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COINFECTION OF *FELINE PANLEUKOPENIA* AND *MYCOPLASMA HAEMOFELIS* IN A DOMESTIC CAT AT BOBON VET CLINIC

Koinfeksi *Feline panleukopenia* dan *Mycoplasma haemofelis* pada Seekor Kucing Domestik di Bobon Vet Clinic

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Abstract

Coinfection of Feline Panleukopenia Virus (FPV) and *Mycoplasma haemofelis* can exacerbate feline health conditions due to the combined effects of immunosuppression and hematological disorders. FPV targets lymphoid tissues and bone marrow, resulting in leukopenia, whereas *Mycoplasma haemofelis* adheres to erythrocytes and induces hemolytic anemia. The coinfection of these two pathogens leads to a significant decline in immunity, rendering cats highly susceptible to opportunistic infections and worsening disease progression. This case report describes the diagnosis and management of FPV and *Mycoplasma haemofelis* coinfection in a domestic male cat named Milky, which presented with lethargy, fever, and dyspnea. Diagnostic procedures included anamnesis, physical examination, FPV rapid test, and blood smear examination, which revealed low-grade *Mycoplasma haemofelis* parasitemia (1-3 infected erythrocytes per microscopic field). Treatment consisted of supportive and symptomatic therapy administered for 11 days, including intravenous fluid therapy (Asering and Ringer Lactate), doxycycline and cefixime as antibiotics, meloxicam and tolfenamic acid as anti-inflammatory agents, and metabolase, fufang, neuroboran, and felcover as hematological supplements. This case highlights the importance of comprehensive diagnostic evaluation and appropriate supportive and symptomatic management in cats with coinfection of Feline panleukopenia virus (FPV) and *Mycoplasma haemofelis*, as well as the need for early detection and long-term monitoring.

Keywords: coinfection, domestic cat, *feline panleukopenia virus*, *Mycoplasma haemofelis*

Abstrak

Koinfeksi *Feline Panleukopenia Virus* (FPV) dan *Mycoplasma haemofelis* dapat memperburuk kondisi kesehatan kucing akibat kombinasi imunosupresi dan gangguan hematologi. FPV menyerang jaringan limfoid dan sumsum tulang sehingga menimbulkan leukopenia, sedangkan *Mycoplasma haemofelis* menempel pada eritrosit dan memicu anemia hemolitik. Koinfeksi

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kedua patogen ini menyebabkan penurunan imunitas yang signifikan, menjadikan kucing rentan terhadap infeksi oportunistik lain dan memperberat perjalanan penyakit. Laporan kasus ini bertujuan mendeskripsikan diagnosis dan penanganan koinfeksi FPV dan *Mycoplasma haemofelis* pada seekor kucing domestik jantan bernama Milky yang menunjukkan gejala lemas, demam, dan sesak napas. Pemeriksaan dilakukan melalui anamnesis, pemeriksaan fisik, rapid test FPV, serta pemeriksaan ulas darah yang menunjukkan parasitemia *Mycoplasma haemofelis* derajat rendah. Penanganan dilakukan selama 11 hari melalui terapi suportif dan simptomatik yang meliputi pemberian cairan intravena (Asering dan Ringer Lactate), antibiotik doksisiklin dan cefixime, antiinflamasi meloxicam dan tolfenamic acid, serta suplemen hematologi berupa Metabolase, Fufang, Neuroboran, dan Felcover. Kasus ini menekankan pentingnya pendekatan diagnosis yang komprehensif serta pemberian terapi suportif dan simptomatik yang tepat pada kucing dengan koinfeksi Feline panleukopenia virus (FPV) dan *Mycoplasma haemofelis*, serta pentingnya deteksi dini dan pemantauan jangka panjang.

Kata kunci: *feline panleukopenia* virus, *Mycoplasma haemofelis*, koinfeksi, kucing domestik

INTRODUCTION

Feline panleukopenia is a highly contagious viral disease that commonly affects domestic cats (Purnamaningsih *et al*., 2020). The causative agent, *feline panleukopenia virus* (FPV), belongs to the family *Parvoviridae* (Maharani *et al*., 2025). The virus primarily targets rapidly dividing cells, resulting in lesions mainly affecting the bone marrow, lymphoid tissues, and intestinal crypt epithelium (Abhijith *et al*., 2025). FPV infection most commonly occurs in unvaccinated kittens aged 2–6 months, with risk factors including high population density, poor environmental sanitation, and contact with infected cats (Pacini *et al*., 2023). Common clinical manifestations include fever, anorexia, vomiting, hemorrhagic diarrhea, leukopenia, and dehydration (Syarifuddin *et al*., 2025). These conditions may lead to immunosuppression, increasing the susceptibility of affected cats to various secondary infections (Irgashev *et al*., 2023).

Coinfections in cats with *feline panleukopenia* have been widely reported and may involve a variety of pathogenic agents. These include enteric bacteria such as *Clostridium perfringens*, *Clostridium piliforme*, and *Salmonella spp.*, protozoa such as *Cryptosporidium spp.*, *Giardia spp.*, and *Tritrichomonas foetus*, as well as other viruses, including *canine parvovirus type 2*, *feline bocavirus*, *feline astrovirus*, and *feline coronavirus* (Putri & Wahyuwardani, 2022). These reports indicate that immunosuppression associated with FPV infection may increase susceptibility to secondary infections, potentially exacerbating the clinical condition of affected cats.

One opportunistic infection that may further compromise affected cats is *Mycoplasma haemofelis*, a hemotropic bacterium that attaches to erythrocytes and can induce hemolytic anemia in cats (Strandberg *et al*., 2023). Infection may be characterized by pale mucous membranes, lethargy, fever, anorexia, and icterus (Ferraz *et al*., 2024). This case report aimed to describe the clinical manifestations, diagnostic approach, treatment, and outcome of a domestic cat coinfected with FPV and *M. haemofelis*. This report is expected to contribute to the existing literature on coinfections in cats and provide a reference for the management of similar cases in veterinary practice. Documentation of this case may also increase awareness of potential coinfections, emphasize the importance of vaccination, and support the use of comprehensive diagnostic approaches in veterinary practice.

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RESEARCH METHODS

Study Location

This case report was conducted at Bobon Vet Clinic, Bogor, West Java, Indonesia, from October 25 to November 4, 2025. The case involved a four-month-old female domestic cat named Milky that underwent clinical examination, diagnostic testing, and treatment during hospitalization.

Case History and Anamnesis

Milky, a four-month-old female domestic cat weighing 1 kg, was presented to Bobon Vet Clinic with lethargy, fever that had developed one day before presentation, and difficulty breathing. The cat was kept exclusively indoors and had never been vaccinated or dewormed. There was no previous history of medical treatment.

Physical Examination

Physical examination revealed a body temperature of 39.7 °C, a skin turgor time of >3 seconds, and a capillary refill time of >2 seconds. The oral and ocular mucous membranes appeared pale, with slight jaundice observed on the pinnae. Abdominal palpation revealed no crepitus. The cat had a good appetite and was observed sneezing several times.

Rapid Antigen Test

A Vet Diagnostix® Rapid FPV Ag Test Kit (Hangzhou EVEGEN Biotech, Hangzhou, China) was used to detect FPV antigen using a rectal swab. A sterile cotton swab was inserted into the rectum to collect fecal material, which was then mixed with the provided buffer solution and allowed to stand for several moments. Subsequently, 3-4 drops of the supernatant were applied to the sample well of the test device. Detection occurred as the supernatant migrated along the test strip containing the control (C) and test (T) regions. The result was interpreted approximately 5-10 minutes after application (Nofira *et al*., 2022).

Blood Smear Examination

A thin blood smear was prepared on a glass slide and fixed with methanol to preserve cellular morphology and minimize artifacts. The smear was stained using a combination of eosin and *methylene blue*. Eosin, an acidic dye, stains cytoplasmic components red, whereas *methylene blue*, a basic dye, highlights cell nuclei blue. This combination provides clear contrast between the nuclei and cytoplasm, facilitating the identification of blood cell morphology and the detection of parasites or hematological abnormalities. Microscopic examination was performed using an Olympus CX23 light microscope at 1000× magnification with immersion oil.

RESULTS AND DISCUSSION

Results

The clinical findings observed during physical examination of Milky included a body temperature of 39.7 °C. According to Putra *et al*. (2024), the normal body temperature of cats ranges from 37.8 to 39.2 °C; therefore, Milky's body temperature was considered febrile. Milky remained responsive but appeared lethargic and showed reduced movement and activity. The rapid antigen test yielded a positive result, indicated by the appearance of two red bands at the T and C lines (Figure 1). Blood smear examination revealed the presence of *M. haemofelis*, which appeared attached to erythrocytes, with a low degree of parasitemia, approximately 1-3 infected erythrocytes per microscopic field at 1000× magnification. The erythrocytes also exhibited anisocytosis while maintaining a normochromic appearance (Figure 3).

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Diagnosis and Prognosis

Based on the physical examination, positive rapid antigen test for FPV, and blood smear examination, Milky was diagnosed with feline panleukopenia associated with *M. haemofelis* infection. Based on the clinical condition and response to treatment, the prognosis was considered favorable.

Treatment

Milky received treatment during an 11-day hospitalization period. On the first day (October 25, 2025), intravenous fluid therapy was administered using Asering at a volume of 167 mL. Antibiotic therapy consisted of cefixime at a dose of 22 mg/kg body weight administered orally twice daily (b.i.d.) for seven days and doxycycline at a dose of 15 mg/kg body weight administered orally twice daily (b.i.d.) for four days. Hematological supplements were also administered, including Metabolase® at a dose of 0.54 mL/kg body weight orally twice daily (b.i.d.) for 11 days, Fufang Ejiao Jiang® (Dong-E-E-Jiao Co., Ltd., China) at a dose of 0.54 mL/kg body weight orally twice daily (b.i.d.) for 11 days, Neuroboran® at a dose of 0.1 mL/kg body weight orally once daily (s.i.d.) for one day, and Felcover® at a dose of 1 tablet/kg body weight orally once daily (s.i.d.) for one day.

On the second and third days of hospitalization (October 26–27, 2025), intravenous fluid therapy with Asering was continued at 157 mL per day. On the second day, meloxicam at a dose of 0.162 mg/kg body weight and Tolvet® (tolfenamic acid) at a dose of 1.08 mg/kg body weight were administered intramuscularly once daily (s.i.d.). Methylprednisolone was also administered orally at a dose of 1.08 mg/kg body weight once daily (s.i.d.).

On the fourth day of hospitalization, the patient developed vomiting, prompting an adjustment of the treatment regimen. Methylprednisolone was administered at a dose of 1.08 mg/kg body weight, while Tolvet® (tolfenamic acid) was administered orally at a dose of 4.32 mg/kg body weight once daily (s.i.d.) for one day.

On the seventh day of hospitalization, the patient's clinical condition deteriorated, characterized by swelling of the tarsal and carpal joints and the paws, along with suspected permanent deformity of the left carpal joint. An open wound was also observed on the paw. Based on these clinical developments, the treatment was adjusted by administering 100 mL of Ringer's lactate solution intravenously over one day. Wound management was also performed using Genoint® ointment applied topically to the affected area.

Subsequently, the patient's clinical condition improved, as indicated by a reduction in recurrent fever, improved hydration status, and restoration of appetite. Milky was discharged on the 11th day of hospitalization. The patient's condition after discharge was unknown because no further follow-up evaluation was performed.

Discussion

The coinfection of FPV and *M. haemofelis* in Milky resulted in a complex clinical course. FPV causes immunosuppression, thereby increasing susceptibility to secondary infections (Putri & Wahyuwardani, 2022). Meanwhile, *M. haemofelis* is a hemotropic bacterium that attaches to the surface of erythrocytes and can induce hemolytic anemia, further compromising the systemic condition of affected cats (Strandberg *et al*., 2023). The combined effects of these two pathogens may explain the recurrent fever, anorexia, weakness, and pale mucous membranes observed during hospitalization.

Fecal examination using a rapid FPV antigen test yielded a positive result (Figure 1). This method was selected because it enables rapid detection of FPV antigen using a lateral flow

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immunochromatographic assay (LFA) (Safwat *et al*., 2026). The rapid test works by allowing the sample to flow through a conjugate pad containing labeled antibodies. These antibodies bind to FPV antigens to form antigen-antibody complexes, which then migrate along the membrane and produce a positive line in the test region. The relatively high sensitivity and specificity of rapid tests make them practical screening tools for supporting the initial diagnosis of FPV infection (Jacobson *et al*., 2021).

Blood smear examination revealed approximately 1–3 erythrocytes infected with *M. haemofelis* per microscopic field at 1000× magnification. This finding indicated a low level of parasitemia, with an estimated parasitemia of <1% of erythrocytes, based on the proportion of infected erythrocytes relative to the total number of erythrocytes observed in several representative microscopic fields. Nevertheless, blood smear examination has limited sensitivity because *M. haemofelis* parasitemia can fluctuate throughout the course of infection. Therefore, PCR remains a more sensitive method for confirmation (Ferraz *et al*., 2024). Identification of *M. haemofelis* was based on its characteristic morphology, consisting of small round to oval organisms attached to the erythrocyte surface and appearing darker than the erythrocyte cytoplasm following Giemsa or Wright staining (Ameldev & Tresamol, 2017).

The clinical manifestations of swelling of the tarsal and carpal joints and paws, accompanied by an open wound and bruising, may have resulted from an inflammatory process that developed during the course of the disease. The suspected permanent deformity of the left carpal joint suggests that musculoskeletal complications may occur in patients with severe systemic disease, although these are not primary manifestations of either FPV or *M. haemofelis* infection. The positive FPV antigen rapid test together with the detection of *M. haemofelis* on blood smear further supported the diagnosis of coinfection. This finding is consistent with Ayub *et al*. (2026), who reported that FPV and *M. haemofelis* coinfection may exacerbate disease progression through immunosuppression and anemia, requiring intensive supportive treatment and continuous clinical monitoring.

Treatment in this case focused on supportive and symptomatic therapy to maintain the patient's physiological condition, control secondary infections, reduce excessive inflammatory responses, and promote recovery. Fluid therapy using Asering and Ringer's lactate was administered intravenously to correct dehydration, maintain fluid and electrolyte balance, improve tissue perfusion, and support circulation in a patient experiencing anorexia, vomiting, and fluid loss. Fluid therapy is a cornerstone of feline panleukopenia management because no specific antiviral treatment against FPV is currently available, making optimal supportive care essential for successful clinical management.

Doxycycline was selected as the primary antibiotic against *M. haemofelis* because this tetracycline-class antibiotic has activity against hemotropic mycoplasmas by inhibiting bacterial protein synthesis through binding to the 30S ribosomal subunit (Tasker *et al*., 2018). Meanwhile, cefixime, a third-generation cephalosporin, was administered to help control opportunistic bacterial infections that could potentially develop as a consequence of FPV-associated immunosuppression. The use of both antibiotics was intended to suppress bacterial infection and support clinical recovery.

Inflammation was managed using meloxicam, methylprednisolone, and Tolvet®, which contains tolfenamic acid. Meloxicam and tolfenamic acid are non-steroidal anti-inflammatory drugs (NSAIDs) that inhibit cyclooxygenase (COX) enzymes, thereby reducing prostaglandin synthesis involved in inflammation, pain, and fever (Mechery *et al*., 2021). Methylprednisolone, a corticosteroid, was administered according to the patient's clinical progression to help control excessive inflammatory responses and reduce tissue edema.

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Supportive treatment was supplemented with Metabolase® (PT Swadesi Candrasentosa, Indonesia), Fufang®, Neuroboran®, and Felcover® during hospitalization. These supplements were intended to support metabolism, hematopoiesis, and the patient's overall condition and to promote recovery from anorexia, anemia, and physical deterioration associated with FPV and *M. haemofelis* infection. Adequate nutritional and metabolic support is an important component of supportive care because it may help maintain the patient's physiological condition and response to treatment during recovery.

Additional symptomatic treatment with metoclopramide was administered to control nausea and vomiting through antagonism of dopamine D_2 receptors in the chemoreceptor trigger zone, thereby improving patient comfort and facilitating oral nutritional support. Gabapentin was administered as an adjunctive analgesic to help alleviate pain and provide mild sedation, thereby improving patient comfort during hospitalization (Gölgeli *et al*., 2025). Wound management was performed using Genoint® ointment applied topically to the open wound to maintain wound hygiene, promote tissue healing, and reduce the risk of secondary bacterial infection.

The improvement in clinical condition, characterized by reduced fever, improved hydration status, increased appetite, and eventual discharge on the 11th day of hospitalization, suggests a favorable clinical response to the combination of supportive, symptomatic, and antibiotic therapies. However, the patient's condition after discharge could not be evaluated because no follow-up examination was performed. Therefore, the long-term clinical outcome of this case remains unknown.

CONCLUSION AND SUGGESTIONS

Conclusion

This case demonstrates that coinfection with *feline panleukopenia virus* (FPV) and *Mycoplasma haemofelis* in a domestic cat may result in clinical manifestations including recurrent fever, anorexia, pale mucous membranes, weakness, and complications such as joint swelling and wounds affecting the extremities. A diagnostic approach involving a rapid FPV antigen test and blood smear examination supported the identification of both infectious agents. Management consisting of supportive, symptomatic, antibiotic, and anti-inflammatory therapies, together with wound care, resulted in clinical improvement, allowing the patient to be discharged after 11 days of hospitalization. This case report provides additional information on the diagnostic and therapeutic approaches to FPV and *M. haemofelis* coinfection in domestic cats and may serve as a reference for the management of similar cases in veterinary practice.

Suggestions

In cases suspected of *feline panleukopenia virus* (FPV) infection, evaluation for potential concurrent infections, including *Mycoplasma haemofelis*, should be considered to improve diagnostic accuracy and guide appropriate treatment. In addition, clinical follow-up after discharge is recommended to evaluate the treatment outcome and monitor the patient's subsequent clinical progression.

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Figures

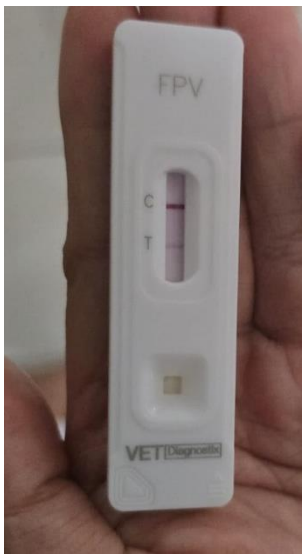

Figure 1. Results of the rapid antigen test.

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Figure 2. Joint swelling and a wound on the paw.

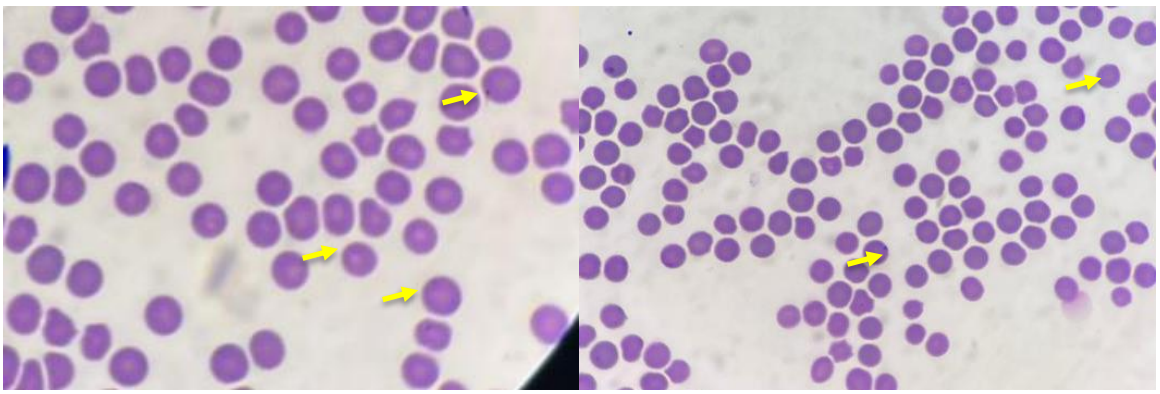

Figure 3. *Mycoplasma haemofelis* detected on blood smear examination.