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DIAGNOSIS AND TREATMENT OF FELINE IMMUNE-MEDIATED THROMBOCYTOPENIA

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ABSTRACT

Immune-mediated thrombocytopenia is an immune-mediated thrombocytopenia (IMT) of increased platelet destruction. The purpose of this article is to describe the diagnosis and treatment of IMT in a cat, which may be helpful for the diagnosis and treatment of Thrombocytopenia. The diagnosis and treatment of IMT were analyzed by case information, clinical examination, laboratory examination, imaging examination, treatment and prognosis. The results showed that the clinical manifestations of IMT were ocular hemorrhage, massive ecchymosis in abdomen, severe decrease of platelet concentration in whole body and black stool. The diagnosis of Thrombocytopenia was made by combining clinical symptoms, blood routine examination and ultrasound examination to exclude infectious diseases and parasitic infections. After 5 days of oral administration of Microlone and Synulox, the symptoms of the cats tended to smooth, and the prognosis was good. This paper has provided case study and a clinical practical reference for the diagnosis and treatment of Feline Immune-Mediated Thrombocytopenia.

***Keywords*:** Feline, Immune-mediated thrombocytopenia, Diagnosis, Treatment

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1. INTRODUCTION

Immune-mediated thrombocytopenia, the most common cause of spontaneous bleeding in dogs, is not common in cats (Huang et al. 2017; Ellis et al. 2018). Today, most families begin to keep their companion pets, and IMT cats increase with the increasing number of pet cats. However, the data on the diagnosis and treatment of cat IMT are not perfect. The disease is due to the autoimmune system attacks platelets, the speed of bone marrow regeneration is less than the speed of platelet destruction, and the number of platelets in the peripheral blood decreases (Wang et al. 2018; Lo Piccolo et al. 2019). IMT can be divided into two types: primary IMT and secondary IMT. The former is mainly hematological abnormalities caused by autoimmune disorders. Secondary IMT includes tumor, microbial infection, and transfusion (Scuderi et al. 2016). The mortality rate of IMT is 30%-40% and the causes of primary IMT are still being explored.

In July 2019, I dealt with a case of IMT in the process of internship. After a week of treatment, cat's symptoms and signs tend to stabilize. Combined with the case data of pet clinic, through the observation and analysis of a series of processes of Feline diagnosis, treatment andnursing, this paper provides some reference for the treatment of Feline Immune-Mediated Thrombocytopenia.

2. MATERIALS AND METHODS

2.1. Case History

The affected cat was a British short-haired, weighing 1.55kg and aged about 5 months. Normal immunization, regular vaccination and use of repellent in vitro and abroad. Three days before the onset of the disease, the third injection of cat vaccine, the day of the onset of blood in the stool, the second day of the onset of black stool, the third day to our hospital to see a doctor, voiding no abnormal. Usually the diet to dry food, snacks and cooked chicken breast meat, no desire to eat after the disease, no vomiting.

2.2. Diagnosis

The body temperature of the affected cat was 38.2~38.4℃, the respiratory rate was 36 to 38 times/min, the mucosa was pale, bleeding in both eyes and bleeding in the right eye, a large number of congestion spots in the abdomen, heart rate and breathing were normal, no obvious abnormalities, and the stool was black.

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The laboratory results showed that the number of red blood cells, hematocrit and hemoglobin were low, the number of reticulocytes and monocytes was increased and the second amylose was 8.65mg/L. The results showed that the cat was having aplastic anemia and inflammation in the body.

Whole abdominal ultrasound of the affected cat showed the (Fig. 1) smooth liver contour, uniform parenchymal echo, sharp liver benefit, and no abnormal nodules. Smooth spleen contour, uniform parenchymal echo and no abnormal nodules, but the spleen is larger than normal. Whereas the liver parenchyma appeared unremarkable. The left kidney size was about 3.00x1.91cm and right kidney size was about 3.55x1.87cm. No obvious structure and echo abnormality was seen in bladder and pancreatic gastrointestinal tract. Ultrasound tip: the spleen is larger than normal. Primary immune-mediated thrombocytopenia was suspected; the cat was hospitalized.

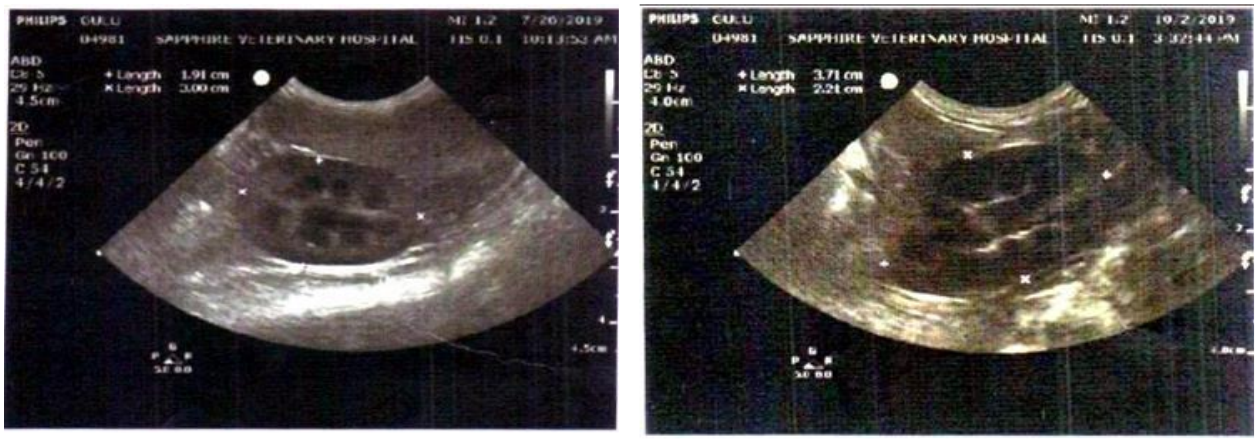

Fig. 1: Ultrasonic acoustic examination of a cat suffering from immune-mediated thrombocytopenia.

3. RESULTS

According to the comprehensive analysis of the clinical symptoms and medical history, routine blood examination (Table 1), blood biochemical examination and abdominal imaging examination, the affected cat was initially diagnosed as immune-mediated thrombocytopenia (IMT).

Table 1: Hematological findings on various treatment days

Parameters	Units	Blood samples collected on days					Normal range
		1st	3rd	6th	11th	25th	
RBC	10^{12}/L	3.93↓	5.59↓	4.90↓	6.62	9.63	6.54-12.0
HCT	%	16 ↓	24.1↓	20↓	27.9↓	36.6	30.3-52.3
HGB	g/dL	5.5↓	8.0↓	6.9↓	8.6↓	11.8	9.8-16.2
RETIC	k/μL	167.8↑	276.7↑	76.9↑	28.3	32.3↑	3.0-50.0
WBC	10^9/L	16.65	18.67↑	11.31	18.96↑	13.61	2.87-17.02
NEU	10^9/L	8.65	12.49↑	6.27	16.09↑	9.16	2.30-10.29
LYM	10^9/L	6.16	4.20	2.86	1.55	2.10	0.92-6.88
MONO	10^9/L	1.16↑	0.12	0.71↑	0.64	0.64	0.05-0.67
PLT	k/μL	1↓	1↓	185	179	522	151-600
MCH	g/dL	34.4	33.2	34.5	30.8	32.2	28.1-35.8
RDW	%	21.3	22.0	21.8	22.2	18.9	15.0-27.0
EOS	10^9/L	0.64	0.68	0.65	0.71	0.48	0.14-1.57
BASO	10^9/L	0.04	0.05	0.07	0.13	0.11	0.01-0.26
MPV	fL	11.9	11.9	11.6	11.5	12.3	11.4-21.6
PCT	%	0.00	0.03	0.04	0.03	0.13	0.00-0.79

Note: "↑" means that the inspection result is above normal, "↓" indicates that the inspection result is below normal. RBC=Red Blood Cells, HCT=Red blood cellsspecific volume, HGB=Hemoglobin, RETIC=Reticulocyte count, WBC=Whilte blood cells, NEU=Neutrophils, LYM=Lymphocytes, MONO: Monocytes, PLT=Platelets, MCHC=Mean corpuscular hemoglobin Concentration, RDW=Red blood cell volume distribution width, EOS=Eosinophils, BASO=Basophil, MPV=Mean platelet volume, PCT=Plateletocrit.

3.1. Treatment

She was given Microlone 5mg/kg/d and Synulox 50mg/kg/d twice daily orally. After 3 days of treatment, the state of the cat gradually improved, the stool was normal, the mucosa was reddish, the abdominal congestion gradually subsided, and the eyeball bleeding spot also improved. On the fourth day, the cat could feed independently and had no congestion in the abdomen, normal stool, fair skin elasticity, physical signs returned to normal and was discharged on the sixth day. Two weeks later, the overall state was stable and the affected cat had no abnormal basic recovery. Ultrasonic acoustic examination was performed again, with no internal bleeding (Fig. 2):

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smooth liver contour, uniform parenchymal echo, sharp liver benefit, and no abnormal nodules. Smooth spleen contour, uniform parenchymal echo and no abnormal nodules, but the spleen is larger than normal. Whereas the liver parenchyma appeared unremarkable. Left kidney size was about 3.00x1.91cm and right kidney size was about 3.55x1.87cm. No obvious structure and echo abnormality were seen in bladder and pancreatic gastrointestinal tract.

The routine results of blood testing (Table 1) showed that the number of red blood cells, hematocrit and hemoglobin values gradually returned to the normal value, and the number of platelets also increased to the normal range. On 25th day of treatment, all the indicators were normal and the medication was stopped.

4. DISCUSSION

Immune-mediated thrombocytopenia can be divided into two forms (Rieder and Mischke 2018), primary IMT and secondary IMT. Primary IMT is mainly the hematological abnormalities caused by defects in the immune system, where antibodies directly attack platelet antigens. There are many secondary IMT cofactors, such as infectious diseases (cat fever, cat herpes virus, gobicivirus infection, viral rhinovirus, etc.), parasitic diseases (*Taenia solium*, hookworm disease, babesiosis, filariasis), tumors (basal cell tumor, breast tumor, fibroma), drugs (sulfonamides, vaccines, cephalosporin antibiotics) and improper blood transfusion (Garden et al. 2019; Aranda Escaño et al. 2021).

Thrombocytopenia may result from decreased thrombopoiesis, platelet retention in the spleen, increased platelet injury or depletion, and decreased platelet concentration, but either cause of severe thrombocytopenia can lead to typical bleeding (Wu et al. 2020; Huang et al. 2021). Primary IMT may not show clinical symptoms, as in animals with temporary symptoms of somnolence or mental depression (46%), no diet (34%), and black feces (25%). Blood spots (66%) and enlarged lymph nodes (27%) were often found on physical examination. The affected cat can have pale mucosa, ball bleeding in both eyes and severe bleeding in the right eye, a large number of congestion spots in the abdomen and feces was black (Wang 2011).

The detection of platelet antibodies is an important indicator of this disease, but this test is not widely used in pet clinic. Therefore, the speculative diagnosis (Chen et al. 2017) is mainly made through clinical manifestations, complete blood cell count, blood cell morphological examination, and exclusion of other causes. The affected cat showed characteristic clinical symptoms, such as black stool and large congestion spots on the abdomen. Routine blood examination found that the number of platelets in the affected cat was severely decreased to 1kg/L. In addition, the serum amyloid amylose in the affected cat was 8.65mg/L. Based on the history and clinical examination, the possible causes of melanosis were excluded as ingestion of blood-containing substances, gastrointestinal inflammation, parasites, masses, and hepatic and renal causes. Blood routine results confirmed the presence of thrombocytopenia. So melanosomia may be due to thrombocytopenia. Blood routine showed a platelet count as low as 1k/μL indicating immune-mediated thrombocytopenia. At the same time, the history and examination results excluded all possible causes of thrombocytopenia, and the initial diagnosis was primary immune-mediated thrombocytopenia. There was also moderate nonregenerative anemia due to gastrointestinal bleeding. The cat was eventually diagnosed with IMT and with mild inflammation in the body.

The most important things for affected cats are dietary restrictions, physical recovery, and minimizing wounds. Subcutaneous, intramuscular and intravenous injections are contraindicated. IMT should be treated by immunosuppressive agents, but dexamethasone is not the preferred drug and can only be used in the short term, otherwise it will inhibit the adrenal axis of the body and increase the risk of gastrointestinal ulcer and perforation (Nelson and Couto 2009).Immunosuppressive drugs such as corticosteroids and cyclosporine are used for the treatment of inflammatory and immune-mediated diseases in small animals, this time is chosen Microlone 5mg/kg/d twice daily orally, because IMT can cause systemic infection, oral broad-spectrum antibiotics can be taken to prevent secondary infection in vivo, so may be the choice will be Synulox 50mg/kg/d twice daily orally. Within 5 days of glucocorticoid treatment, significant efficacy is usually seen, and most primary IMT platelets gradually return to normal levels.

The prognosis of primary IMT is difficult to predict due to different regions, different physical conditions of the affected animals, and different responses to immunosuppressants. At the diagnosis of primary IMT, the presence of black manure is an important marker of poor prognosis. Black feces indicate gastrointestinal bleeding, which means more severe anemia, that is more difficult to treat, and the animal's condition is worse, so the animal's owner is more likely to choose euthanasia (Whitley and Day 2011). In this case, three days after receiving treatment, the physical condition improved significantly, the stool color returned to normal, and the abdominal congestion spots gradually subsided until the prognosis was good on the 5th day.

5. Conclusion

The number of platelets in the affected cat was seriously decreased, and imaging examination showed that the spleen of the affected cat was too large. The combination of cat serum-like amyloid detection kit could preliminarily confirm the diagnosis of immune-mediated thrombocytopenia in the affected cat. Oral treatment with

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Microlone and Synulox was given. On the sixth day of treatment, the blood platelets returned to normal. On the 25th day of treatment, the reexamination results showed that the number of red blood cells, hematocrit, and hemoglobin returned to normal values, and ultrasound indicated that the spleen returned to normal. The cat's symptoms are leveling off and the prognosis is good. This study provides a case study and clinical practice reference for the diagnosis and treatment of feline immune thrombocytopenia.

Author's contribution

Xianling Yang: Results analysis, Writing - original draft, Writing - review & editing, Validation. Fangfang BI: Conceptualization, Writing - review & editing, Supervision, Project administration, Funding acquisition.

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