Case Report

Haemotropic Mycoplasmosis in a Cat

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Abstract

Feline hemotropic mycoplasmosis is a ricketsial disease that infects red blood cells and is caused by *Mycoplasma haemofelis, Candidatus Mycoplasma haemominutum*, and *Candidatus Mycoplasma turicensis*. An 8-month-old female domestic cat that had anorexia and weakness is the subject of this case study. Tachycardia, increased rectal body temperature, and icteric mucous membranes were found in clinical examination. Serum biochemistry evaluation revealed elevated activities of alanine aminotransferase (ALT), aspartate aminotransferase (AST) enyzme activities, as well as increased total and direct bilirubin concentrations. Hematological evaluation showed anemia and leukocytosis characterized with lymphocytosis, monocytosis and neutropenia. Blood smear examination confirmed the presence of *Mycoplasma haemofelis*. After receiving oxytetracycline and methylprednisolone for 10 days, the clinical findings of the cat significantly improved. Feline hemotropic mycoplasmosis should be included in the differential diagnosis for cats presented with icterus, increased rectal body temperature and anemia.

Keywords: Anemia, cat, hemotropic mycoplasma

INTRODUCTION

Hemotropic mycoplasmas are gram-negative, cell wall-deficient bacteria that adhere to the surface of red blood cells, leading to hemolytic anemia. In cats, three species have been identified: *Mycoplasma haemofelis, Candidatus Mycoplasma turicensis,* and *Candidatus Mycoplasma haemominutum*. *M. haemofelis* is recognized as most prevalant and pathogenic mycoplasma species infecting cats. These microorganisms are primarily transmitted through blood-feeding arthropods such as fleas, lice, ticks, and mosquitoes. Additionally, transmission can occur via intrauterine and galactogenic routes, bite wounds from cat fights, or contaminated blood transfusions (Tasker et al., 2018)

The severity of the clinical signs associated with the disease may vary depending on the infecting *Mycoplasma species*, the presence of concurrent infections (e.g. retrovirus infections) and the stage of infection (Tasker, 2010). In cats suffered from acute hemotropic mycoplasmosis caused by *Mycoplasma haemofelis* present clinical signs including dullness, inappatence, weight loss, lymphadenopathy, anemia, and increased rectal body temperature. Icterus is uncommon and typically occurs in cases of severe acute hemolysis. Diagnosis is based on clinical and hematological findings, microscopic examination of a peripheral blood smear and observation of single, double or sometimes arranged round bodies on the erythrocyte surface, or polymerase chain reaction (Ameldev and Tresamol, 2017; Barker, 2019).

Although the treatment with tetracycline and quinolone group antibiotics have been reported to reduce the number of organisms in the blood, there is no study to show that the organism can be completely eliminated from the blood with these

group antibiotics. The use of corticosteroids is also recommended to suppress immune-mediated hemolytic anemia associated with hemotropic mycoplasma infection in cats (Tasker et al. 2018).

The aim of this case report was to present the clinical, hematological, and biochemical findings in a cat diagnosed with hemotropic mycoplasmosis.

Case description

The material of the case was an 8-month-old female cat that was presented to the Veterinary Teaching Hospital of Kastamonu University Faculty of Veterinary Medicine with the complaints of anorexia and weakness. The owner reported that the cat was kept in the garden, had anorexia and weakness for the last two days, and had not recevied any preventive vaccinations.

Clinical examination revealed icteric mucous membranes (Figure 1).

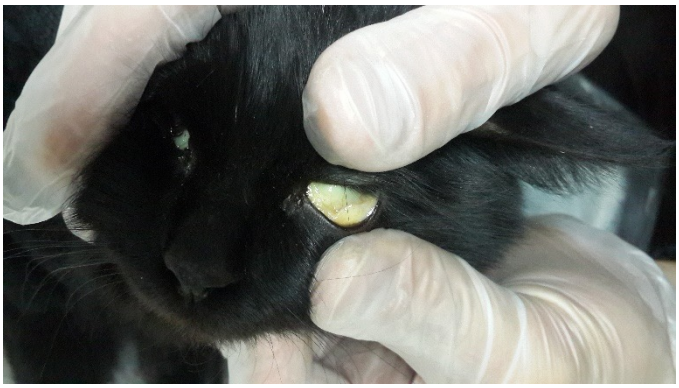

Figure 1. An icteric appearance of the conjunctiva berofe treatment

The rectal body temperature was recorded as 39.4°C, and the heart rate was 160 beats per minute. Blood samples were collected from the vena cephalica antebrachii into EDTA containing and plain tubes for hematological and biochemical analyses respectively. A peripheral blood smear was also prepared and stained with Giemsa. Hematological examinations were performed using an automated veterinary analyser (iVet5, Norma Diagnostika, Budapest, Hungary). Serum biochemistry analysis was conducted using a dry chemistry analyzer (FujiDri-Chem NX500i, Fujifilm Corporation, Tokyo, Japan) The presence of Feline Leukemia Virus (FeLV) and Feline Immunodeficiency Virus (FIV) antigens and antibodies were qualitatively evaluated using an immunochromatographic lateral flow test kit (FeLV-FIV Diagnostic Kit, Uranovet, Spain).

Haematological examination revealed severe leukocytosis (30.1 x 103/µl), characterised by neutropenia, lymphocytosis and monocytosis, macrocytic anaemia and thrombocytopenia (Table 1). Biochemical examination showed inceased activities of alanine aminotransferase (ALT), aspartate aminotransferase (AST), along with elevated total and direct bilirubin levels (Table 1).

Table 1. Hematology and serum biochemistry analysis results

Parameters	Results	Referance Values
WBC (x10³/µL)	30.1	5.1-16.2
Lymphocyte (%)	64	9-56
Monocyte (%)	20	0-6
Neutrophil (%)	15	27-82
RBC (x10⁶/µL)	2.32	6.9-10.1
Hemoglobin(g/dL)	5.2	10.9-15.7
HCT (%)	13.8	31-48
MCV (fL)	59.7	40-52
MCHC (g/dL)	37.6	32-35
ALT (U/L)	511	28-109
AST (U/L)	394	17-48
Creatinine (mg/dL)	0.5	0.8-2.1
Total Bilirubin (mg/dL)	16.4	0-0.1
Direct Bilirubin (mg/dL)	7.4	0-0

Microscopic examinaton of the blood smear showed the stuctures on the surface of the erytocytes consistent with *M. haemofelis* (Figure 3). FeLV antigen and FIV antibody presence were also not detected in this cat.

Based on the results obtained from clinical and flaboratory examinations, hemotropic mycoplasmosis was diagnosed. The treatment was initiated including oxytetracycline (Pan-Terramycin 3% fl., Zoetis) at a dose of 10 mg/kg once daily, and methylprednisolone (Deltacoltril tablet 5 mg, Pfizer) at a dose of 1 mg/kg once daily for a period of 10 days. After the treatment period, appetite, mobility, and mucous membrane color returned to normal (Figure 2).

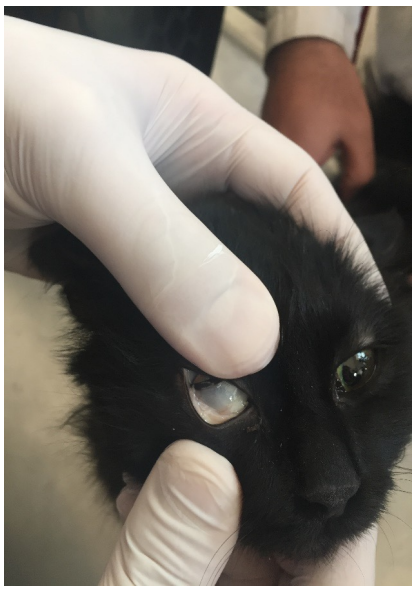

Figure 2. Appearance of the conjunctiva after treatment

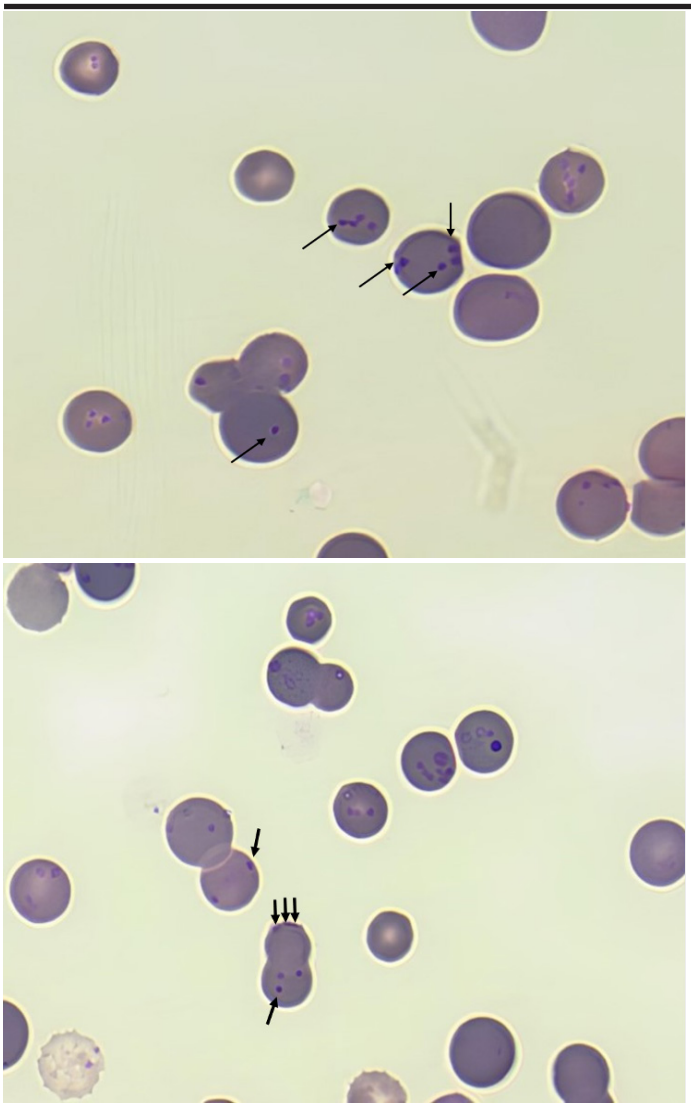

Figure 3. Image of the agent of *Mycoplasma haemofelis* under a light microscope with a 100x objective.

Discussion and Conclusion

Hemotropic mycoplasma infection is the most prevalent etiological factors of hemolytic anaemia in cats. The clinical signs associated with this infection include weight loss, dehydration, tachypnea, tachycardia, pallor of mucous membranes, hyperthermia during the acute phase and hypothermia in cats in the late stages of the disease. It has been documented that the disease more frequently affects male cats under 4-6 years of age, particularly those with free access to outdoor and those not vaccinated against FeLV. The clinical findings in this case, in conjunction with the age, housing and vaccination status of the animal, are consistent with those reported in previous studies (Kurtdede and Ural 2004; Aslan et. al. 2010).

The presence of retrovirus infections has been demonstrated to be a risk factor for hemotropic mycoplasmosis in cats, with the potential to result in a more severe presentation of clinical signs. (Bobade et al., 1988, Harrus et al., 2002). The previous studies showed that hemotropic mycoplasmas induce a significantly more severe anaemia in cats infected with both feline leukaemia virus and feline immunodeficiency virus (Bobade et al.,1988; Messick, 2004). Ural et al. (2008) reported the presence of severe anaemia in a cat naturally infected with "*Candidatus M. haemominutim*", despite the absence of concurrent FeLV or FIV infection. Similarly, despite the absence of either FeLV antigen or FIV antibody, severe anemia was observed in the present case. It has been reported that co-infection with multiple *Mycoplasma* species in cats can lead to increased disease severity, particularly when a cat already infected with one species becomes infected with an additional, different *Mycoplasma* species. (Sykes, 2003). Westfall et al. (2001) demonstrated that cats chronically infected with *Mycoplasma haemominutum* developed significantly more severe clinical signs when subsequently inoculated with *M. haemofelis*, compared to cats with no prior mycoplasma infection that were inoculated with M. haemofelis alone. Although immunosuppressive agents such as FeLV and FIV were not detected in the present case, the severe anaemia observed in the cat suggests that the cat may have been infected with more than one *mycoplasma* species.

The most common haematological alterations associated with hemotropic *mycoplasma* infections encompass regenerative anaemia with anisocytosis, reticulocytosis and polychromasia, and the presence of Howell-Jolly bodies (Sykes, 2003; Sykes, 2010). Aslan et al. (2010) found macrocytic and hypochromic anaemia in a cat with hemotropic mycoplasmosis. It has been hypothesised that anaemia resulting from concurrent FeLV and *M. haemofelis* infections may be non-regenerative. However, previous studies have reported macrocytic-hypochromic regenerative anemia, high levels of parasitemia, and poor response to treatment in cats concurrently infected with FeLV and *Mycoplasma haemofelis*. (Bobade et al, 1988; Harrus et al., 2002). In another study, a cat with *Mycoplasma haemofelis* infection without FeLV developed severe hemolytic anemia with a marked increase in reticulocyte count (VanSteenhouse et al., 1995). In the present case, macrocytic-hypochromic anemia observed in hemotropic Mycoplasma infection without concurrent FeLV infection is consistent with the previous studies.

Elevated hepatic enzyme activities resulting from hypoxic hepatic injury, along with hyperbilirubinemia caused by hemolysis, are common biochemical alterations observed in cats with hemotropic

mycoplasmosis. Kurtdede and Ural (2004) reported serum concentrations of ALT, AST, total bilirubin, and direct bilirubin as 1053 U/L, 220 +U/L, 1.42 mg/dL and 0.87 mg/dL, respectively, in a cat infected with *M. haemofelis.* In another study, the serum concentrations of ALT, AST, total bilirubin and direct bilirubin were measured as 2703 IU/L, 1822 IU/L, 27.3 mg/dL and 20.3 mg/dL, respectively, in a cat infected with *M. Haemofelis* (Aslan et. al. 2010). The findings of the present study are consistent with those of previous reports. An increase in indirect bilirubin concentration is expected in diseases with hemolytic anemia. However, both in the present case and in the case reported by Aslan et al. (2010) direct bilirubin concentration increased along with indirect bilirubin. This finding may be explained by increased levels of proinflammatory cytokines in hepatocytes due to systemic infection, causing a decrease in the gene expression of transport proteins involved in the passage of direct bilirubin into the bile ducts. Alternatively, the increase may be explained by hepatocyte swelling as a result of hypoxic damage causing pressure on intrahepatic bile ducts (Trauner et al. 1999, Bhogal and Sanyal, 2013). In conclusion, Feline hemotropic mycoplasmosis should be included in the differential diagnosis for cats presented with icterus, increased rectal body temperature and anemia.

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