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LOPH PROTOCOL AND RESCUE WITH DOXORUBICIN, VINCRISTINE AND CYTARABINE IN THE CHEMOTHERAPY TREATMENT OF CHRONIC LEUKEMIA IN FELINE FELV POSITIVE

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ABSTRACT

Chronic leukemia is a myeloproliferative disorder considered rare in felines, affecting mainly elderly cats, and is also observed in animals carrying the feline leukemia virus (FeLV), which may be directly or indirectly associated with the oncogenesis of the neoplasm. The objective of this study was to report a case association between FeLV and chronic lymphocytic leukemia in a 5-year-old cat. In its first visit, the animal presented severe anemia (hematocrit 10%), leukocytosis (21,140/µL) due to lymphocytosis (44% of the total leukocytes) with the presence of circulating atypical mononuclear cells and clinical signs of mucosal pallor, progressive prostration and hyporexia. Blood transfusion was performed on day 0, and after 24 hours, bone marrow puncture was performed to obtain a definitive diagnosis by means of myelogram. During the first week, the animal showed clinical improvement and the myelogram result confirmed the suspicion of chronic lymphocytic leukemia. A rescue protocol with doxorubicin, vincristine, and cytarabine (OCH) was instituted, and five cycles were performed. During this period, it was necessary to perform four new blood transfusions due to episodes of anemia with worsening of the clinical picture, in addition to repeated episodes of neutropenia in which it was necessary to institute prophylactic antibiotic therapy and application of granulocyte and monocyte stimulating factor. After the fifth cycle, due to the persistence of hematological alterations and the reappearance of circulating atypical cells, the owner chose not to continue the treatment, and euthanasia was performed on the 226th day since her first consultation, obtaining approximately 7.5 months of survival.

Keywords: Feline leukemia. Oncology. Chemotherapy.

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INTRODUCTION

Leukemia is a myeloproliferative disorder characterized by an abnormal increase in cells produced by the bone marrow in the circulation (OGILVIE; MOORE, 2001). In cats, neoplasms of rare occurrence are considered, the most commonly described being acute lymphoblastic leukemia (ALL), chronic myeloid leukemia (CML) and chronic lymphoblastic leukemia (CLL) (JACOBS; MESSIK; VALLI, 2002).

In felines, leukemia may be associated with concomitant infection with feline leukemia virus (FeLV), whose oncogenesis is related to the activation of proto-oncogenes or inhibition of tumor suppressor genes during the insertion of the provirus into cellular DNA (HARDY, 1993).

With nonspecific clinical symptoms, the diagnosis is made by laboratory tests, observing hematological and myelogram alterations (OGILVIE; MOORE, 2001). Leukemia can also course with other alterations in the production of bone marrow cells, such as anemia, neutropenia and thrombocytopenia (COTTER; HOLZWORTH, 1987).

Treatment is carried out through cytotoxic chemotherapy, and the most commonly used are drugs such as chlorambucil, vincristine, doxorubicin, lomustine and cyclophosphamide associated with prednisolone, combined in different protocols (COTTER; HOLZWORTH, 1987).

The prognosis in treated animals is more promising in cases of CLL when compared to cases of ALL and CML (CAMPBELL; HESS; WILLIAMS, 2012), however, when associated with FeLV infection, both quality of life and life expectancy decrease considerably (LINENBERGER; ABKOWITZ, 1995).

Leukemia is a neoplastic disorder originating in the bone marrow characterized by abnormal proliferation in the number of leukocyte, erythroid, or thrombocyte cells in the bloodstream (OGILVIE; MOORE, 2001). They can be classified as acute or chronic according to their behavior and cellular characteristics, with acute leukemia characterized by a rapid and significant cell increase, and chronic leukemia by a gradual increase in the number of neoplastic cells (JACOBS; MESSIK; VALLI, 2002).

In cats, the main leukemia described are acute lymphoblastic leukemia, chronic myeloid leukemia and chronic lymphoblastic leukemia, all of which are considered rare neoplastic disorders (JACOBS; MESSIK; VALLI, 2002) and with a lower incidence among lymphoid neoplasms in felines (OGILVIE; MOORE, 2001).

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Chronic lymphocytic leukemia, specifically, is characterized by a gradual and slow increase in the number of mature lymphocytes of good or moderate differentiation in the bloodstream (CRISTO et al., 2019). Other hematological alterations may be present, such as anemia, leukopenia and thrombocytopenia, a consequence of the replacement of hematopoietic tissue by neoplastic cells, a process called myeloftisis (JARK; RODRIGUES, 2022).

The main clinical signs observed are nonspecific, such as progressive weight loss, prostration, hyporexia, adipsia, fever, and pallor of the mucous membranes (JACOBS; MESSIK; VALLI, 2002).

The etiopathogenesis of leukemia in feline patients is related to FeLV infection, especially in ALL (SHIMADA et al., 1995) and AML (OGILVIE; MOORE, 2001), mainly affecting animals under 5 years of age (JACOBS; MESSIK; VALLI, 2002). CLL is mostly associated with elderly animals (over 8 years of age) negative for FeLV (CAMPBELL; HESS; WILLIAMS, 2012). The concomitant occurrence of CLL and FeLV infection is poorly described in the literature (KYLE; WRIGHT, 2010). In a study in Brazil carried out by Cristo et al. (2019), of 16 animals affected by lymphoblastic leukemia, 14 were positive for FeLV (87.5%), of which only one (7.14%) had the chronic form, and the others (92.86%) the acute form.

The research was carried out with the objective of reporting a case of chronic lymphoblastic leukemia in a feline patient positive for FeLV,

METHODOLOGY AND REPORTING OF THE SERVICE

On October 29, 2022 (day 0), a 5-year-old cat, neutered, mixed-breed, weighing 2.760 kg, was treated at a veterinary clinic, in the feline medicine sector, under referral for blood transfusion and specialized clinical-therapeutic follow-up after being seen by a veterinarian colleague with a complaint of progressive prostration and hyporexia. In this previous consultation, a complete blood count was performed, in which alterations were observed, such as severe anemia (hematocrit of 10%, red blood cells 1.9 x 106/mm³) with signs of regeneration (14% of erythroblasts in differential leukocyte count and presence of mild anisocytosis) and leukocytosis (21,140/µL) by lymphocytosis (44% of the total leukocytes) with the presence of atypical mononuclear cells (22% of the total leukocytes). The animal already had a previous diagnosis of FeLV infection through a rapid ELISA test.

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The animal was admitted to hospitalization, and a whole blood transfusion was performed through a positive compatibility test with the donor animal. On the day after transfusion (day 1) and after clinical stabilization of the patient, spinal cord puncture was performed under general anesthesia to perform a myelogram and definitive diagnosis. Under the main suspicion of lymphoblastic leukemia due to the hematological changes observed and a history of FeLV infection, the animal's owner chose to start the chemotherapy protocol before the myelogram result. On the same day, the LOPH chemotherapy protocol was initiated (Chart 1), with the administration of prednisone 2.0 mg/kg SID (Prediderm®) and lomustine 9 mg PO.

48 hours after the transfusion (day 2), a new blood count was performed, in which improvement of the anemic condition was observed (Chart 2), absence of lymphocytosis and atypical cells in the leukogram. The patient was discharged from hospitalization because she already had improved behavior, normorexia, and normocored pink mucous membranes. In addition to corticosteroids, ondansetron hydrochloride 0.5 mg/kg TID VO or maropitant citrate (Cerenia®) 1 mg/kg SID PO was prescribed for motion sickness control and mirtazapine (Mirtz®) 2 mg/cat q48h PO as an appetite stimulant to be used throughout the protocol if necessary.

Table 1 – LOPH induction chemotherapy protocol

	PERIOD	LOPH*QUIMIOTERÁPIC PROTOCOL, DOSE AND ROUTE
CYCLE	THE ONE (1) is	Lomustine 6 mg/gato < 3kg, 9 mg/gato 3.0-4.5kg, 12 mg/gato 4.5-6.0 kg, 15 mg/gato >6kg VO
	Episode 2 (7th)	Vincristina 0,6 mg/m² IP
	SEMANA 3 (14º)	Doxorrubicina 1 mg/kg IV
	Episode 4 (21)	Vincristina 0,6 mg/m² IP
	SEMANA 5 (28º)	REST

*Concomitant administration of Prednisone with tapering of dose by 25% weekly.
Source: Survey data

Table 2 – Results of blood counts performed before and after transfusion

	PRE-TRANSFUSION	48h POST-TRANSFUSION
ERYTHROGRAM		
HEMATOCRIT (%)	10	20,3
HEMACIAS (106/mm³)	1,9	4,08
ERITROBLASTOS (%)	14	-
LEUKOGRAM		
TOTAL LEUKOCYTES (/µL)	21.140	6.280
NEUTRÓFILOS SEGMENTADOS (/mm³)	3.805	3.140
LYMPHOCYTES (/mm³)	9.302	2.763
ATOMIC MONONUCLEAR (/mm³)	5.302	-
PLATELETS (10³/mm³)	150	155

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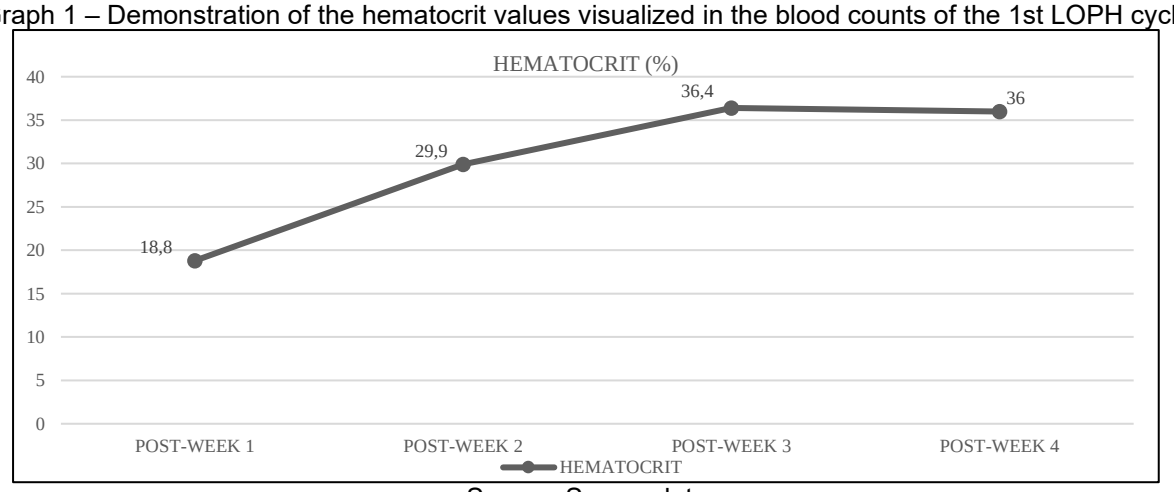
ABSOLUTE RETICULOCYTE COUNT (/mm³)	-	-

Source: Survey data

During the first week after the first chemotherapy session, the diagnosis of chronic lymphocytic leukemia was confirmed by myelogram results, which showed 96.0% of mature lymphocytes, 2.0% of mature erythroid cells, 1.0% of mature myeloid cells, and 1.0% of monocytes and macrophages (M:E ratio 0.33:1.0).

7 days after the beginning of the protocol (day 8), a new follow-up blood count and reticulocyte count examination were performed, in which satisfactory bone marrow regeneration was observed. During the first cycle, a sign of chemotherapy myelotoxicity was observed after the administration of both doses of vincristine provided for in the protocol, and significant neutropenia was observed in the blood counts performed after the chemotherapy sessions of the 2nd and 4th weeks of the cycle. Therefore, it was necessary to administer filgrastim (Filgrastine®) at a dose of 5 µg/kg via SC, institution of prophylactic antibiotic therapy with pradofloxacin 5 mg/kg SID PO (Veraflox®) and perform a new blood count after 48 hours. In all major episodes of neutropenia, the next scheduled chemotherapy session was postponed until neutrophil values were above 1,500/mm³. The hematocrit values visualized during the LOPH protocol are shown in Graph 1, and the blood counts in Chart 3.

Graph 1 – Demonstration of the hematocrit values visualized in the blood counts of the 1st LOPH cycle



Source: Survey data

Table 3 – Results of blood counts performed during the 1st cycle of the LOPH protocol

	LOPH PROTOCOL			
	POST-WEEK 1	POST-WEEK 2	POST-WEEK 3	POST-WEEK 4
ERYTHROGRAM				

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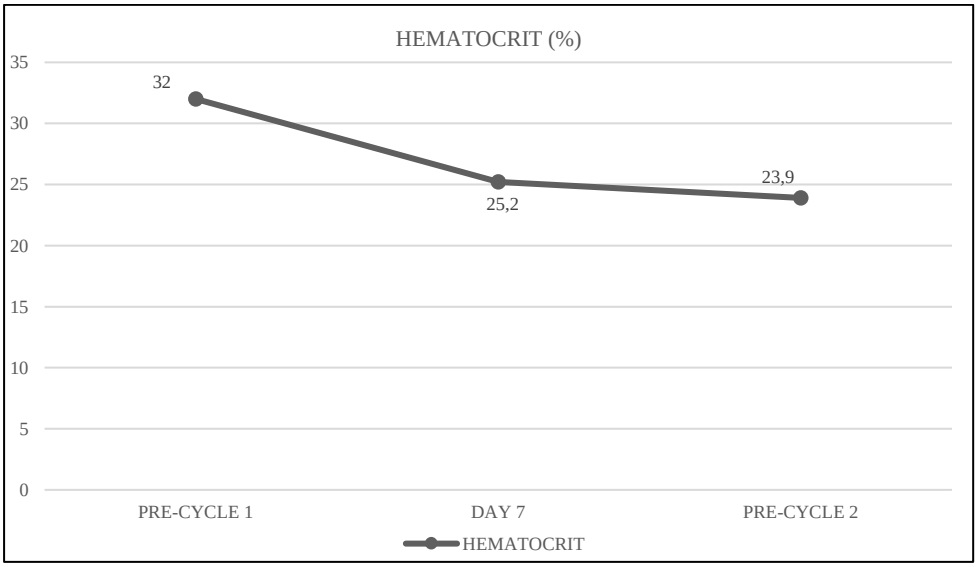
HEMATOCRIT (%)	18,8	29,9	36,4	36
HEMACIAS (106/mm³)	3,41	4,74	6,32	6,8
ERITROBLASTOS (%)	-	-	-	-
LEUKOGRAM				
TOTAL LEUKOCYTES (/µL)	36.238	3.730	4.140	2.300
NEUTRÓFILOS SEGMENTADOS (/mm³)	28.990	149*	1.904	437*
LYMPHOCYTES (/mm³)	4.711	3.544	2.111	736
ATOMIC MONONUCLEAR (/mm³)	-	-	-	-
PLATELETS (10³/mm³)	224	386	252	270
ABSOLUTE RETICULOCYTE COUNT (/mm³)	320.540	-	-	-

* Applied Filgrastim (Filgrastine ®) 5 µg/kg through SC
Source: Survey data

After the completion of the first cycle of the LOPH protocol, an attempt was made to institute a monthly chemotherapy protocol with oral administration of lomustine every 21 days. Between the blood count performed on the day before the beginning of the first cycle of the new protocol and the blood count performed 7 days after lomustine administration, a 6.5% drop in hematocrit was observed. On the 21st day of the cycle, a new blood count showed a drop in hematocrit to 23.9%. The hematocrit values visualized during the maintenance protocol are shown in Graph 2, and the blood counts are shown in Chart 4.

Graph 2 – Demonstration of hematocrit values visualized in the blood counts of the maintenance protocol



Source: Survey data

Table 4 – Results of blood counts performed during the chemotherapy maintenance period

	MAINTENANCE PERIOD		
	PRE-CYCLE 1 (1st day)	Day 7	PRE-CYCLE 2 (21st day)
ERYTHROGRAM			
HEMATOCRIT (%)	32	25,2	23,9
HEMACIAS (106/mm³)	6,4	5,12	4,81

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ERITROBLASTOS (%)	9	-	-
LEUKOGRAM			
TOTAL LEUKOCYTES (/µL)	5.028	4.000	11.270
NEUTRÓFILOS SEGMENTADOS (/mm³)	1.106*	1.280	2.479
LYMPHOCYTES (/mm³)	2.715	2.400	8.114
ATOMIC MONONUCLEAR (/mm³)	-	-	-
PLATELETS (10³/mm³)	277	250	140

*Applied Filgrastim (Filgrastine®) 5 µg/kg through SC
Source: Survey data

Due to the worsening observed in the erythrogram, it was decided to start the OCH rescue protocol (Chart 5), as well as return of oral corticosteroid therapy at 2 mg/kg.

Table 5 – OCH Chemotherapeutic Resgagate Protocol

	PERIOD	CHEMOTHERAPEUTIC PROTOCOL, DOSE AND ROUTE
CYCLE	THE ONE (1) is	Vincristina 0,6 mg/m² IP + Citarabina 300 mg/m² SC
	Episode 2 (7th)	Doxorrubicina 1 mg/kg IV
	SEMANA 3 (14º)	Vincristina 0,6 mg/m² IP + Citarabina 300 mg/m² SC
	Episode 4 (21)	REST

Source: Survey data

72 hours after the first session, a control blood count was performed to monitor the anemia observed in the previous examination, with a decrease in hematocrit to 12.8%, requiring a new transfusion. During the first cycle, only one application of filgrastim was required after the second week of chemotherapy, in which significant neutropenia was observed, and prophylactic antibiotic therapy with marbofloxacin 2 mg/kg SID PO for 7 days (Marbocyl P®) was also instituted. The hematocrit values visualized during the first cycle of the OCH protocol are shown in Graph 3, and the blood counts are shown in Chart 6.

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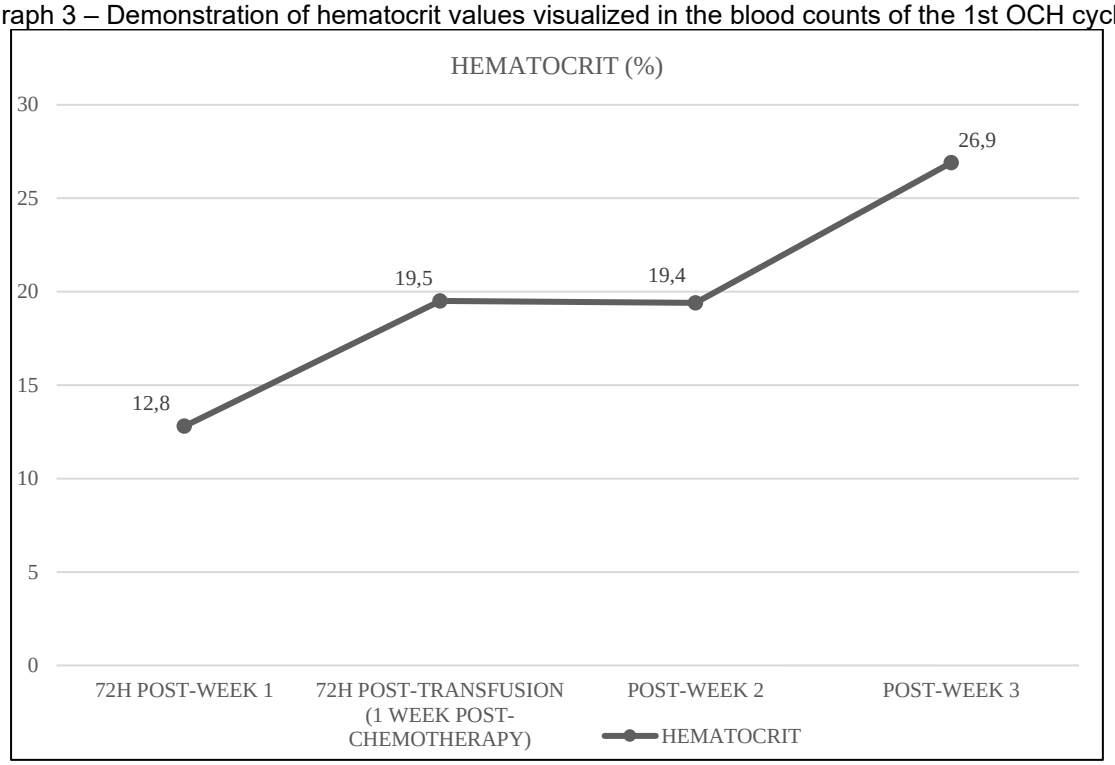
Graph 3 – Demonstration of hematocrit values visualized in the blood counts of the 1st OCH cycle



Source: Survey data

Chart 6 – Results of blood counts performed during the 1st cycle of the rescue protocol (OCH)

	PROTOCOL OCH1º CICLO			
	72h POST-WEEK 1	72h POST-TRANSFUSION(7 DAYS POST-WEEK 1) (PRE-WEEK 2)	POST-WEEK 2(PRE-WEEK 3)	POST-WEEK 3 (REST)
ERYTHROGRAM				
HEMATOCRIT (%)	12,8*	19,5	19,4	26,9
HEMACIAS (106/mm³)	2,41	3,82	3,62	4,34
LEUKOGRAM				
TOTAL LEUKOCYTES (/µL)	5.100	5.800	5.800	6.600
NEUTRÓFILOS SEGMENTADOS (/mm³)	663	3.132	804**	2.772
LYMPHOCYTES (/mm³)	3.029	1.914	4.365	2.442
PLATELETS (10³/mm³)	60	200	237	238

*Whole blood transfusion was performed. **Applied Filgrastim (Filgrastine®) 5 µg/kg via SC.
Source: Survey data

During the second cycle of the new protocol, seven days after the first week of chemotherapy, it was necessary to perform a new blood transfusion due to anemia and worsening of the patient's clinical condition. After the second week, due to febrile neutropenia, filgrastim was applied and prophylactic antibiotic therapy with pradofloxacin 5 mg/kg SID PO for 7 days (Veraflox®) was instituted. The hematocrit values visualized

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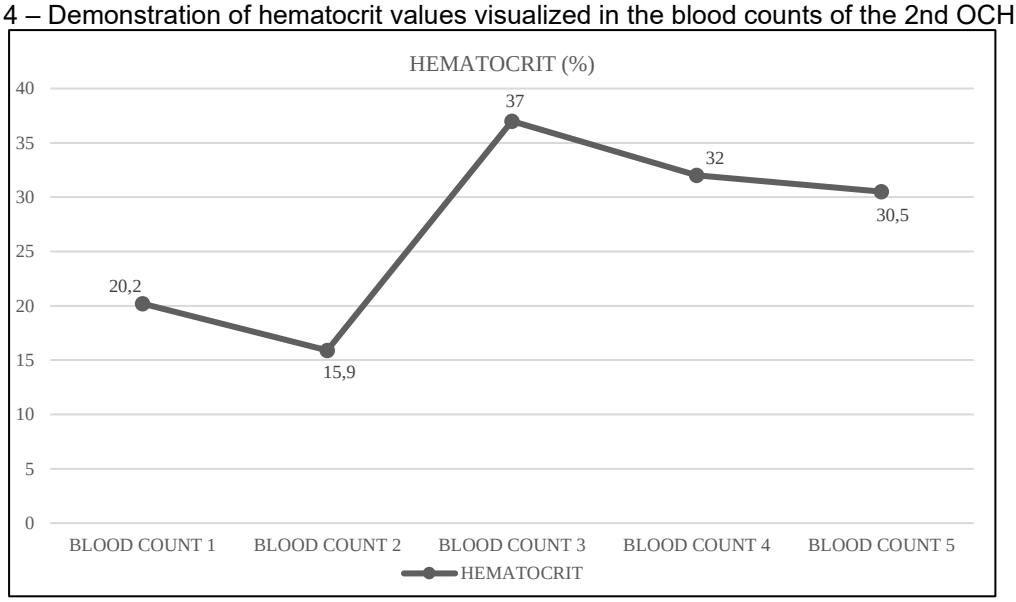
during the second cycle of the OCH protocol are shown in Graph 4, and the blood counts are shown in Chart 7.

Graph 4 – Demonstration of hematocrit values visualized in the blood counts of the 2nd OCH cycle



Source: Survey data

Chart 7 – Blood counts performed during the 2nd cycle of the rescue protocol (OCH)

	OCH PROTOCOL - 2ND CYCLE				
	PRE-WEEK 1	POST-WEEK 1 (PRE-WEEK 2)	48h POST TRANSFUSION	POST-WEEK 2(PRE-WEEK 3)	POST-WEEK 3 (REST)
ERYTHROGRAM					
HEMATOCRIT (%)	20,2	15,9*	37	32	30,5
HEMACIAS (106/mm³)	6,7	2,61	7,02	6,1	5,85
LEUKOGRAM					
TOTAL LEUKOCYTES (/µL)	7.300	8.400	3.084	2.450	4.800
NEUTRÓFILOS SEGMENTADOS (/mm³)	1.168	1.848	493	515**	2.256
LYMPHOCYTES (/mm³)	5.037	4.368	1.802	686	1.728
PLATELETS (10³/mm³)	160	145	150	180	190

*Whole blood transfusion was performed.**Filgrastim (Filgrastine®) 5 µg/kg was applied via SC.
Source: Survey data.

It was necessary to perform new blood transfusions in the third cycle (14th day, patient with hematocrit 14%) and prior to the beginning of the fourth cycle (patient with hematocrit 17.5%). A reticulocyte count test was requested during the third cycle, and a low rate of bone marrow regeneration was observed. Thus, anabolic steroid treatment was initiated with the administration of nandrolone decanoate (Deca-durabolin®) at 1 mg/kg via IM aiming mainly at spinal cord stimulation of erythroid lineage, with four applications being performed with a minimum interval of 7 days between each in the period of time during the third and fourth cycles. The hematocrit values visualized during the third and fourth cycles

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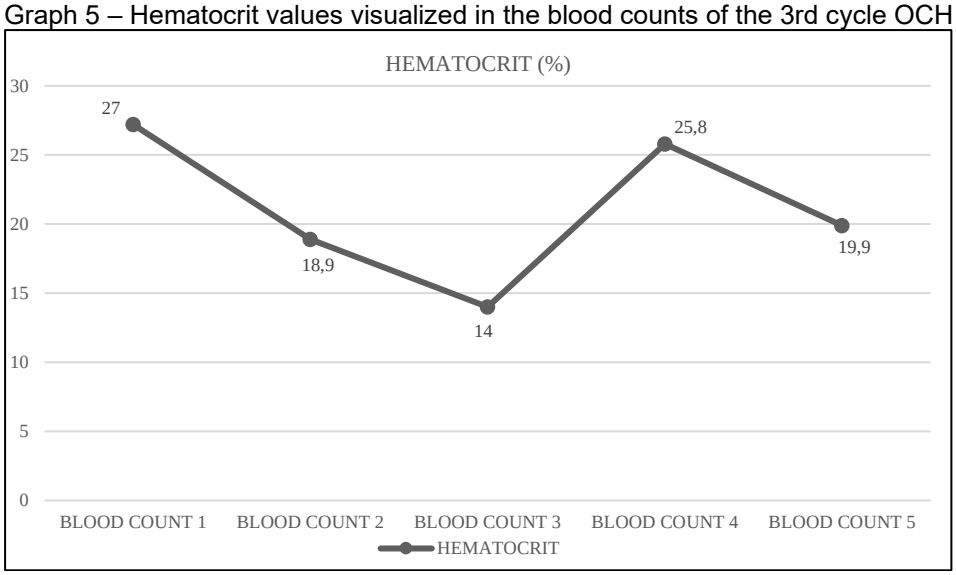
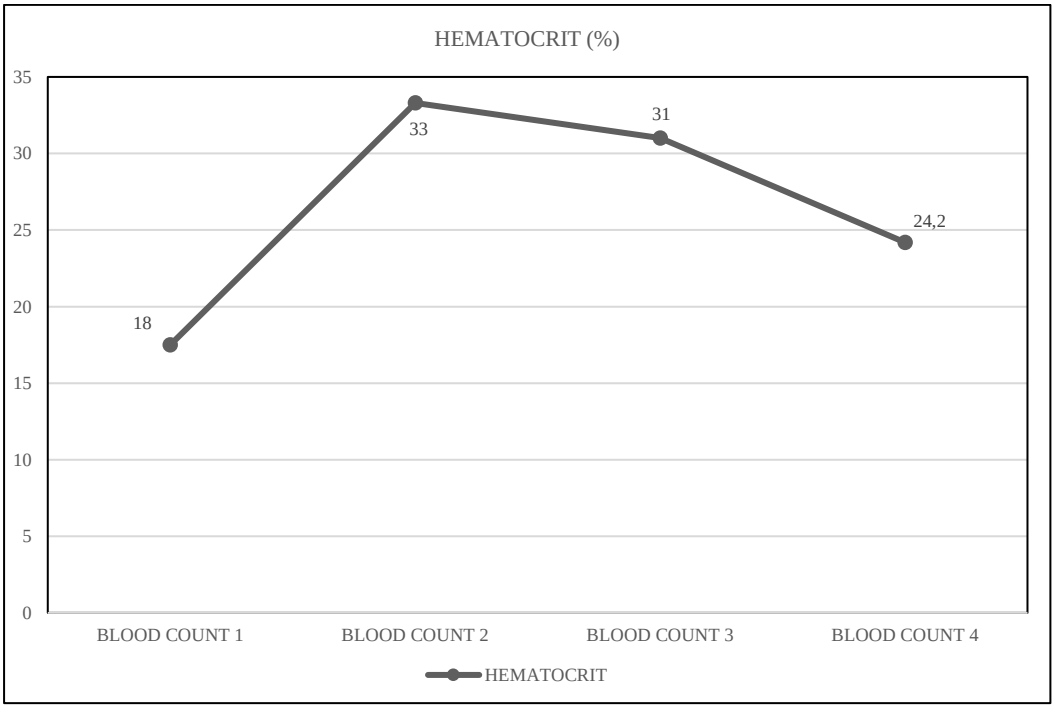
of the OCH protocol are shown in Graphs 5 and 6, respectively, and the blood counts in Tables 8 and 9.

Graph 5 – Hematocrit values visualized in the blood counts of the 3rd cycle OCH



Source: Survey data.

Graph 6 – Demonstration of the hematocrit values visualized in the blood counts of the 4th OCH cycle



Source: Survey data.

Chart 8 – Results of blood counts performed during the 3rd cycle of the rescue protocol (OCH)

	OCH PROTOCOL - 3RD CYCLE				
	PRE-WEEK 1	POST-WEEK 1 (PRE-WEEK 2)	POST-WEEK 2(PRE-WEEK 3)	48h POST TRANSFUSION	POST-WEEK 3 (PRE-WEEK 1 OF THE 4TH CYCLE)

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ERYTHROGRAM					
HEMATOCRIT (%)	27,2	18,9**	14*/**	25,8	19,9**
HEMACIAS (106/mm³)	5,16	3,51	2,9	4,81	3,95
ERITROBLASTOS (%)	-	-	17	-	-
LEUKOGRAM					
TOTAL LEUKOCYTES (/µL)	9.127	7.900	5.744	6.190	3.500
NEUTRÓFILOS SEGMENTADOS (/mm³)	821	632	976	1.052	980
LYMPHOCYTES (/mm³)	7.940	6.083	517	4.890	2.135
ATOMIC MONONUCLEAR (/mm³)	-	-	1142	-	-
PLATELETS (10³/mm³)	140	150	180	150	105
ABSOLUTE RETICULOCYTE COUNT (/mm³)	-	24.290	-	-	-

*Whole blood transfusion was performed.**Nandrolone Decanoate 1 mg/kg IM was administered.
Source: Survey data.

Table 9 – Results of blood counts performed during the 4th cycle of the rescue protocol (OCH)

	OCH PROTOCOL - 4TH CYCLE			
	POST-WEEK 1 (PRE-WEEK 2)	48h POST TRANSFUSION	POST-WEEK 2(PRE-WEEK 3)	POST-WEEK 3 (REST)
ERYTHROGRAM				
HEMATOCRIT (%)	17,5*	33.3	31	24,2**
HEMACIAS (106/mm³)	3,56	7,08	5,9	4,24
ERITROBLASTOS (%)	65	32	35	-
LEUKOGRAM				
TOTAL LEUKOCYTES (/µL)	4.848	1.970	3.615	31.000
NEUTRÓFILOS SEGMENTADOS (/mm³)	630	315	2.133	24.800
LYMPHOCYTES (/mm³)	1.454	571	615	6,200
ATOMIC MONONUCLEAR (/mm³)	PRESENT	PRESENT	-	-
PLATELETS (10³/mm³)	180	32	186	236

*Whole blood transfusion was performed.**Nandrolone Decanoate 1 mg/kg IM was administered.
Source: Survey data.

In June 2023, seven months after the diagnosis, the fifth cycle of the rescue protocol began (day 216). In the blood test prior to the first session, the patient already had mild anemia (23.8% hematocrit), with a 6.8% drop in hematocrit in the blood count performed seven days after this first session, and nandrolone decanoate was applied as previously described. Return of circulating atypical mononuclear cells was also observed. No improvement was observed in the blood count performed 48 hours after the previous examination, with the patient having 16% hematocrit and the presence of atypical mononuclear cells persisting. The hematocrit values visualized during the fifth cycle of the OCH protocol are shown in Graph 7, and the blood counts in Chart 10.

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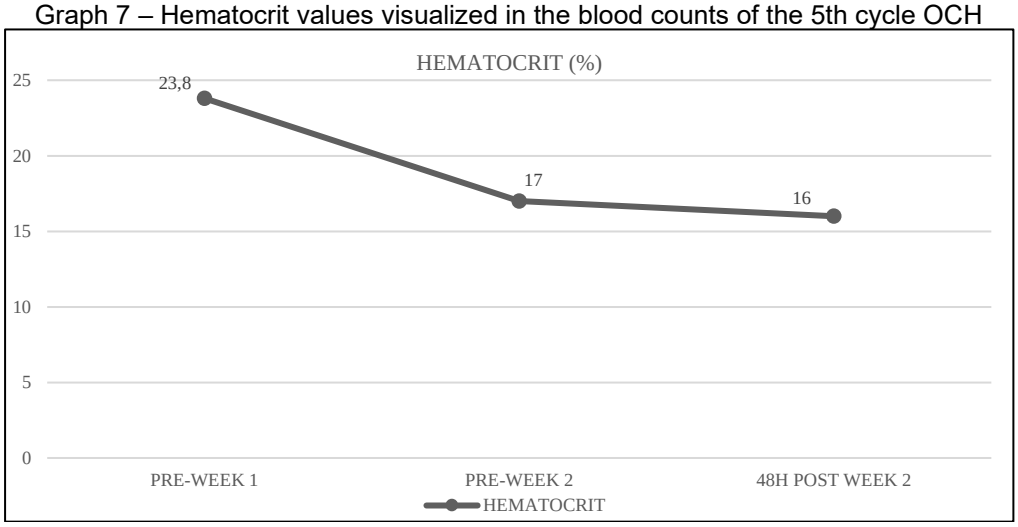
Graph 7 – Hematocrit values visualized in the blood counts of the 5th cycle OCH



Source: Survey data.

Chart 10 – Results of blood counts performed during the 5th cycle of the rescue protocol (OCH)

	OCH PROTOCOL - 5TH CYCLE		
	PRE-WEEK 1	POST-WEEK 1 (PRE-WEEK 2)	48h POST-WEEK 2
ERYTHROGRAM			
HEMATOCRIT (%)	23,8	17**	16
HEMACIAS (106/mm³)	4,89	5,6	3,4
ERITROBLASTOS (%)	-	62	13
LEUKOGRAM			
TOTAL LEUKOCYTES (/µL)	4.800	4.827	7.531
NEUTRÓFILOS SEGMENTADOS (/mm³)	1.296	579*	3.991
LYMPHOCYTES (/mm³)	2.544	2.510	602
ATOMIC MONONUCLEAR (/mm³)	-	PRESENT	340
PLATELETS (10³/mm³)	240	90	45

*Applied Filgrastim (Filgrastine®) 5 µg/kg via SC.**Nandrolone Decanoate 1 mg/kg through IM administered.
Source: Survey data.

The owner was talked about the worsening of the prognosis due to the hematological changes observed even with chemotherapy treatment, and that in order to continue with chemotherapy, a new blood transfusion would be necessary. The owner also reported clinical worsening of the animal during the last days of treatment, presenting prostration, fever, inappetence and adipsia, requiring forced feeding.

Faced with these factors, the owner chose not to continue the treatment and euthanize the patient, which took place on June 12, 2023 (day 226).

DISCUSSION

Chronic lymphoblastic leukemia is more reported in cats over 8 years of age and negative for FeLV (CAMPBELL; HESS; WILLIAMS, 2012), different from what is reported in this study. There is little literature regarding the treatment and prognosis of this neoplasm in

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felines, mainly associated with FeLV, since, especially in countries in the northern hemisphere, the prevalence of the virus currently reaches a maximum of 12% (BUCH; BEALL; O'CONNOR, 2017). In the study by Cristo et al. (2019), among 14 animals diagnosed with leukemia concomitantly infected by FeLV, only one had the chronic form of the neoplasm, but treatment and survival were not discussed. Campbell, Hess and Williams (2012) reported a mean survival of 14 months for FeLV-negative leukemic animals submitted to chemotherapy treatment, approximately twice that observed in this report.

In Espírito Santo, the state where the animal was cared for, the prevalence of FeLV is still considered high, and was the highest among those reported in the other states of the southeast, reaching 42.6% according to Gonçalves et al. (2021). It is not possible to prove the direct relationship between infection by the virus and the development of neoplasia. It is mentioned in the literature that carrier animals concomitantly affected by leukemia have a lower quality of life and life expectancy (LINENBERGER; ABKOWITZ, 1995), and may present recurrent episodes of myelo and immunosuppression (COTTER; HOLZWORTH, 1987), as observed in the animal reported in this case, making them susceptible to secondary infections and clinical decline.

Regarding the chosen induction chemotherapy protocol (LOPH), Horta et al. (2021) reported its use in the treatment of lymphoblastic leukemia in its acute presentation in a FeLV-positive patient. We found no reports in the literature on the use of the LOPH protocol in the chronic presentation of lymphoblastic leukemia in cats.

Horta et al. (2021) also reported the use of the D-MHC protocol (including dexamethasone, melphalan, doxorubicin, and cytarabine) in rescue treatment, resulting in 124 days of survival. The use of cytarabine was also reported by Smallwood, Harper, and Blackwood (2021) as a good chemotherapy option during the rescue protocol in lymphoid neoplasms. No complications associated with subcutaneous administration of the chemotherapy drug were reported in the studies reported by Horta et al. (2021), Smallwood, Harper, and Blackwood (2021), and Elliot and Finotello (2018), being a faster and more convenient option when compared to intravenous administration. In the present case, the drug was diluted in 40 mL of 0.9% NaCl in all applications, and no changes related to the route of administration were observed.

The only report in the literature of the association of FeLV with CLL was reported by Kyle and Wright (2010). The patient, an 8-year-old cat, was diagnosed by myelogram and submitted to initial chemotherapy treatment with chlorambucil and prednisolone. After

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recurrence of hematological alterations during treatment, rescue was performed with doxorubicin, lomustine and cyclophosphamide. Until the publication of the report, the animal had 10 months of survival since diagnosis, contrasting with approximately 7.5 months of survival of the patient reported in this study. At the time of its first care, however, the animal did not present hematological alterations such as anemia or neutropenia as reported in this present case, having mostly presented mild lymphocytosis. The absence of severe cytopenias during the diagnosis and treatment period may have positively interfered with its prognosis, since myelo and immunosuppression are directly linked to loss of life expectancy (COTTER; HOLZWORTH, 1987). In the animal reported in the present study, recurrent episodes of aregenerative anemia and febrile neutropenia requiring blood transfusions and prophylactic antibiotic therapy may have had a negative impact on its survival.

It is also possible that the successive episodes of anemia during the final weeks of treatment were caused not only by myeloftisis associated with leukemia, but also by the destruction of precursor cells of the erythroid lineage caused by FeLV, a condition that is difficult to reverse (JAVINSKY, 2011).

Regarding the use of filgrastim during neutropenia to stimulate the production of granulocytes by the bone marrow, an increase in the value of neutrophils was observed after the application of the drug in most of the times it was used, as seen by Horta et al. (2021). On the other hand, it was not possible to suggest the effect of the use of nandrolone decanoate as an adjuvant in the stimulation of erythroid lineage according to the observed red blood cell and hematocrit values.

FINAL CONSIDERATIONS

Although the patient had a lower survival rate than that reported in the scarce literature available on the treatment of CLL associated with FeLV, it was possible to obtain 226 days of survival, approximately 7.5 months, for a patient with a poor prognosis due to severe hematological alterations caused by the neoplasm observed since his first visit, making it possible to provide him with a longer time and quality of life since his diagnosis.

In a country that still has a high prevalence of feline leukemia virus, making animals susceptible to the development of neoplasms commonly associated with their infection, it is necessary to demonstrate therapeutic alternatives to obtain a better quality of life and life expectancy for these patients.

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