Immune-mediated hemolytic anemia in a spayed female domestic short hair cat: diagnosis and treatment

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Abstract

An adult spayed female DSH cat, diagnosed to be afflicted with immune-mediated hemolytic anemia (IMHA) with concurrent thrombocytopenia, was successfully treated with conventional oral broad-spectrum antibiotic-corticosteroid combination regimen, supported by adequate home care by the well-informed client. The patient responded well to this line of treatment, evidenced by increased activity level, finishing the meals and drinking more water, and improved behavioral profile.

Keywords: Anemia, Immune-mediated, Hemolytic, Thrombocytopenia, Cat

Anemia, signifying deficiency of blood or hemoglobin, occurs when the number of circulating red cells falls below the physiological range, or these cells are not able to function properly. A low red blood cell count may be the consequence of hemmorhage, accelerated destruction of red cells, or inadequate synthesis of new red cells, reticulocytes. Immune-mediated hemolytic anemia (IMHA) in the domestic cat is a clinical condition where the circulating red blood cells - tagged with the immunoglobulins G and M, complements, or a combination of these - are mistaken as foreign and destroyed by the pet's own immune system. Primary or idiopathic IMHA is also named autoimmune hemolytic anemia. Secondary IMHA involves a triggering agent: drugs like propylthiouracil, blood transfusion, neoplasia (such as lymphoma/ multiple myeloma), and infection (*Babesia spp*., hemoplasmosis, feline infectious peritonitis, and feline leukemia virus). In the cats, unlike dogs, primary IMHA is relatively rare (Carr, 2018).

The clinical signs in cats with IMHA are highly variable, depending on the magnitude/ nature of the episode, and other contributory factors. The common clinical signs comprise anorexia, lethargy, body weight loss, dysponea, tachypnoea, tachycardia, and pale visible mucous membranes. Splenomegaly. icterus and pyrexia may be observed occasionally (Kohn *et al*., 2006). The diagnostic panel includes complete blood count (CBC) to corroborate anemia and evaluate the compensatory response through synthesis and release of new red cells (reticulocyte count), the blood biochemistry panel to monitor the renal, hepatic and pancreatic function, the circulatory electrolytes to assess generalized tissue dehydration and electrolyte imbalance, and urinalysis to rule out UTI. The supplementary panel includes Coombs test, PCR analysis, FeLV/ FIV testing to determine if the primary cause of anemia is a contagious viral disease (Cowell *et al*., 2006), and bone marrow aspirate/ core biopsy and imaging to study neoplasia (Weiss, 2007).

Case History

Lilly Chilcutt, 6 years old spayed DSH eat, body weight 4.5 kg, was presented to the Milford Veterinary Clinic, Milford, MI USA on November 5, 2018 with a history of lethargy and reduced activity. However, in view of the patient's apparently aggressive stance, adequate safety precautions were taken before the routine physical examination and laboratory diagnostic samplings. Urinalysis did not indicate anything abnormal. The in-house survey radiographs revealed no abnormal growths. The diagnosis was severe hemolytic anemia (IMHA) with thrombocytopenia (IMTP), immune-mediated. The unique feature of the patient's profile was freedom from anxiety. The clinical condition warranted immediate blood transfusion in the referral Emergency Clinic. However, the owner declined because of her financial constraints, necessitating case management in the home clinic.

Treatment and Discussion

The feline patient, Lilly Chilcutt had unimpaired renal function (normal/ low values of serum creatinine and blood urea nitrogen, BUN in the blood biochemical

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Table 1. Patient's hemogram (In-house Automated CBC) at the specified pre-treatment and post-treatment intervals.

Parameter (units)	Pre-treatment 05.11. 2018	Status	Post-treatment			Reference interval	Status
			23.11. 018	07.12.2018	09.2018		
TEC (1x10^6/µL)	1.1	Low	1.56	2.74	2.62	6.54-12.20	Low
Hematocrit (%)	7.1	Low	11.50	18.40	17.00	30.30-52.3	Low
Hb (g/dL)	2.7	Low	3.41	4.80	5.00	9.6-16.2	Low
MCV (fL)	64.0	High	-	67.20	65.00	35.5-53.1	High
MCH (pg)	-		-	17.50	19.1	-	High
MCHC (g/dL)	38.0	High	-	-	29.40	28.1-35.8	Low
RDW (%)	30.3		-	28.80	1.70	15.0-27.0	High
Reticulocyte (%)	2.1		-	2.60	1.70	-	
Reticulocyte (1x10^3 /µL)	23.1	Low	62.4	75.40	45.00	30.0-50.0	Normal
TLC (1x10^3 /µL)	-		-	6.12	5.00	-	
Neutrophil (%)	-		-	42.30	44.00	-	
Lymphocyte (%)	--		-	51.00	39.80	-	
Monocyte (%)	-		-	3.90	12.50	-	
Eosinophil (%)	-		-	2.00	3.10	-	
Basophil (%)	-		-	0,80	0.20	-	
Neutrophil (1x10^3 /µL)	-		-	2.59	2.66	-	
Lymphocyte (1x10^3 /µL)	-		-	3.12	2.39	-	
Monocyte (1x10^3 /µL)	-		-	0.24	0.75	-	
Eosinophil (1x10^3 /µL)	-		-	0.12	0.19	-	
Basophil (1x10^3 /µL)	-		-	0.05	0.01	-	
Thrombocyte (1x10^3 /µL)	21.0	Low	-	97.00	0.20	151-600	Low

profile) with absence of signs of pathogenic bacterial infection in urinalysis. The serological tests confirmed freedom from viral/ heartworm infection. Further, the T_4 serum titre (1.4 µg/ dL in the reference range of 0.8-4.7 µg/ dL) indicated no thyroid-related issues (Tables 1-4). However, in view of the severe anemic condition of the patient on presentation, the top-most priority was blood transfusion with infection-free feline blood and supportive therapy to prevent further hemolysis. Concurrent Doxycycline antibiotic therapy was prescribed because of enzootic *Mycoplasma spp.*, *Cytauxzoon felis,* and *Babesia spp*. In the cats, unlike the dogs thrombosis is not a major issue (Carr, 2018).

The positive feature of the patient's blood biochemical profile was unimpaired hepatic function, indicated by the normal circulatory albumin concentration and alkaline phosphatase titre (Table 2). Further, the circulatory globulin concentration, and the albumin/ globulin ratio remaining within the respective normal range pointed to the absence of clinical pathogenic bacterial infection. Absence of electrolyte imbalance is reflected in the normal circulatory titres of the cations: sodium (Na^+), potassium (K^+) and anion, Chloride (Cl^-). Absence of neoplastic transformation in any body part/ internal organ was confirmed by in-house radiography.

In perspective, antibiotic-corticosteroid oral regimen was considered safe to pre-empt fresh microbial infection. Doxycycline was given @ 10 mg/kg q12 hr PO for 3 weeks. Concurrently, the corticosteroid Prednisolone was given @ 4 mg/ kg q 12 hr PO from November 5, 2018 with gradual tapering off under clinical supervision. In any emergency situation (PCV% < 15), the priority is restoration of the circulatory blood volume through i/v infusion of the typed whole blood from a healthy donor cat/ Hb-based blood substitute, e.g. Oxyglobin®. This option could not be excercised in the instant case. However, the combination oral regimen brought prompt relief to the patient, as evidenced by the visibly improved

Table 2. Patient's pre-treatment blood biochemical panel (In-house Auto Chemistry Analyzer).

P Parameter (unit)	Value	Reference interval	Status
Blood glucose (mg/dL)	160.0	74-159	High
Serum creatinine (mg/dL)	1.3	0.8-2.4	Normal
Blood urea nitrogen, BUN (mg/dL)	13	16-36	Low
Inorganic phosphate, Pi (mg/dL)	3.7	3.1-7.5	Normal
Total calcium (mg/dL)	7.5	7.8-11.3	Low
Serum total protein (g/dL)	7.8	5.7-8.9	Normal
Albumin (g/dL)	3.0	2.2-4.0	Normal
Globulin (g/dL)	4.6	2.8-5.1	Normal
Albumin/ globulin, A/G ratio	0.7		
Alkaline phosphatase (U/L)	57.0	12-130	Normal
Total bilirubin (mg/dL)	0.6	0-0.9	Normal
Total cholesterol (mg/dL)	153.0	65-225	Normal
Amylase (U/L)	928.0	500-1500	Normal
Lipase (U/L)	704.0	100-1400	Normal
Gama glutamyl transaminase, GGT (U/L)	0.0	0-4.0	Normal
Sodium, Na+ (m mol/L)	158.0	150-165	Normal
Potassium, K+ (m mol/L)	3.7	3.5-5.8	Normal
Chloride, Cl- (m mol/L)	119	112-129	Normal
Total T4, thyroxine (µg/dL)	1.8	0.8-4.7	Normal

Urinalysis and serological tests

Table 3. Patient's pre-treatment urine examination (IDEXX Reference Laboratories).

Characteristics	Result	Characteristics	Result
Physic I. I. Physical		IIIIISediments III. Sediments (Centrifuged)	
Colour	Pale yellow	Evegetated blood cells: WBCs RBCs	<1/HPF <1/HPF
Consistency	Clear	Bacteria: Rods Cocci	None to rare None to rare
Specific gravity	1.025	Exfoliated epithelial cells: Squamous Non-squamous	None to rare None to rare
Patho-chemicalIII II.II Pathochemical		Casts: Hyaline/ Non-hyaline	None to rare
pH	7.0	Crystals: Struvite/ Calcium oxalate	None to rare
Proteins	Negative	Table 4. Serological tests for the patient's immunity status	
Glucose	Negative	Feline Leukemia Virus (FeLV)	Negative
Ketone bodies	Negative		
Urobilinogen	Normal	Feline Influenza Virus (FIV)	Negative
Bilirubin	Negative		
Bilirubin-direct	Negative	Heart worm Infection	Negative
Hemoltic anemia in cat			

clinical condition: eating well and drinking more water, and more relaxed disposition. Extended combination therapy: Prednisolone oral suspension [10 mg/ ml] @ 0.75 ml PO bid + Doxycycline oral syrup [25 mg/ ml] @ 0.5 ml PO bid for 14 days was prescribed on December 7, 2018 with advisory on periodic reassessment and modification/ extension. The absolute count ($1x10^3/\mu L$) of the circulatory reticulocytes is a highly dependable index of regenerative capability (50-75 mild, 75-175 moderate, > 175 marked) in the individual patient. Nearly three-fold increase in the value of this parameter (23.1 → 62.5, Table 1) in just 3.5 weeks is highly pertinent in the recovery process, corroborated by the continuing parallel increases in the TEC, hematocrit and Hb values. The cat is now fully recovered, evidenced by pink visible mucous membranes and improved behavoural profile.

Acknowledgments

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