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Case Report

Chemotherapy Application on a Cat with Lymphoblastic Lymphosarcoma

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ABSTRACT

The case was a 2.5-year-old calico cat with an abdominal mass, which was brought from a private clinic to Ankara University, Veterinary Faculty, Animal Hospital, Internal Diseases Clinic. It was reported that the cat was operated 20 days ago, a mass of 8 cm in diameter near the jejunum was removed, but a second mass in the region was noticed in the investigation. The mass removed with operation was found to be Lymphoblastic lymphocarcinoma. In the ultrasonography, a two lobed mass of 3x4.5 cm in size was detected in the mesenterium near the liver. An alternative treatment was considered to be performed instead of reoperation on determining that the mass recurred in a very short time and was malignant as a result of the pathology. Considering that the cat was young and with good general condition, it was decided to administer chemotherapy. Modified Wisconsin Maddison method was selected for the chemotherapy. Shortly after the initiation of the chemotherapy protocol, chemotherapy had to be discontinued due to dense acid accumulation in the abdomen and deterioration of the general condition. Feline Corona Virus was detected positive in the cat scanned for subclinical diseases.

Keywords: Cat, Lymphoblastic Lymphosarcoma, FIP, Chemotherapy

INTRODUCTION

Lymphoma is the most common type of cancer in cats (Carreas et al., 2013; Mauldin et al., 1994). A prevalence of 160-200 in 100,000 has been determined (Vail et al., 1998). There are two types, large-cell *lymphoblastic lymphoma* and small-cell *lymphocytic lymphoma* (Taske et al., 2002; Simon et al., 2008). Lymphoblastic lymphomas are malignant and most prevalent in the gastrointestinal tract (Mahony et al., 1993; Zwahlen et al., 1998). When treatment is decided, the patient should be evaluated for age, gender, general condition and viral diseases (Remain et al., 2008; Moore et al., 1996). In the lymphoblastic lymphoma cases, operation, radiotherapy, chemotherapy and treatment protocols where these applications are used together are possible (Ogilvie, 1998; Elmslie et al., 1991). In patients to be treated with chemotherapy, variables such as character, locality, body condition, and preferred chemotherapy protocols differ in the treatment (Norsworthy et al., 2011; Moore et al., 1996). In lymphoblastic lympho-sarcomas, three chemotherapy protocols are mainly applied: Wisconsin-Madison (COP), Modified Wisconsin-Madison (Modified CHOP) and Wisconsin-Madison with doxorubucine (COPA) (Norsworty et al., 2011).

COP protocol consists of the active ingredients of cyclophosphamide, vincristine, and prednisolone, and

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although the success rate is reported as 79%, data regarding the mean life span could not be found. In modified CHOP protocol, L-asparginase, vincristine, cyclophosphamide, chlorambucil, doxorubicin and prednisolone are used. The success rate with modified CHOP was reported as 68% with the average life span of 225 days. In the COPA protocol, cyclophosphamide, vincristine, prednisolone, doxorubicin are used and the success rate was reported as 47% (Norsworty et al., 2011).

The chemotherapeutics applied in the treatment are calculated according to the body surface area of the patient. In this context, ready-made tables are used which convert body weight into body surface area (Krick et al., 1991). The monitoring of the chemotherapy can be followed by the Karnofsky Performance Status Scale. In this context, the patient is assessed and scored between 0-4 before the weekly cures are applied (Stein et al., 2010; Krick et al., 2011).

CASE PRESENTATION

A 2.5-year-old calico cat operated in a private clinic for an abdominal mass (8 cm in diameter) (Figure 1) in mesenterium close to jejunum and diagnosed with Lymphoblastic Lymphosarcoma was brought to Ankara University Veterinary Faculty Animal Hospital, Internal Diseases Clinic after the detection of a new mass in the abdomen 20 days after the operation.

Metastases were observed in the abdomen around the liver and spleen (Figure 2). The general condition was good and the mucous membranes were anemic, and the operation wound was not healed. In the hemogram, WBC was determined to be at the upper limit and biochemical values close to the reference range.

Since recurrence risk of the mass and presence of metastases support malignancy, an alternative treatment was considered to be performed instead of reoperation. Considering that the cat was young and with good general condition, it was decided to administer chemotherapy. Chemotherapy was scheduled for 25 weeks and Modified Wisconsin Maddison method was selected for the chemotherapy. Chemotherapy was started on the 4th day after the application (24th day after the operation) (Figure 3).

Body surface corresponding to the live weight of the cat (3,5 kg) was calculated to be 0,230 m^2 and the chemotherapies were dosed accordingly.

Chemotherapy was applied on the same days of the week. Chemotherapy was applied as below:

1st Week: Vincristine 0.5-0.7 mg/m^2 IV, L-asparginase 400 IU SC, Prednisolone 2 mg/kg PO,

Figure 1: The mass removed with operation.

2nd Week: Cyclophosphamide 200 mg/m^2 IV, Prednisolone 2 mg/kg PO,

3rd Week: Vincristine 0.5-0.7 mg/m^2 IV, Prednisolone 1 mg/kg PO,

4th Week: Doxorubicin 25 mg/m^2 IV, Prednisolone 1 mg/kg PO.

Ultrasonographic abdominal masses were examined weekly, then the efficacy of chemotherapy applied the previous week was evaluated with the Modified Karnofsky Performance Status Scale (Table 1).

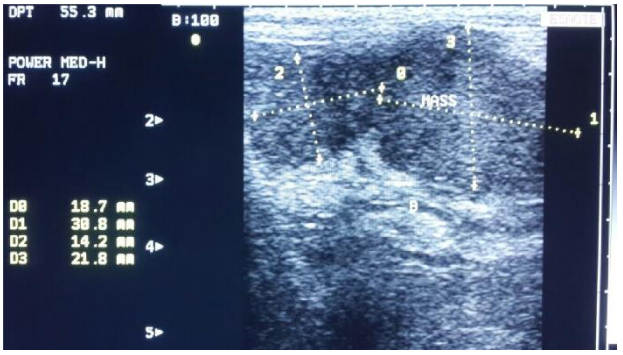

Figure 2: Two lobed mass of 4.5 cm in diameter detected in abdomen after post-operative 20 days.

Chemotherapy was administered after the weekly evaluation of the patient. According to the Modified Karnofsky Performance Status Scale, the patient was scored as "1" in the week when chemotherapy was applied. According to this, the activity of the cat was reduced compared to the pre-disease period, but it was considered to be at a self-care level. The patient showed anger after the first application.

Ultrasonographic examinations performed during the first three weeks of chemotherapy showed that the metastatic foci around the liver and spleen were enlarged. After 4 weeks of application, chemotherapy was interrupted at the 5th week according to the applied chemotherapy method. Chemotherapy was discontinued on the sixth week after the determination of changes in hematologic and biochemical values, decreased appetite and respiratory failure. At the eighth week, the mass in the spleen was observed to be

smaller. The mass in the liver could not be observed. Growth in the abdominal lymph nodes and a small amount of acid in abdomen were detected. In the ninth week, there was no growth in the mass in the spleen, but a mass of 1.5x1.7 cm in diameter was observed in the liver, and an increase in the amount of abdominal acid was determined (Figure 4a, 4b, 5a, 5b). At this time, FIP was determined in the cat investigated for subclinical disease and antibiotherapy was applied for FIP.

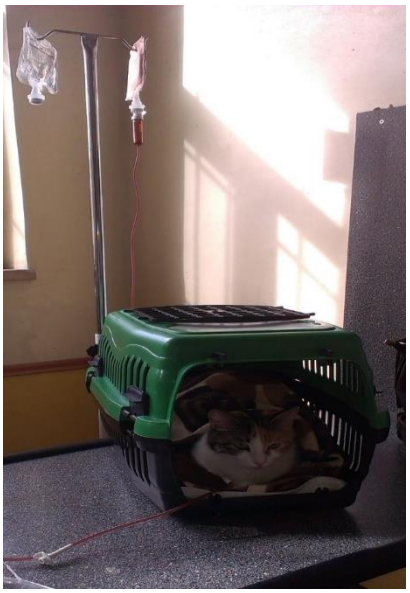

Figure 3: Application of chemotherapeutic medication in cat.

The owner of the patient wanted to stop the administration of chemotherapy since the tumoral masses did not disappear but increased in number, and requested the cat to be euthanized when the general condition deteriorated.

Stages of Disease	Scoring	Clinical Table
Normal Period	0	Clinically unchanged period compared to the pre-disease period.
Limited Period	1	There is a decrease in movements compared to the pre-disease period, the patient can care for self.
Dangerous Period	2	The patient can only stand for food intake, defecation and urination and is in a lying position at other times.
Central Period	3	Parental feeding is required. Defecation and ability to control urination is inadequate.
Time of Death	4	The period the patient died.

Table 1. Modified Karnofsky Performance Status Scale

It was learned that the patient who was taken and followed at home had difficulty breathing and wanted to sleep on the cold floor. Canned food, oral olive oil and paraffin were suggested for the cat to help defecation, whose appetite has never been cut off, as the proliferation of abdominal masses have formed a transition problem in the intestinal tract. In the ultrasonography applied fifteen days later, abdominal masses could not be observed while it was determined that the ascites increased. Pleural effusion was observed in addition to the ascites in daily check-up of the cat for one week. Although ascites develop in the presence of abdominal mass, clinical findings were evaluated to be more likely FIP-specific.

At this stage, the treatment in FIP was applied to the patient who was brought to the clinic every day. Pleural effusion was extracted and respiration was relieved. Famodin tablet, prednol tablet, amoclavin and ventolin syrup were administered.

Figure 4a: Abdominal effusion during chemotherapy

Figure 4b: Abdominal effusion after chemotherapy.

Zylexis and interferon (As there is no patented sale of Feline Interferon in Turkey, Human Interferon α type I was administered as SC at a dose of 1000000 IU/kg) was administered for immunomodulation three times daily. These applications lasted for a week. Due to the deterioration of the general condition of the cat, these applications were discontinued at the request of the owner. Two days later, the cat was reported dead. In the necropsy performed two hours after the death of the cat died at the 12th week, it was observed that the mesenteric lymph nodes enlarged and masses with the diameter of 1.5x0.5x0.2 cm in the spleen and 1 cm in the liver were observed.

DISCUSSION

In the studies performed, it was seen that the malignant lymphoma cases in the cats were more closely related to the gastrointestinal tract (Carreas et al., 2013; Mahony et al., 1993; Teske et al., 2002). In this study, location close to jejunum of the mass removed by the operation is also compatible with the subsequent recurrences be present in the mesenterium located around the gastrointestinal tract. In addition, metastases were found in the necropsy, mediastinum, liver and spleen.

In the treatment of lymphoblastic lymphosarcoma, the researchers used surgery, radiotherapy, chemotherapy or combined treatments (Ogilvie, 1998; Elmslie et al., 1991; Shelton et al., 1990). Although the most radical approach to cancer is seen as a surgical approach, postoperative radiotherapy or chemotherapy is recommended to prevent possible metastases in malignant cases. The initiation of postoperative chemotherapy is recommended post-operative 7-10 days after removal of the sutures (Shelton et al., 1990). In this case, chemotherapy could be started on the post-operative 24th day because the cat was removed from the Elizabeth collar after operation, licked the sutures and delayed tissue healing. Because of this delay, the malignant tumor could not be prevented from metastasizing.

In the literature review, it was found that COP, modified COP and COPA chemotherapies were the main protocols used in lymphoblastic lymphosarcomas in cats (Norswoethy et al., 2011). The mean survival time was determined as 210 days in the COP protocol and 273 days in the Modified COP protocol (Norswoethy et al., 2011; Milner et al., 2005). Under the light of this information, Modified Wisconsin-Madison protocol was preferred. However, before half of the chemotherapy protocol was completed, symptoms related to FIP were observed in the patient's clinic and the cat could be kept alive for 91 days, far below the average life span reported in the literature. Although this result, which

Figure 5a, b: Abdominal appearance; **a:** abdominal effusion during chemotherapy **b:** abdominal effusion after chemotherapy.

is far below the mean survival time, seems to be a failure, chemotherapy was found to be successful because of observing pauses and diminution of masses showing tendency of aggressive growth. The current table is mostly associated with FIP.

In a retrospective study, Shelton et al. (1990) reported that there is a strong correlation between FeLV virus and malignant lymphoma cases in cats and also that FIV virus may be associated with malignant lymphomas independently of this table. In their study, Louwerens et al. (2005) reported that FeLV virus and lymphoma coexist. In this study, while FeLV and FIV were found negative, Feline Corona Virus was positive in subclinical diseases. This result differs from similar literature.

It was concluded that chemotherapy contributed to the shrinkage of tumoral masses in lymphoblastic lymphocarcinoma in the cats, but the detection of subclinical infectious diseases was important before the initiation of immunosuppressive treatment.

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REFERENCES

Carreas JK, Goldschmidt M, Lamb M, McLear RC, Drobatz KJ, Sorenmo KU. Feline Epitheliotropic Intestinal Malignant Lymfhoma: 10 Cases (1997-2000). *J Vet Intern Med*. 2013; 17(3):326-331.

Elmslie RE, Ogilvie GK, Gilette EL, McChesney-Gilette S. Radiotherapy with and without chemotherapy for localized lymphoma ın 10 cats. *Veterinary Radiology*. 1991; 32(6):266-312.

Krick EL, Moore RH, Cohen RB, Sorenmo KU. Prognostic significance of weight changes during treatment of feline lymphoma. *J Fel Med Surg*. 2011; 13:976-983.

Krick EL, Cohen RB, Gregor TP, Salah PC, Sorenmo KU. Prospective Clinical Trial to Compare Vincristine and Vinblastine in a COP-Based Protocol for Lymphoma in Cats. *J Vet Intern Med*. 2013; 27:134-140.

Mahony OM, Moore AS, Cotter SM. Alimentary lymphoma in cats: 28 cases (1988-1993). *J Am Vet Med Assoc*. 1995; 207:1593-1598.

Mauldin GE, Mooney SC, Meleo KA. Chemotherapy in 132 cats with lymphoma (1988-1994). *Vet Cancer Soc Proc*. 1995; 15:35-36.

Milner RJ, Peyton J, Cooke K, Fox LE, Gallagher A, Gordon P, Hester J. Response rates and survival times for cats with lymphoma treated with the United of Wiscconsin-Madison chemotherapy protocol: 38 cases (1996-2003). *J American Vet. Med. Ass*. 2005; 227(7): 1118-1122.

Moore AS, Cotter SM, Frimberg AE. A comparison of doxorubicin and COP for maintenance of remission in cats with lymphoma. *J Vet Intern Med*. 1996; 10:372-375.

Norsworthy GD, Crystal MA, Grace SF, Tilley LP. *The Feline Patient, Four Edition. Chapter*. 2011; 34:76-80.

Ogilvie GK. Chemotherapy and the surgery patient: Principles and Recent Advances. *Clinical Techniques in Small Practice*. 1998; 13(1): 22-32.

Reiman RA, Mauldin GE, Mauldin GN. A comparison of toxicity of two dosing schemes for doxorubicin in the cat. *J Fel Med Surg*. 2008; 10(4):324-331.

Shelton GH, Grant CK, Cotter SM, Gardner MB, Hardy WD, DiGiacomo RF. Feline Immunodeficiency Virus and Feline Leukemia Virus Infections and Their Relationships to Lymphoid Malignancies in Cats: A Retrospective Study (1968-1988). *J Acquired Immune Deficiency Syndromes*. 1990; 3:623-630.

Simon D, Eberle N, Laacke-Singer L, and Nolte I. Combination Chemotherapy in Feline Lymphoma: Treatment Outcome, Tolerability, and Duration in 23 Cats. *J Vet Intern Med*. 2008; 22:394-400.

Stein TJ, Pellin M, Steinberg H, Chun R. Treatment of Feline Gastrointestinal Small-Cell Lymphoma with Chlorambucil and Glucocorticoids. *J Am Anim Hosp Assoc*. 2010; 46(6):413-417.

Teske E, van Straten G, van Noort R and Rutteman GR. Chemotherapy with Cyclophosphamide, Vincristine, and Prednisolone (COP) in Cats with Malignant Lymphoma: New Results with an Old Protocol. *J Vet Intern Med*. 2002; 16(2):179-186

Vail DM, Moore AS, Ogilvie GK. Feline lymphoma (145 cases): Proliferation indices, cluster of differentiation 3 immunoreactivity, and their association with prognosis in 90 cats. *J Vet Intern Med*. 1998; 12:349-354.

Zwahlen CH, Lucroy MD, Kraegel SA. Results of chemotherapy for cats with alimantery malignant lymphoma: 21 cases (1993-1997). *J Am Vet Med Assos*. 1998; 213:1144-1149.