Case Report

Radiologic and clinicopathologic evaluation of invasive thymoma in a domestic shorthair cat

Ali Evren Haydardedeoğlu[1]*, Mehmet Fatih Bozkurt[2] İsmail Özkaptan[3], Hasan Hüseyin Demirel[4], Hadi Alihosseini[3], Ekrem Çağatay Çolakoğlu[5]

[1]Department of Internal Medicine, Aksaray University, Aksaray, Turkey,58100

ORCID: 0000-0002-8473-0072

[2]Department of Pathology Afyon Kocatepe University, Afyonkarahisar Turkey,03030

ORCID: 0000-0002-1669-0988

[3]Department of Internal Medicine, Therapist Veterinary Medical Center Istanbul (Etiler)

ORCID: 0000-0001-8846-4827

[4]Department of Pathology, Afyon Kocatepe University, Bayat Vocaitonal Scholl Afyonkarahisar Turkey

ORCID: 0000-0002-4795-2266

[5]Department of Internal Medicine, Ankara University, Ankara, Turkey,06100

ORCID: 0000-0003-2789-035X

Corresponce

Department of Internal Medicine, Aksaray University, Aksaray, Turkey,58100

E- mail: aehaydardedeoglu@gmail.com

Abstract

A 5-year-old, female spayed, domestic shorthair cat was referred to University hospital, Veterinary Faculty, Internal Medicine Small Animal Clinic according to owner anamnesis the main complaints were respiratory distress accompanying with variable appetite, weight loss and sometimes cough crisis. In the preliminary examination, abnormal lung sound and dyspnea was achieved in thoracic auscultation. Thoracic radiographs showed a mass in the cranial mediastinum causing caudal displacement of the cardiac silhouette and cranial lung lobes. There was no evidence of metastatic disease. Routine blood work were normal and virological examination feline leukaemia virus (FeLV) and feline immunodeficiency virus (FIV); the tests for both viruses were negative. The cytological examination of fine needle aspiration of the chest cavity and the diagnosis of thymoma but couldn't enough for diagnose. Al final surgically resection was made and mass is diagnosed thymoma Type B1 according to Human WHO classification by examination of histopathology and immunohistochemistry.

Keywords: Cat, pathology, immunohistochemistry, surgery, thymoma

Introduction

Thymoma is an uncommon tumour in dogs and cats and there are few population-based reports on the incidence of this tumour. The etiology of thymoma in cats and dogs is unknown. Thymoma is typically a slowly growing tumour of relatively benign behavior. Most tumours are quite well encapsulated but some may be locally invasive of adjacent structures. Metastasis is rare (Morris and Dobson, 2008). Thymoma may be associated with autoimmune paraneoplastic syndromes, in particular myasthenia gravis and occasionally polymyositis, and with an increased incidence of non-thymic neoplasm (lymphoma, pulmonary adenocarcinoma and haemangiosarcoma) (Aronsohn, 1985). Thymomas originate from thymic epithelium but are variably and even predominantly infiltrated with mature lymphocytes. The epithelium is the neoplastic component. Squamous cell carcinoma has been rarely documented to arise within feline thymomas, (Brown et al., 1985). Also thymolipoma has been reported in a cat (Closa et al., 1999).

Routine hematological/biochemical analyses are not generally very helpful in establishing a definitive diagnosis of thymoma. Fine needle aspiration is the least invasive method of obtaining cytological material from a mediastinal mass and with the aid of ultrasound guidance, this is a relatively safe technique. However, although cytology can be useful in the diagnosis of mediastinal lymphoma (on the basis of finding large numbers of lymphoblasts) it is not a reliable method for diagnosis of thymoma. Histopathology and immunohistochemistry are final examinations for diagnose of thymomas and their types. Most affected animals are 6 to 9 years of age. In the latter study cats were aged from 5 to 14

years (mean 9.10 years), four were male, three were domestic short hair, one domestic long hair and one Siamese (Morris and Dobson, 2008). The aim of the present case report was to described a cat with thymoma.

Case History

A 5-year-old, female neutered, domestic shorthair cat There is a cough crisis history Medical management of clinic situation during 10 days systemic antibiotic and anti-inflammatory therapy by other veterinarians has been failed. In the preliminary examination, abnormal lung sound and dyspnea were achieved in thoracic auscultation Thoracic radiographs showed a mass (Figure 1) in the cranial mediastinum causing caudal displacement of the cardiac silhouette and cranial lung lobes. There was no evidence of metastatic disease. Transthoracic cytologic examination of the chest cavity on the cranial thoracic mass with Wright's Giemsa stain for diagnosis of thymoma and cytological examination was referred to surgery. Request of the owner in accordance with the patient, intrathoracic mass (Figure 2-3) was removed in the operation at a private clinic. The tumour was surgically excised, fixed in formalin, and sent to the Department of Veterinary Pathology of the Afyon Kocatepe University, Turkey.

Figure 1. Radiographic view of mass.

Tracheal tube (Figure 4) was inserted during the operation of the tumour taken from the drainage X-rays were taken 3 days after surgery tracheal control tube removed Clinical remission was successfully.

Macroscopic and Microscopic Evaluation

Material from the operation of the front thoracic region 4.5x2.5x2 cm in size, located in fat tissue around the wide, elastic consistency, cross-sectional face, gray-white colour and has multi-lobular appearance (Figure 3A-3B).

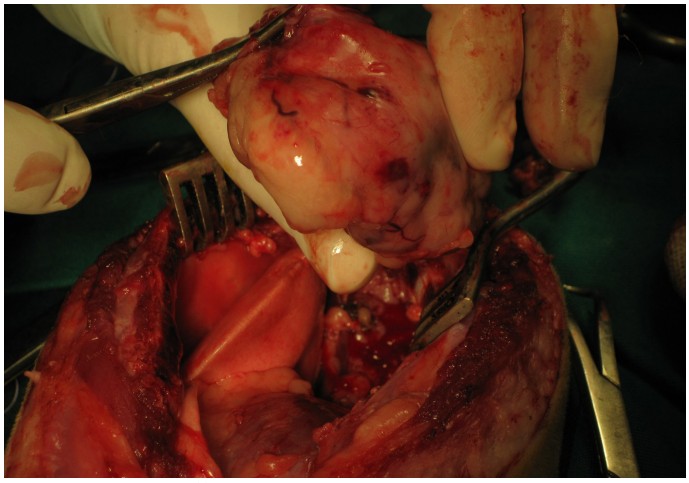

Figure 2. Surgically resection mass

Figure 3. Macroscopical view of mass (A), cut-section (B)

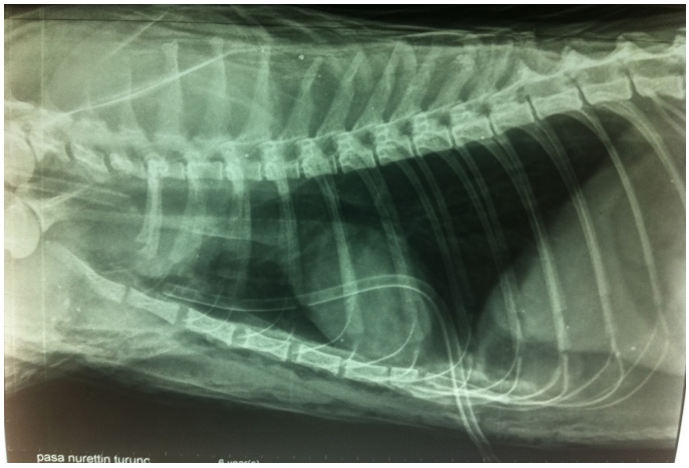

Figure 4. Radiographic view of thoracic tube during the operation for drainage.

Mass, were fixed with buffered formalin solution. After Routine follow-up, tissues were cut 5-6 microns thick to adhesive slides. Slides were stained with hematoxylin-eosin (HE) and avidin-biotin-peroxidase (ABC) immunohistochemical staining methods. Immunohistochemically, Cytokeratin, CD3, CD79a antibodies, ABC kit, and 3-Amino-9-Ethylcarbazole (AEC) chromogen were used. Mayer's hematoxyline was used for background. All slides were covered with aqueous mounting medium and were examined by light microscopy.

In the microscopic examination; narrow eosinophilic cytoplasm of epithelial cells that were had oval big and vesicular nucleus with prominent single nucleolus, and lymphoid cells were observed (Figure 5-6). Neoplastic and lymphoid cells were infiltrated into peripheral fat tissue like structures of thymic tissue. Immunohistochemical examination of medullary regions, especially intense in all areas of diffuse positivity for cytokeratin (Fig. 7) was seen. Nearly all lymphoid cell cytoplasm were have intense membranous CD3 positivity (Fig. 8). Also CD79a positivity is poor cortical and medullar areas. The mass was removed from thoracic cavity, was diagnosed thymoma. According to the classification of human medicine (Travis et al., 2004). histopathologically was classified as B1.

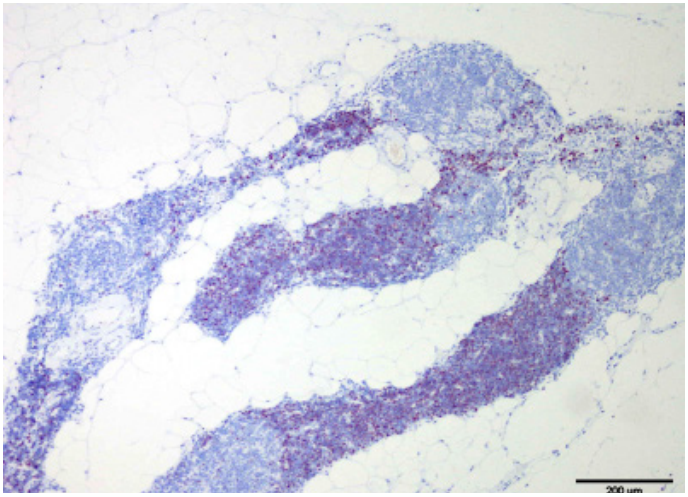

Figure 5. The appearance of the neoplastic epithelial cells and lymphoid cells. HE.

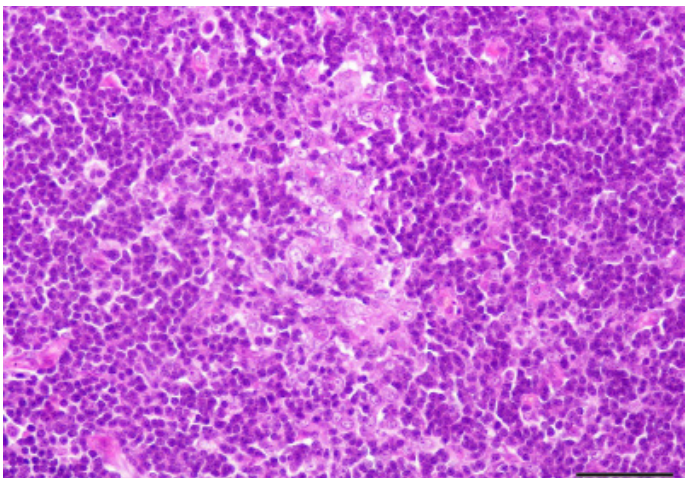

Figure 6. Close-up view of neoplastic cells. HE

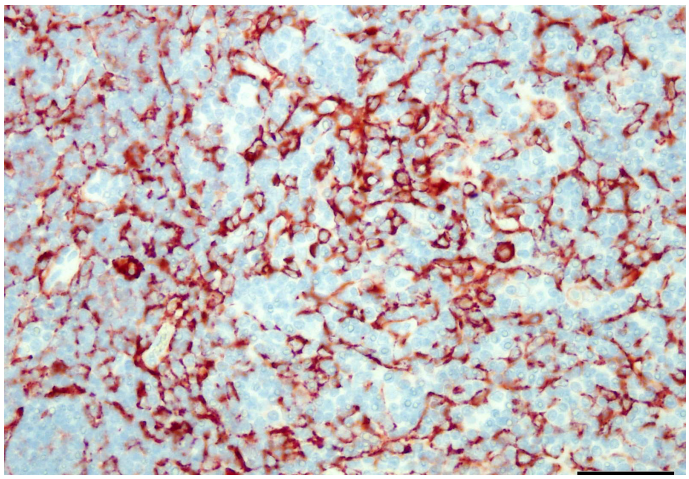

Figure 7. Cytokeratin positive tumor cells. AEC choromagen, Mayer's hematoxilene.

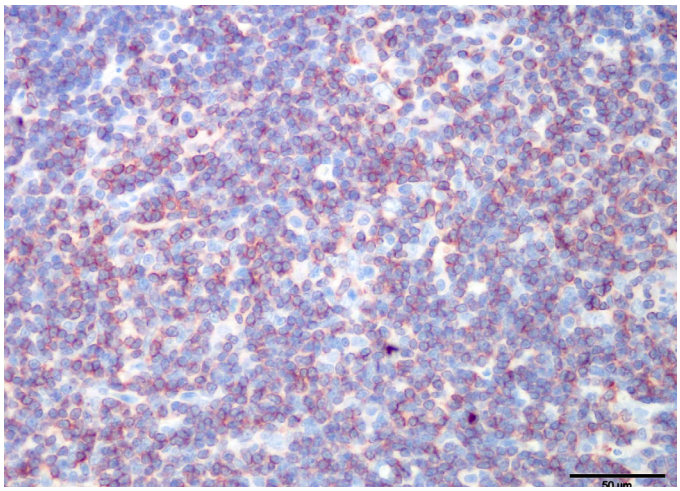

Figure 8. Membranous CD3 positive lymphoid cells. AEC choromagen, Mayer's hematoxilene.

Clinical follow-up information

Complete remission and never recurrence and metastasis of the tumour has been in the case of domestic shorthair cat.

Discussion

Thymoma is an uncommon tumour in dogs and cats and there are few population-based reports on the incidence of this tumour. The aetiology of thymoma in cats and dogs is unknown. Thymoma is typically a slowly growing tumour of relatively benign behaviour. Most tumours are

quite well encapsulated but some may be locally invasive of adjacent structures. Metastasis is rare (Morris and Dobson, 2008). Thymoma is a rare diagnosis in the dog and cat. The tumor arises from the epithelium of the thymus but is usually permeated with small, mature lymphocytes (Withrow, 2000). Derived from the thymus epithelial neoplastic changes are relatively uncommon for pets. Therefore, subtypes are only classified as being benign and malignant tumors based on clinical behavior (Hishima

et al., 1994; Jacobs et al., 2002; Stenner et al., 2003). Burgess et al. have been reported examined 31 dog's thymomas retrospectively and they have described them a similar manner to the classification like made by WHO (Travis et al., 2004; Burgess et al., 2013), on human thymomas. But for cats, there are no available such a classification yet. In this classification is made on the basis of similarity thymus tissue, morphological appearance of the thymus epithelial cells, which also contained amount of T lymphocytes in the tumor. These types are classified 6 main groups; composed of spindle cells, medullary type A; spindle cells mixed of epithelioid cells, mixed type AB; rich in lymphoid cells, organoid type B1; cortical type B2; epithelial, squamoid type B3 and showing prominent atypical cells, thymic carcinomas (Travis et al., 2004). In the histopathologic examination, cytokeratin-positive cells that have vesicular nuclei with prominent nucleoli were seen in the wide cortical areas. These neoplastic cells accompanied by marked mount CD3 positive lymphocytes. Also a small number of Hassal's bodies and perivascular spaces were observed. Thus our thymoma was diagnosed type B1 according to human classification of WHO (Travis et al., 2004). In this classification is reffered to the prognoses is going worst from type A to thymic carcinomas (Travis et al., 2004). In the case has not encountered of postoperative metastasis in compatible with this classification. Detailed examination of this rare tumour in cats are thought shared by us to contribute to the classification can be made in the future.

Acknowledgement

We would like to thank the Veterinary Medical Center Ateş Barut and Oğuz Kuzucu for the operation images and radiological images. This paper was published as abstract in Turkish Small Animal Veterinary Association Congress.

References

Aronsohn, M. (1985). Canine thymoma. Veterinary Clinics of North America: Small Animal Practice, 15(4), 755-767.

Brown, N.O., Patnaik, A.K., MacEwen, E.G. (1985). Canine hemangiosarcoma: retrospective analysis of 104 cases. Journal of the American Veterinary Medical Association, 186(1), 56-58.

Burgess, K.E., DeRegis, C.J., Brown, F.S., Keating, J.H. (2016). Histologic and immunohistochemical characterization of thymic epithelial tumours in the dog. Veterinary and Comparative Oncology, 14(2), 113-121.

Closa, J.M., Font, A., Mascort, J. (1999). Pericardial mesothelioma in a dog: long-term survival after pericardiectomy in combination with chemotherapy. Journal of Small Animal Practice, 40, 383–386.

Hishima, T., Fukayama, M., Fujisawa, M., Hayashi, Y., Arai, K., Funata, N., Koike, M. (1994). CD5 expression in thymic carcinoma. The American journal of pathology, 145(2), 268.

Jacobs, R.M., Messick, J.B., Valli V.E. (2002). Tumors of the skin hemolymphatic system. In: Meuten DJ, editor. Tumors in Domestic Animals. 4th edition. Ames, Iowa, USA: Iowa State Press, 119–198.

Morris, J., Dobson, J. (2008). Miscellaneous Tumours, In: Small Animal Oncology. John Wiley & Sons. WB Saunders Blackwell published, 262.

Stenner, V.J., Parry, B.W., Holloway, S.A. (2003). Acquired myasthenia gravis associated with a non-invasive thymic carcinoma in a dog. Australian Veterinary Journal, 81: 543–546.

Travis, W.D., Brambilla, E., Muller-Hermelink, H.K., Harris, C.C. (2004). World Health Organization classification of tumours. Pathology and genetics of tumours of the lung, pleura, thymus and heart, 10, 179-184.

Withrow, S.J. (2000). Miscellaneous tumours: Th-