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CHYLOTHORAX IN DOMESTIC CAT WITH FELINE INFECTIOUS PERITONITIS: A CASE REPORT

Chylothorax pada Kucing Domestik dengan *Feline Infectious Peritonitis*: Laporan Kasus

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Abstract

Chylothorax is the accumulation of chyle within the pleural cavity and may occur secondary to lymphatic dysfunction. *Feline Infectious Peritonitis* (FIP) can rarely contribute to this condition through immune-mediated vasculitis and disruption of lymphatic drainage. This case report describes the diagnosis and management of chylothorax associated with FIP in a 7-year-old neutered male domestic cat presented with dyspnea, tachypnea, shallow abdominal breathing, and decreased appetite. Clinical examination, hematological analysis, rapid FIP antibody testing, thoracic radiography, thoracocentesis, and cytological evaluation were performed using a Problem Oriented Approach (POA). Hematological findings revealed leukocytosis, lymphocytosis, granulocytosis, and anemia, indicating systemic inflammation. The FIP antibody test was positive, supporting the suspicion of FIP. Thoracic radiography demonstrated pleural effusion, while thoracocentesis yielded milky-white fluid consistent with chyle. Cytological examination revealed neutrophils, macrophages, lymphocytes, and several bacteria, supporting the diagnosis of chylothorax associated with chronic inflammatory processes. Treatment consisted of antiviral GS-441524, followed by oral molnupiravir, together with cefotaxime, furosemide, aminophylline, and supportive therapy. Clinical improvement was observed during hospitalization, characterized by improved appetite, stabilization of respiratory function, and reduction of pleural effusion on follow-up radiography. This case highlights the importance of a systematic diagnostic approach and early antiviral intervention in achieving favorable outcomes in cats with FIP-associated chylothorax.

Keywords: Feline Infectious Peritonitis, chylothorax, pleural efussion, dyspnea

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Abstrak

Chylothorax merupakan kondisi yang ditandai dengan akumulasi cairan limfa (chyle) di dalam rongga pleura dan dapat terjadi akibat gangguan sistem limfatik. *Feline Infectious Peritonitis* (FIP) merupakan penyakit yang disebabkan oleh mutasi *Feline Coronavirus* (FCoV) dan pada kasus yang jarang dapat berkontribusi terhadap terjadinya chylothorax melalui mekanisme vaskulitis imun-mediasi dan gangguan drainase limfatik. Laporan kasus ini menjelaskan diagnosis dan penanganan chylothorax yang berasosiasi dengan FIP pada seekor kucing domestik jantan steril berumur tujuh tahun yang menunjukkan gejala dispnea, takipnea, pola pernapasan abdominal dangkal, serta penurunan nafsu makan. Pemeriksaan yang dilakukan meliputi pemeriksaan klinis, analisis hematologi, uji cepat antibodi FIP, radiografi toraks, thoracocentesis, dan pemeriksaan sitologi dengan pendekatan *Problem Oriented Approach* (POA). Hasil pemeriksaan hematologi menunjukkan leukositosis, limfositosis, granulositosis, dan anemia yang mengindikasikan adanya proses inflamasi sistemik. Hasil uji antibodi FIP menunjukkan hasil positif yang mendukung dugaan FIP. Radiografi toraks menunjukkan adanya efusi pleura, sedangkan thoracocentesis menghasilkan cairan berwarna putih susu yang konsisten dengan chyle. Pemeriksaan sitologi menunjukkan adanya neutrofil, makrofag, limfosit, serta beberapa bakteri yang mendukung diagnosis chylothorax akibat proses inflamasi kronis. Terapi yang diberikan meliputi antiviral GS-441524, molnupiravir, cefotaxime, furosemide, aminophylline, dan terapi suportif. Selama masa perawatan, kondisi klinis pasien menunjukkan perbaikan yang ditandai dengan peningkatan nafsu makan, stabilisasi fungsi respirasi, serta penurunan efusi pleura pada evaluasi radiografi. Kasus ini menegaskan pentingnya pendekatan diagnostik yang sistematis dan intervensi antivirus dini untuk meningkatkan keberhasilan terapi pada kucing dengan chylothorax yang berasosiasi dengan FIP.

Keywords: *Feline Infectious Peritonitis*, Chylothorax, efusi pleura, dyspnea

INTRODUCTION

Feline Infectious Peritonitis (FIP) is a disease caused by a genetically mutated form of *Feline Coronavirus* (FCoV). FCoV is an enteric virus that primarily infects cats. FIP is a progressive systemic disease that is frequently fatal in affected felines. Under normal circumstances, FCoV typically causes mild infections of the gastrointestinal tract. However, under certain conditions, the virus may undergo genetic mutations that increase its pathogenicity, enabling it to infect immune cells, particularly macrophages, and subsequently induce a severe systemic disease (Kennedy, 2020).

The pathogenic FIP virus triggers immune response characterized by immune complex formation and excessive pro-inflammatory cytokine activation. This process causes widespread vasculitis, resulting in tissue damage and the development of either body cavity effusions (effusive form) or granulomatous lesions (non-effusive form) (Felten & Hartmann, 2019). Although FIP is not a direct cause of chylothorax, inflammation and vasculitis involving the thoracic duct may disrupt lymphatic drainage, increase intraluminal pressure, and promote chyle leakage into the pleural cavity. Consequently, chylothorax may occur as a secondary complication of systemic inflammation-associated lymphatic dysfunction (Savary et al., 2001).

Chylothorax is the accumulation of lymphatic fluid (chyle) within the pleural cavity due to disruption of the thoracic duct system. Chyle is a lipid-rich lymphatic fluid containing high levels of triglycerides and lymphocytes from the intestinal lymphatic circulation. This condition is a relatively common cause of pleural effusion and may occur idiopathically or secondary to other diseases. Clinically, chylothorax can cause progressive respiratory

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compromise due to pulmonary compression, while chronic cases may lead to pleural fibrosis and restricted lung expansion (Imayakeerthana et al., 2025).

The high fatality rate and diagnostic challenges associated with *Feline Infectious Peritonitis* (FIP) make it one of the most feared diseases in cats. Therefore, a comprehensive understanding of the etiology, pathogenesis, diagnosis, and treatment of FIP is essential to improve therapeutic success and support efforts to enhance the health and welfare of companion cats. The uniqueness of this case report lies in the occurrence of chylothorax associated with FIP, a rare clinical presentation that provides valuable insights into safe and effective management strategies for this high-risk viral disease.

MATERIALS AND METHOD

Signalement and Anamnesis

A 7-year-old neutered male domestic cat weighing 3.9 kg was presented on 15 February 2026 with dyspnea and decreased appetite. The cat had routine deworming, ectoparasite prevention, and complete vaccination history.

Clinical Examination

The cat's body temperature was 38.4°C, respiration rate of 52 breath/min, heart rate of 140 beats/min, CRT and skin turgor <2 seconds, shallow abdominal breathing, decreased rhonchi sounds, and evidence of pleural fluid accumulation.

Hematological Analyses

Blood samples were collected from the cephalic vein into EDTA tubes and analyzed using a hematology analyzer to obtain complete blood count (CBC) data, including erythrocyte indices, leukocyte differential counts, and platelet counts. CBC provides information on blood cell types, counts, maturation status, and morphological abnormalities and may be supplemented for a comprehensive hematologic assessment (MacNeill & Barger, 2024)

Rapid Test Kit Examination

An FIP antibody test was performed based on clinical signs and medical history. Blood was collected from the cephalic vein into an EDTA tube, centrifuged to obtain plasma, and 10–80 µL of plasma was applied to the FIP test cassette with the provided buffer reagent. Results were interpreted within 10–15 minutes using an immunochromatographic immunoassay to detect anti-FIP antibodies in *feline* blood samples (Paltrinieri et al., 2001).

Thoracic Radiography

Thoracic radiographic examination was performed using left-lateral (LL) and ventro-dorsal (VD) projections to evaluate the thoracic cavity and detect pathological conditions such as pleural effusion, pneumonia, pulmonary edema, pulmonary neoplasia, thoracic trauma, cardiac disease, and respiratory disorders including bronchitis and asthma (Hung et al., 2022).

Thoracocentesis and Cytological Examination

Cytological examination was performed on pleural fluid collected via thoracocentesis at the 7th and 8th intercostal spaces. The procedure was conducted under aseptic conditions with the cat in lateral or sternal recumbency, and the needle was inserted along the cranial rib border to avoid damage to intercostal vessels and nerves (Toliu et al., 2025). The collected fluid was analyzed cytologically using Diff-Quik staining and examined under a microscope at 1000× magnification to assess cellular composition, determine the cause of pleural effusion, and guide appropriate therapy.

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RESULT AND DISCUSSION

Result

Hematological findings revealed leukocytosis with lymphocytosis and granulocytosis (Table 1) indicating systemic inflammation, acute inflammatory response, and immune stimulation against viral infection (Fatra et al., 2025). The FIPV test was positive indicating the detection of antibodies against FIPV in the plasma, which supported the clinical suspicion of FIP (Figure 1). Effusive FIP commonly causes pleural and abdominal effusion. In this case, thoracic radiography showed ventral thoracic fluid opacity (Figure 2). FIP-associated vasculitis may damage lymphatic vessels and inflame the thoracic duct, causing lymphatic leakage into the pleural cavity. Thoracocentesis was performed for diagnostic and therapeutic purposes, yielding milky-white, glistening fluid consistent with chyle due to its high triglyceride content (Figure 3). Cytology revealed neutrophils, macrophages, lymphocytes, and several bacteria associated with tissue inflammation (Johnson et al., 2023) (Figure 4). The cat was diagnosed with chylothorax, presumptively secondary to *Feline Infectious Peritonitis* (FIP). The prognosis was assessed as favorable (*fausta*). Thoracic radiographic evaluation performed on day 14 of treatment revealed a marked reduction in pleural effusion, accompanied by improved delineation of the cardiac silhouette, consistent with progressive resolution of pleural fluid accumulation following therapy (Figure 5).

Treatment

Treatment included antiviral GS-441524 (15 mg/kg SC q24h, 7 days), a nucleoside analog inhibiting viral RNA replication (Gokalsing et al., 2025), followed by molnupiravir (15 mg/kg PO q12h for 84 days) starting after antiviral injection to support clinical remission (Sase, 2023). Cefotaxime (40 mg/kg IV q24h, 7 days) was administered for secondary bacterial infection, while furosemide (4 mg/kg PO q12h, 7 days) reduced fluid accumulation and aminophylline (10 mg/kg PO q12h, 7 days) served as a bronchodilator (Wang & Shen, 2018; Papich, 2021). Supportive therapy included fluid therapy Ringer Lactat® (IV, 7 days) and Transfer Factor® (1 capsule/day, 7 days), isolation, and clinical monitoring.

Discussion

The Problem Oriented Approach (POA) began with the identification of the primary clinical problem, namely tachypnea accompanied by shallow abdominal breathing. These clinical findings guided the development of differential diagnoses based on the organ systems and pathophysiological mechanisms potentially involved, including pleural effusion, pulmonary disease, systemic infection, cardiomyopathy, neoplasia, and thoracic trauma. Because similar clinical signs may arise from a variety of disease processes, a stepwise diagnostic workup was required to narrow the differential diagnoses. Thoracic radiography revealed pleural effusion, characterized by increased soft tissue opacity within the thoracic cavity and retraction of the pulmonary lobes. However, as imaging alone could not determine the specific etiology of the effusion, thoracocentesis was performed as both a diagnostic and therapeutic procedure to obtain pleural fluid samples for further evaluation (König et al., 2019; Hung et al., 2022).

Thoracocentesis yielded a milky-white fluid consistent with chyle, supporting a diagnosis of chylothorax. This finding was further supported by cytological examination, which revealed a predominance of inflammatory cells, and hematological analysis showing leukocytosis indicative of systemic inflammation or infection. Within the framework of the Problem Oriented Approach (POA), Feline Infectious Peritonitis (FIP) was considered an important differential diagnosis because it can cause body cavity effusions through immune-mediated vasculitis and increased vascular permeability. The positive rapid test result demonstrating the

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presence of anti-FIPV antibodies in plasma further strengthened the suspicion of FIP involvement in this case. Therefore, the combination of pleural effusion on radiography, chylous fluid obtained by thoracocentesis, leukocytosis, inflammatory cell predominance on cytology, and positive serological findings supported a diagnosis of FIP-associated chylothorax (Imayakeerthana et al., 2025).

Feline Infectious Peritonitis (FIP) is a progressive and often fatal systemic disease caused by a mutated form of *Feline Coronavirus* (FCoV) that acquires the ability to replicate within monocytes and macrophages. Infected macrophages disseminate the virus throughout the body via the bloodstream and lymphatic system, triggering an exaggerated immune response characterized by immune-mediated vasculitis and the release of pro-inflammatory cytokines. These processes increase vascular permeability, resulting in protein-rich effusions within body cavities, including the pleural space (Pedersen et al., 2019; Epstein & Balsa, 2020). In the present case, chronic inflammation associated with FIP likely involved the thoracic lymphatic system, particularly the thoracic duct, leading to impaired lymphatic drainage, chyle leakage, and subsequent development of chylothorax. The accumulation of chylous fluid within the pleural cavity contributed to respiratory compromise, as evidenced by tachypnea and shallow breathing (Imayakeerthana et al., 2025).

Based on this pathophysiological mechanism, treatment was directed toward controlling viral replication, managing secondary infection, reducing pleural fluid accumulation, and improving respiratory function. GS-441524 was administered as the primary antiviral therapy to inhibit viral RNA replication, followed by oral molnupiravir as a continuation treatment to maintain viral suppression (Gokalsing et al., 2025; Sase, 2023). Supportive therapies included cefotaxime to prevent or treat secondary bacterial infection, furosemide to reduce fluid accumulation, aminophylline to improve airway patency and ventilation, and fluid therapy to maintain hydration and tissue perfusion (Wang & Shen, 2018; Papich, 2021). Clinical improvement during hospitalization, including increased appetite, and stabilization of respiratory pattern, indicated a favorable response to therapy.

CONCLUSION AND SUGGESTION

Conclusion

Based on the results of the clinical and laboratory examinations, the cat was diagnosed with chylothorax associated with Feline Infectious Peritonitis (FIP). The primary clinical signs included dyspnea, tachypnea, shallow abdominal breathing, and decreased appetite. Thoracic radiography revealed radiopaque fluid accumulation in the ventral thoracic cavity, indicating pleural effusion. Cytological examination further supported the diagnosis by demonstrating a predominance of inflammatory cells, including neutrophils, macrophages, and lymphocytes, consistent with chylous effusion. The suspicion of FIP was supported by a positive FIP antibody test result and hematological abnormalities, including leukocytosis, lymphocytosis, granulocytosis, and anemia, which are indicative of systemic inflammation or chronic infection commonly observed in cats with effusive FIP. Causal therapy consisted of the antiviral agent GS-441524, followed by oral molnupiravir. Symptomatic treatment included furosemide to reduce fluid accumulation and aminophylline as a bronchodilator to improve respiratory function. Progressive improvement in appetite, respiratory function, and hydration status indicated a positive treatment outcome.

Suggestion

Continued veterinary follow-up and close clinical monitoring are recommended throughout the 84-day antiviral treatment protocol to assess therapeutic response, ensure treatment

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compliance, and facilitate the early detection of potential complications or disease recurrence.

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Table

Table 1. Hematological examination

Parameter	Result	References	Information
WBC	38.8 x 10^9/L	9.0 – 24.0 x 10^9/L	High
LYM#	9.4 x 10^9/L	2.0 – 9.0 x 10^9/L	High
MID#	20.2 x 10^9/L	0.1 – 4.5 x 10^9/L	High
GRAN#	21.6 x 10^9/L	6.5 – 9.5 x 10^9/L	High
WBC	38.8 x 10^9/L	9.0 – 24.0 x 10^9/L	High
LYM%	24.3%		Normal
MID%	20.2%		Normal
GRAN%	55.5%		Normal
RBC	5.53 x 10^{12}/L	6.5 – 9.5 x 10^{12}/L	Low
HGB	9.5 g/dL	7.0 – 15.5 g/dL	Normal
HCT	27.2%	24.0 – 45.0%	Normal
MCHC	34.9 g/dL	31 – 39 g/dL	Normal
MCH	17.1 pg	16.5 – 24.5 pg	Normal
MCV	49.2 fL	51.0 – 63.0 fL	Low
RDWCV	19.4%	14 – 20%	Normal
RDWSD	40.9 fL		Normal
PLT	640	100 – 500 x 10^9/L	High
MPV	11.5 fL	0.1 – 30.0 fL	Normal
PDW	12.5%		Normal
PCT	0.73%		Normal

Abbreviations: WBC=White blood cells; LYM= Lymphocytes; MID= Middle-sized cells; GRAN= Granulocytes; RBC= Red blood cells; HGB= Hemoglobin; HCT= Hematocrit; MCV= Mean corpuscular volume; MCH= Mean corpuscular hemoglobin; MCHC= Mean corpuscular hemoglobin concentration; RDWCV= Red cell distribution width coefficient of variation; RDWSD= Red cell distribution width standard deviation; PLT= Platelets; MPV= Mean platelet volume; PDW= Platelet distribution width; PCT= Plateletcrit.

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Figures

Figure 1. Result of the rapid test FIPV was positive.

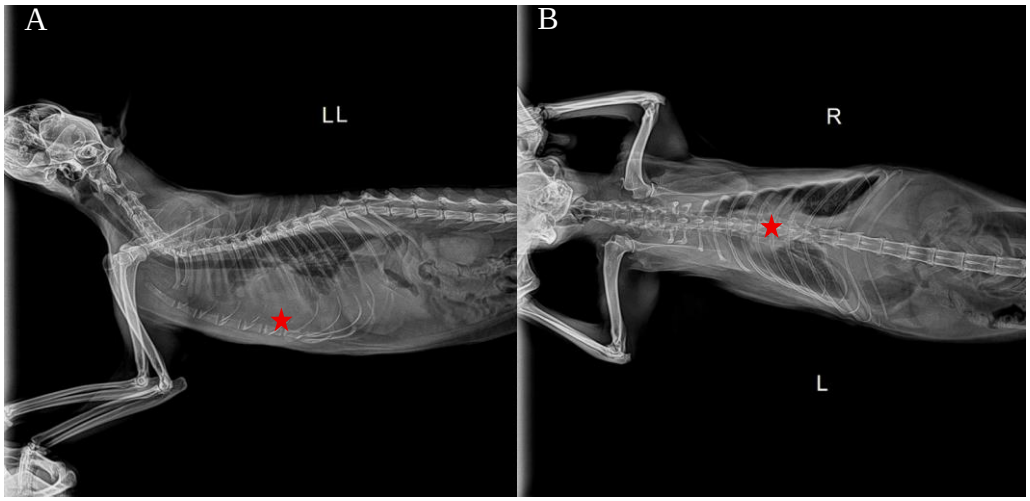

Figure 2. (A) Left-lateral (LL) view; (B) Ventro-dorsal (VD) view radiographs show ventral thoracic radiopaque (red star) indicates pleural effusion.

Figure 3. Milky-white thoracocentesis fluid.

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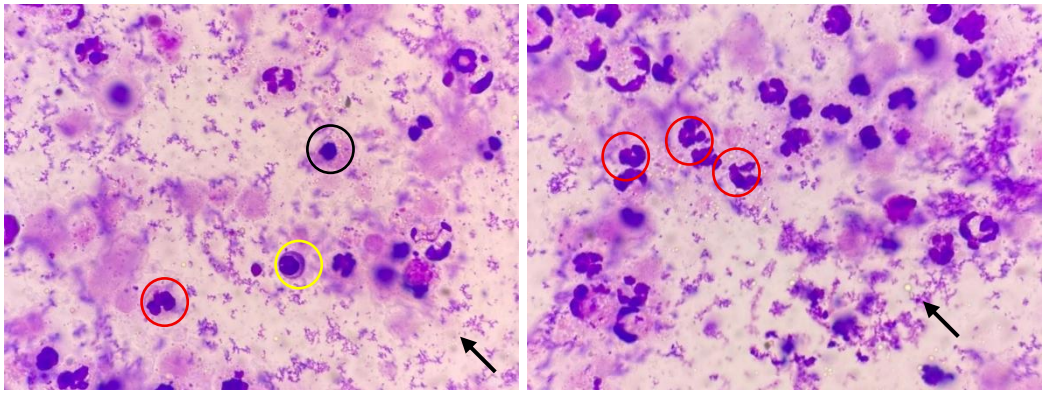

Figure 4. Diff-Quick stained showed neutrophils (red circle), macrophages (yellow circle), lymphocytes (black circle), and bacteria (black arrows).

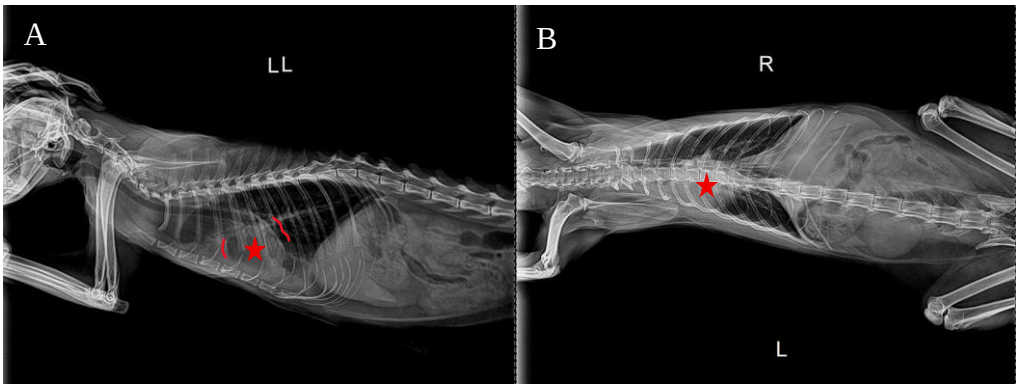

Figure 5. Thoracic radiographs on day 14 of treatment (A) Left-lateral (LL) view; (B) Ventro-dorsal (VD) view. Thoracic radiographic evaluation revealed a marked reduction in pleural effusion (red star) and improved visualization of the cardiac silhouette (red line).