A report on the surgical extraction of thymoma in cats: 3 Cases

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Abstract
It is at present case reports of thymoma cat's not enough yet. For three cases in this study, we experienced a course of treatment and diagnostic methods, each providing a different report. Thymoma was diagnosed in 3 cats by combining fine needle aspiration biopsy with an ultrasound test, which was followed by surgical extraction. Using this method, 2 cases were diagnosed as thymoma, but in 1 case, diagnosis could not be confirmed. This suggested that new diagnostic methods are needed. Moreover, in three inner 2 cases, radiotherapy was the first hope. By radiotherapy, involution of thymoma was clearly accepted by two inner 1 case. It extracted surgically after involution of thymoma. There are few case reports which conducted the surgical operation after radiotherapy. In future, it may also be necessary to consider the use of standard radiotherapy in combination with the surgical procedure and evaluate the survival time of the patients. I hope that many case reports are made more in the future.

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1. Introduction
Thymoma in cats is a neoplastic disease originating in the thymus epithelium and is rarely observed in feline leukemia virus (FeLV)-negative cats 8 or more than 8 years of age. Difficulty in breathing is the most common symptom, followed by various secondary immunologic diseases such as myasthenia gravis, polymyositis, and exfoliative dermatitis (Gregory et al., 2003). On the basis of their histology, the tumors can be classified into 3 types: predominantly lymphocytic tumor, epithelial tumor, and hybrid tumors. The clinical behavior of thymoma differs from case to case. Thymoma is mainly classified as an isolated noninvasive tumor wrapped in the tunicate. On the basis of differential diagnosis, thymoma may be identified as mediastinum-type lymphoma, which is frequently observed in cats (Withrow et al., 1996). This finding is reported to be highly significant, since the post diagnosis treatment is different between the 2 pathologies (Gregory et al., 2003). In cases involving cytological diagnosis by fine-needle aspiration biopsy (FNA) without any other diagnostic criteria, misdiagnosing a thymoma as a mediastinum type lymphoma is a clinical concern. In FNA, adult lymphocytes are the predominant cell type in thymomas, and epithelial ingredients and mast cells may also be present. On the other hand, lymphoblasts are the predominant cell type in lymphomas. An ultrasound test is also useful in the differential diagnosis of a front mediastinal tumor, where the thymoma is mainly observed as cystoidal and lymphoma, parenchymal. Surgical extraction is considered to be an effective cure for thymoma (Linda et al., 1991). In addition, radiotherapy (RT)
is also reported (Kaser-Hotz et al., 2001) to be effective.

2. Objective

In this study, we diagnosed 3 cases of cat thymoma by combining FNA and an ultrasound test followed by treatment with surgical operation, which yielded new knowledge regarding this disease.

3. Case report

3.1 Case 1

A Japanese female cat aged 8 years and 1 month and weighing 3.85 kg, with contraception, presented with the chief complaint of loss of appetite. The cat was negative for both feline immunodeficiency virus (FIV) and FeLV, and marked abnormalities were not observed on the blood test. A 2.5 × 4 cm tumor without the presence of hydrothorax was confirmed in the front mediastinum by chest radiography. On computed tomography (CT) inspection, a tumor the size of the heart was confirmed in the front part of the chest. Although there were no signs that the blood vessels had entered the tumor because the tumor itself was not imaged with contrast media, a thin blood vessel and the main artery were observed in the circumference of the tumor (Fig. 1). The epithelial portion was considered to be the thymus epithelium and adult lymphocytes were extracted by FNA. The tumor was not substance-like on the ultrasound test (Fig. 2), indicating that the tumor was a thymoma. Therefore, the tumor was extracted by surgical operation using median sternotomy. The extracted tumor was wrapped in the tunic and was pathologically diagnosed as an epithelium-dominant type thymoma. Since blood-like hydrothorax was extracted after the operation, thoracotomy was carried out. Hemostasis treatment was performed again using bone wax because a clotting lump was observed alongside the sternum incision. Moreover, taking into consideration the exudation of blood from the pericardium and surrounding adipose tissue, a pericardium excision was performed. Recurrence of the disease has not been observed 1380 days after the operation.

3.2 Case 2

An American Shorthair female cat aged 10 years and 2 months and weighing 3.15 kg, with contraception, presented with the chief complaint of difficulty in breathing. The cat was diagnosed with a thymoma in another animal hospital and visited our hospital for RT. Decreasing neutrophil and lymphocyte counts were observed on blood test. There were no marked abnormalities on both biochemical and solidification system inspections. Using X-ray examination, the tumor was observed in the front part of the chest, with slippage towards the left hand side without hydrothorax. CT revealed a 4 × 5 × 10 cm tumor in the front part of the chest, with slippage towards the left hand side (Fig. 3). A view showing permeation in the circumference of internal organs and the involvement of blood vessels was not seen. Using contrast media, the tumor margins were reinforced, but the central part of the tumor, which is divided into 2 or more compartments by the partition, was not reinforced. In FNA, small lymphocytes were the dominant cell type. On image inspection, s cyst-like structure was observed inside the tumor (Fig. 4), and after puncturing the cyst under an ultrasonic guide, the size of the tumor became approximately half the original size due to the exudation of approximately 37 ml of reddish-brown liquid. On the basis of these results, the tumor did not seem to be a lymphoma, and the treatment effect of radiography seemed low because of the cyst-like structure. Therefore, we thought it was a thymoma, and treated it with surgical operation. Although the operation was first conducted using an intercostal approach, according to the expected size of the tumor, it was changed to a 4th to 6th intercostal approach in combination with cutting through the 4th rib after the size of tumor was found to be larger than expected. Although the membrane

Figure 1: Case 1. CT: A thin blood vessel and main artery were observed in the circumference of the tumor

Figure 2: Case 1. Ultrasound: tumor was not substance-like
structure of the tumor was observed, part of the tumor had adhered to marginal tissues. As a result of pathological diagnosis, the tumor was identified as a lymphocytic predominant type breast adenoma, and the tumor cells that had not been extracted were observed. Although local recurrence was detected on the 715th day after the operation, the cat is still surviving 940 days postoperation.

**Figure 3:** Case 2. CT: A 4 × 5 × 10 cm tumor was observed in the front part of the chest with left side slippage.

**Figure 4:** Case 2. Ultrasound: Cyst-like structure was observed in the inside of the tumor.

### 3.3 Case 3
A Japanese female cat aged 5 years and 3 months and weighing 3.25 kg, with contraception, presented with the chief complaint of loss of weight without loss of appetite. The cat was both FIV- and FeLV-negative. The cat was diagnosed with a thymoma by a chest radiograph, an echo examination, and FNA at another animal hospital, and visited our hospital for RT. Blood test detected an increase in the number of white blood cells, and the lymphocyte increase, in particular, was remarkable. A comparatively big tumor was observed in the front part of the chest, on radiographic inspection. Although neither blood vessel involvement nor cyst formation was observed on CT laboratory findings, the heart was pushed to the right (Fig. 5). In FNA, adult lymphocytes were predominantly identified, but not mast cells or epithelial cells. The substance-like structure of the tumor became apparent in the ultrasound test (Fig. 6), and lymphoblasts were not detected on inspection of the smear of the hydrothorax. On the basis of the above results, thymoma was indicated, but we were unable to eliminate the possibility of a lymphoma. Therefore, we decided to carry out RT based on the suggestions of the patient and family doctor and the size of the tumor. RT was performed once by gate irradiation with a dose of 6 Gray, and the tumor size was notably reduced. On the blood test performed just after RT, reduction in both neutrophil and blood platelets were observed. The tumor reduced to approximately one-third of its original size as determined by radiographic inspection, and the reduction of the tumor was also confirmed by CT imaging (Fig. 7). However, the patient decided to opt for surgical intervention because it was difficult to visit the hospital every week for RT. A median sternotomy was performed, and the tumor was extracted. Although a tunic structure was not seen and the extraction of the tumor was difficult, remarkable infiltration of the circumference organization was not observed, and on pathological diagnosis, the tumor was classified as a hybrid-type thymoma. The postoperative course is good and recurrence of the disease has not been observed 790 days postoperatively.

**Figure 5:** Case 3. CT: Involvement of neither blood vessel nor cyst formation was observed.

**Figure 6:** Case 3. Ultrasound: A substance-like structure of the tumor was apparent.
4. Discussion

When diagnosing a thymoma, it is important to distinguish thymoma from a lymphoma. The fact remains that cytological diagnosis by FNA under an ultrasonic guide is useful for thymoma diagnosis. On the other hand, it may be difficult to diagnose in cases where the lymphocyte infiltrates are predominant in the tumor. Therefore, invasive diagnosis, such as thoracotomy, is needed. As reported here, the diagnostic accuracy for thymoma can be improved by combining FNA and an ultrasound test. However, there are tumors that are difficult to diagnose as thymoma only by an FNA and ultrasound test, like in case 3. Therefore, further diagnostic characteristics, such as a clonality inspection (Keller et al., 2012), should be established. In performing surgical treatment of thymoma, the appropriate method can be determined by evaluating the location of the tumor, permeation in circumference organization, etc., by CT inspection. Although tumor capacity may contract with RT before an operation and surgical resection may be carried out more easily, it is necessary to consider that there may be a case in which the effects of RT cannot be predicted. On the contrary, when recurrence of the tumor after an operation is suspected, RT may be effective as an auxiliary treatment, for lymphocytic predominant type thymoma. As for the results of RT, a case that remitted only with the combined use with an antineoplastic drug has also been reported (Smith et al., 2001). Moreover, there is also a report (Linda et al., 1991) of a case that was controlled for 4 years with RT alone. On the other hand, a report (Zitzet al., 2008) indicates that the median overall survival after only extraction is 1825 days. In addition, there are few reports (Smith et al., 2001) of combined surgical operation and RT. In the cat, the report which carried out the extraction way after RT is not included. With the dog, it has been reported (Smith et al., 2001) by the partial extraction after RT, and combined use of the chemotherapy that survival time is 226 days. However, it has passed satisfactorily by surgical operation after RT, like in case 3.

Unfortunately, most reports do not include long-term survival data. Moving forward, it may also be necessary to consider the effect of standard RT combined with surgical procedure on survival time.

Research Highlights

There is a risk that leads to erroneous conclusions in the diagnosis of only ultrasound or FNA. Therefore, it is performed both ultrasonography and FNA, the diagnosis is recommended. It may also be hysterectomy is useful as a therapeutic method, but it is considered that performing the CT scan is important in that case.

Limitations

In the case report of this time, because the type of the tumor was different each, it may be the same as the one case report.

Recommendations

That in many cases, to perform a diagnostic method by ultrasonography and FNA, to explore for its usefulness is desired.

Funding and Policy Aspects

None.

Justification of Research

In this study, I was using the diagnosis by ultrasonography and FNA. Further, to perform surgical removal as treatment was performed preplanning with CT. Thus, it was possible to advance the treatment safely.

Conclusion

Number of cases is small, but recognition is generally thymoma in cat. However, criteria for surgery are not clear. This time, I was able to easily make the surgical plan by CT and ultrasound. And to report a case of experience, a good case also the postoperative course. Future, such as the study criteria of long-term survival data is desired.

Author’s Contribution and Competing Interests

None of the authors of this paper has a financial or personal relationship with other people or
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**References**


