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Extreme leukocytosis in a 3-year-old domestic cat with coxofemoral hip luxation

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ABSTRACT: This paper reports the case of a 3-year-old domestic cat named Teyung, diagnosed with coxofemoral hip luxation through physical examination and X-ray imaging. Additional hematology diagnostics indicated extreme leukocytosis. The treatment administered included supportive therapy with Ringer's lactate infusion and injections of cefotaxime, gabapentin, and ondansetron. The patient did not show significant improvement over three days, and extreme leukocytosis was identified as the primary cause of death.

Keywords:
cat health, coxofemoral hip luxation, extreme leukocytosis

■ INTRODUCTION

Extreme leukocytosis is a condition characterized by a drastic increase in the total white blood cell (WBC) count, where leukocyte levels exceed $30x10^9$ (Teja *et al*. 2021). Leukocytosis can be classified based on the white blood cell components contributing to the elevated total WBC count, such as neutrophilia, lymphocytosis, monocytosis, eosinophilia, basophilia, or immature cells. Combinations of several WBC indices can also be involved (Susumu 2020). Cases of extreme leukocytosis in the category of extreme neutrophilic leukocytosis are rare; however, dogs with this condition have a mortality rate of up to 41% (Ziccardi *et al*. 2022). This extreme leukocytosis in felines results in a high mortality rate of up to 70% (Javinsky 2012). However, reports of this case in cats are limited. This paper discusses the immune response and treatment of cats with extreme leukocytosis due to trauma.

■ CASE

Anamnesis and Signalment: A cat named Teyung was brought to the Zoom Veterinary Team in a lethargic state. On the same day, the owner reported that Teyung was found lying on the street after being hit by a vehicle at around 8 a.m. and taken to another clinic for an X-ray by 8:30 a.m. **Physical Examination**: Body temperature 37.7 °C, body weight 6,3 kg. The cat was lethargic, convulsive, had difficulty moving, and crepitus was detected in the left coxofemoral joint upon palpation. **Diagnostic laboratory**: X-ray imaging was used to determine the displacement of the femur bone. Hematological tests were also conducted to evaluate the blood components. **Diagnosis**: The cat was diagnosed with a coxofemoral hip luxation accompanied by extreme leukocytosis.

■ RESULTS AND DISCUSSION

The X-ray image revealed displacement of the left femoral head from its acetabulum (Figure 1). Blood hematology showed a significant increase in the leukocyte count (Table 1). Based on these results, there is a rapid increase in white blood cell indices, termed extreme leukocytosis. According to Teja *et al*. (2021), leukocytosis is categorized as extreme when white blood cell counts exceed $>30x10^9$. Additionally, other leukocyte indices, including eosinophilia, neutrophilia, lymphocytosis, and monocytosis, were markedly increased.

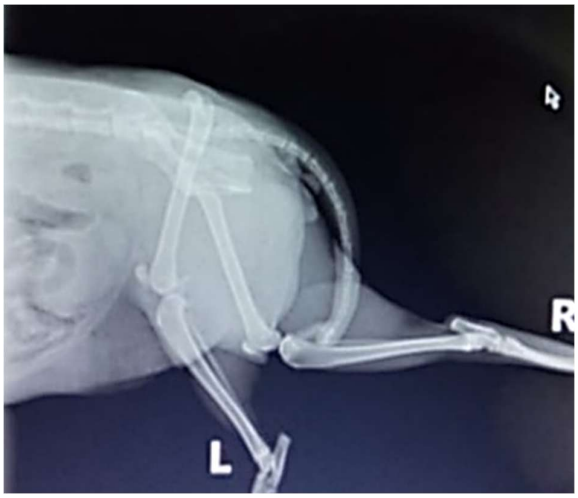

Figure 1 Radiogram of the cat with displacement of the left femoral head from the acetabulum.

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Table 1 Hematology results evaluation of cat named Teyung with coxofemoral hip luxation

Parameter	Results	Range Reference
HGB (gr/dL)	9.5	8.17–15.26
HCT (%)	30.8	224.0–46.0
RBC (mil/mm^3)	6.45	5.92–11.16
MCV (fL)	47.8	36.96–54.98
MCH (pg)	14.7	13–21
MCHC (%)	30.8	26.24–35.91
WBC (cell/mm^3)	**61,200**	5,500–14,400
BASO (%)	-	10.0–30.0
EOS (cell/mm^3)	**1,713.6**	200–610
NEU (cell/mm^3)	**38,800**	2,100–15,000
LYM (cell/mm^3)	**13,700**	800–7,000
MONO (cell/mm^3)	**8,700**	100–900
PLT (cell/mm^3)	**2,090,000**	200,670–377,000

Note: HGC= hemoglobin; HCT= hematocrit; RBC= red blood cells; MCV= Mean Corpuscular Volume; MCH= Mean Corpuscular Hemoglobin; MCHC= Mean Corpuscular Hemoglobin Concentration; WBC= white blood cells; BASO= basophils; EOS= eosinophils; NEU= neutrophils; LYM= lymphocytes; MONO= monocytes; PLT= platelet. Blue text= increasing.

Extreme leukocytosis may be caused by catecholamines released during stress due to trauma, leading to white blood cell accumulation in the lungs, spleen, and bone marrow (Hetz *et al*. 1996). An extreme increase in WBC count can elevate the risk of blood hyperviscosity, where blood becomes thicker than normal (Dale 2024). This condition can slow blood flow to vital organs such as the brain, heart, and lungs, potentially increasing the risk of multiorgan failure due to insufficient blood supply (Pallister *et al*. 2002).

The accumulation of excessive leukocytes, especially neutrophils, can be toxic within the body. Traumatic injury triggers an inflammatory response that rapidly increases leukocyte production. The expression of adhesion molecules on the leukocyte surface membrane is regulated within 20 h after tissue injury (Cocks *et al*. 1998). This stimulates leukocytes to interact with endothelial receptors and direct them to the site of injury. However, when leukocytes persist and are not properly cleared from the injury site, dying neutrophils continue to release reactive oxygen species (ROS). This leads to organ failure, tissue damage, exacerbation of inflammation, and autoimmune responses (Bratton & Henson 2011). Moreover, comorbidities, such as anemia and thrombocytopenia, complicate clinical management (Jordan *et al*. 1993).

Poor prognosis reduces the potential for recovery, focusing treatment solely on preventing multiorgan failure with interventions such as Ringer's lactate infusion and other supportive therapies tailored to symptoms. These include gabapentin for stress relief, ondansetron to suppress vomiting receptors, and cefotaxime to prevent the worsening of sepsis. However, the cat showed no significant improvement within 3 days and eventually succumbed to the condition.

■ CONCLUSION

In extreme leukocytosis in Teyung, the cat had poor prognosis. The primary cause of Teyung's death was multiorgan failure, resulting from the accumulation of increased leukocyte counts, particularly neutrophils. Supportive therapy was administered to prevent multiorgan failure and alleviate symptoms; however, extreme leukocytosis rendered the treatment ineffective.

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