection, caused by the highly contagious feline panleukopenia virus (FPV), poses a significant threat to feline populations worldwide. This paper presents a case study detailing the successful diagnosis and management of feline parvoviral infection in a seven-month-old Persian kitten. Diagnostic evaluation was performed using a comprehensive approach including Complete Blood Count (CBC), Lateral flow assay and Polymerase Chain Reaction (PCR). The treatment focused on administering supportive care along with antibiotics. In conclusion, this case study underscores the importance of using appropriate molecular diagnostic techniques like LFA and PCR for timely prompt diagnosis and aggressive supportive care in the management of feline parvoviral infection, infection, particularly in susceptible breeds like Persian cats.

Keywords: Feline parvovirus, Panleukopaenia, PCR, Lateral flow assay

INTRODUCTION

Feline parvoviral infection is a highly contagious viral disease of domestic and wild cats characterized by enteritis and panleukopaenia. The etiological agent is Feline panleukopaenia Virus (FPV), a small, single stranded non enveloped DNA virus categorized within the species Carnivore protoparvovirus 1. Feline panleukopaenia virus primarily targets felids under one year of age, though individuals of any age lacking adequate immunity are susceptible to infection due to the virus's ability to exploit gaps in immunity (Sykes and Parrish, 2024). Transmission occurs primarily through the faecal-oral route, with indirect transmission via contaminated fomites representing the most significant means of infection. Similar to Canine Parvovirus, FPV enters cells via the transferrin receptor

type-1 and replicates within cells that are in the S-phase of the mitotic cycle. Infected cats present with clinical signs such as pyrexia, lethargy, vocalization, asthenia, anorexia, potentially culminating in profound dehydration, emesis, occasionally watery to haemorrhagic enteritis, and rapid weight deterioration. During late gestation or in neonates up to one week old, FPV-induced destruction of Purkinje cells and granule precursor cells in the cerebellar external granular layer results in cerebellar hypoplasia.

The feline panleukopenia virus induces immunosuppression by infecting lymphoid tissues, resulting in cellular depletion. Neutropenia can occur due to various factors, such as heightened tissue utilization or loss surpassing bone marrow production, diminished bone marrow function, or neutrophil sequestration. A single cause like endotoxemia may also contribute to this condition. Viral infections, septicaemia, endotoxemia, lymphocyte-rich thoracic effusions, and certain gastrointestinal ailments represent the predominant factors contributing to lymphopenia. Commonly employed tools for diagnosing FPV include; Haematology, Lateral Flow Assay (LFA), Conventional PCR, Elisa, Recombinase polymerase amplification assay with lateral flow dipstick, Faecal electron microscopy and virus isolation in cell cultures (Awad *et al*., 2018; Haryanto and Raj, 2020; Priambudi *et al*., 2022; Wang *et al*., 2019).

CASE HISTORY AND OBSERVATIONS

A seven-month-old unvaccinated, female persian kitten was presented to Teaching Veterinary Clinical Complex, Mannuthy, Thrissur, Kerala with the complaint of hyporexia for past one week. On general inspection, the animal was found to be dull and inactive (Fig. 1). On clinical examination, no significant changes in the vital parameters were found. CBC, faecal sample analysis, blood smear examination, LFA and PCR (for FPV) were performed to identify the etiology. The blood smear examination yielded negative results for the presence of haemoparasites. CBC revealed panleukopaenia and thrombocytopaenia. LFA for FPV antigen in the faecal sample demonstrated a positive result, indicating the presence of the FPV virus (Fig. 2). DNA was extracted from faecal sample using a commercial stool DNA extraction kit (QIAmp DNA Mini Kit) according to the manufacturer instruction and the PCR reaction was carried out, as detailed by Carreno *et al*. (2021). The primers [F1-TGGTTGATGCAAATGCTTGGG and F2 AACCAACCTCAGCTGGTCTC], were specifically chosen for their ability to produce an amplicon of 681 base pairs. Polymerase Chain Reaction was performed

which yielded 681 bp product suggestive of FPV (Fig. 3). The protocol of PCR was as follows (Table 1 and Table 2).

TREATMENT AND DISCUSSION

Table 1- Composition of PCR mix

Master mix	12.5 µL
Forward Primer	1 µL
Reverse Primer	1 µL
NFW	5.5 µL
Template DNA	5 µL
Total volume	25 µL

Table 2- PCR reaction

Initial denaturation	94°C, 2 minutes	
Denaturation	94°C, 30 seconds	40 cycles
Annealing	55°C, 1 minute	
Extension	72°C, 1 minute	
Final extension	72°C, 10 minutes	

Feline parvoviral infection was diagnosed based on the results of LFA, PCR and CBC. Being a viral disease, no targeted antiviral treatment was prescribed. Therapeutic approaches prioritizing the mitigation of secondary bacterial infections and the provision for symptomatic relief via supportive care modalities were advised. Parenteral therapy with amoxicillin-sulbactam (12.5 mg/kg, q 12 hours), pantoprazole (1mg/kg, q 24 hours), DNS (5ml/kg) and RL (5ml/kg) were administered for five days. Within 3 days, the animal started showing improvement in activity and feed and made an uneventful recovery by the end of therapy.

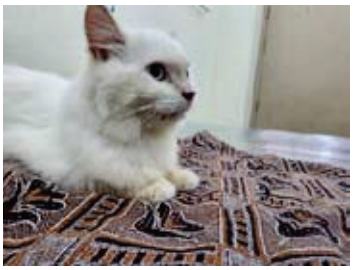

Fig 1- Seven-month-old kitten with FPV

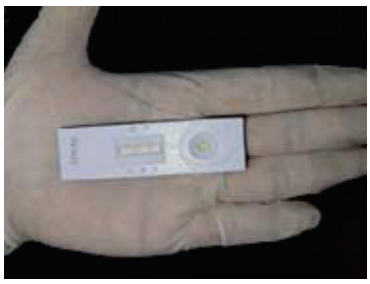

Fig 2- LFA demonstrating positive for FPV

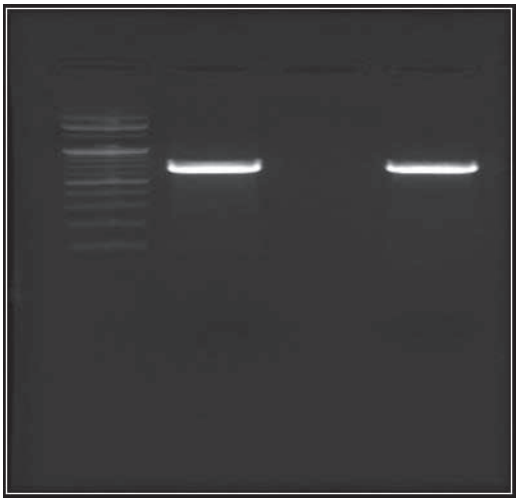

Fig 3- Amplification of VP2 gene of FPV by PCR. The PCR reactions yielded the expected products of 681 bp. (*Lane 1- 100bp DNA ladder; lane 2- Test sample; Lane 4- Positive control***)**

FPV poses a significant threat to young animals due to its high mortality and morbidity rates (Barrs, 2019). Cats infected with the virus succumb to complications arising from secondary bacterial infections,

sepsis, dehydration, and disseminated intravascular coagulopathy (DIC). Cats demonstrating clinical symptoms such as hypothermia, vomiting, dysentery, and dehydration are anticipated to have an elevated mortality rate (Riya *et al*., 2020). To date, no targeted antiviral therapy for FPV infection in cats has undergone clinical trials, necessitating reliance on supportive care for management. Given the frequent disruption of the gastrointestinal barrier, resulting in potential translocation of intestinal bacteria into the bloodstream, coupled with neutropenia predisposing to sepsis in immunocompromised subjects, proactive prevention of sepsis is imperative in all cases. For effective management, a broad-spectrum antibiotic regimen demonstrating efficacy against Gram-negative anaerobic bacteria is advocated. A suitable combination for feline panleukopenia involves amoxicillin-clavulanic acid paired with a third-generation cephalosporin (Hartmann, 2017). Early and timely diagnosis is imperative for effective disease management and containment, vital in halting the dissemination of FPLV. Raheena *et al*. (2017) found that, PCR is a sensitive, specific and rapid technique for FPV detection, while sensitivity of LFA is poor.

SUMMARY

In this case study, the diagnosis of feline panleukopenia in a 7-month-old Persian cat was established through comprehensive evaluation including history, clinical signs, LFA, CBC and PCR. Successful treatment was achieved through the administration of antibiotics and fluid therapy. The integration of, PCR, and lateral flow assay proved instrumental in facilitating accurate early diagnosis and guiding appropriate therapeutic interventions, ultimately leading to a favourable outcome in this clinical case. This necessitates the need for establishing an in-house molecular laboratory and emphasizing the use of pen-side diagnostics in current-day veterinary practice.

Conflict of interest

The authors declare that they have no conflict of interest.

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