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Case Report

Abdominal Wall Hibernoma in a Cat: A Case Report [1]

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Abstract

Hibernoma is a very rare benign tumor of brown fat tissue which is found in hibernating and non-hibernating mammals. Until now, it has been reported in rats, dogs, and human beings. In this case report, a thirteen-year-old, spayed, female Siamese cat was examined for intestinal motility disorder. Local obstruction of the colon descendens was observed on radiographs 72 h after contrast medium administration. In order for the abdominal organs to be examined, diagnostic laparotomy was performed. A mass 1 cm in diameter located on the abdominal wall showing adhesion to mesenterium of the colon descendens was observed and completely removed. Post-operative treatment was maintained by intestinal diet, metoclopramide, and enrofloxacin administration. Histopathological examination of the mass revealed hibernoma, a benign tumor of brown fat tissue. Further immunohistochemical analyses were performed to evaluate the origin and behavior of the tumor by using S-100 and osteopontin antibodies. As a result, immunohistochemical staining was positive for S-100 and was weakly positive for osteopontin antibodies. In the presented report, a case of hibernoma in a cat was described with the clinical, histopathological, immunohistochemical findings and treatment procedure.

Keywords: *Abdominal wall, Brown fat tissue, Cat, Hibernoma, Tumor*

Bir Kedide Abdominal Hibernoma: Olgu Sunumu

Öz

Hibernoma, kış uykusunda ve kış uykusunda olmayan memelilerde bulunan, çok nadir görülen, iyi huylu bir kahverengi yağ dokusu tümörüdür. Bugüne kadar farelerde, köpeklerde ve insanlarda bildiren raporlar bulunmaktadır. Bu olgu sunumunda; on üç yaşında, kısır, dişi bir Siyam kedisi bağırsak motilite bozukluğuna yönelik muayene edildi. Kontrast madde verilmesinden 72 saat sonra radyografilerde colon descendens'te lokal obstruksiyon gözlendi. Abdominal organların incelenmesi için diyagnostik laparotomi yapıldı. Karın duvarında, colon descendens ile mezenteryum adezyonuyla karakterize 1 cm çapında bir kitle gözlendi ve kitle tamamen çıkarıldı. Ameliyat sonrası tedavi; intestinal diyet, metoklopramid ve enrofloksasin uygulamasıyla sürdürüldü. Kitlenin histopatolojik incelemesinde; kitleye kahverengi yağ dokusunun iyi huylu tümörü olan Hibernoma tanısı konuldu. Tümörün orijinini ve biyolojik davranışını değerlendirebilmek için S-100 ve osteopontin antikorları kullanılarak, immünohistokimyasal analizler yapıldı. Sonuç olarak, immünohistokimyasal boyamalarda tümör dokusu S-100 için kuvvetli pozitifken, osteopontin'e karşı çok zayıf pozitif yanıt verdi. Bu yazıda, bir kedide saptadığımız hibernoma klinik, histopatolojik, immünohistokimyasal bulgular ve tedavi prosedürü birlikte sunulmuştur.

Anahtar sözcükler: *Hibernoma, Karın duvarı, Kahverengi yağ dokusu, Kedi, Tümör*

INTRODUCTION

Brown fat was defined by Velch in 1670 as a specialized fat tissue found in hibernating and non-hibernating animals; such as rats, monkeys, cats, rabbits, and human beings [1]. Brown fat tissue allows the non-shivering thermoregulatory function by the dissipation of energy through the production of heat in the condition of cold induced stress. Therefore, brown fat tissue plays a particular role for small mammals, neonatal human beings, rodents and hibernating animals [2-4]. Hibernoma is rare, benign soft tissue tumor of this specialized brown fat and can occur both in human beings and animals. It was first described as "pseudolipoma" in human beings by Merkel in 1906 [1]. Thereafter, the term so-called "hibernoma" was given by Gery in 1914 [1], because of its morphological resemblance

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to the hibernating gland in hibernating animals. This case report presents clinical, histopathological and immunohistochemical findings of a hibernoma in a cat.

CASE HISTORY

A thirteen-year-old, spayed, female Siamese cat with intestinal motility disorder, including difficulties in defecation and constipation, was brought to the veterinary clinic. On physical examination, the cat was found to be severely lethargic, dehydrated and the body condition score was 6/9. In addition to these findings, the cat also had chronic periodontal disease. Body temperature and respiratory examination were normal. Laboratory findings, total blood test and biochemistry parameters indicated no signs for anemia. In biochemistry total protein (8.3 g/dL), albumin (4.0 g/dL), glucose (158 mg/dL), blood urea-nitrogen (43.0 mg/dL) and globulin (4.3 g/dL) counts were found mildly high that was found to be associated with severe dehydration. The increased level of the globulin was found related to the periodontal disease. Severe abdominal defense was observed during abdominal palpation. On ultrasonographical examination, the peristalsis of the intestine was found abnormal and distention was observed in the area of the large intestine. Severe intestinal distention was observed at the radiography, and the patient was examined by further radiological tests with contrast material to differentiate obstructive or non-obstructive distention. As a result, local obstruction of the colon descendens was observed on radiographs 72 h after iohexol contrast media (Omnipaque; GE Healthcare) administration (700 mg iodine/kg with an iodine concentration of 300 mg iodine/mL diluted with tap water until a total volume of 10 mL/kg, via an orogastric tube) *(Fig. 1)*. The patient then was referred to median laparotomy to determine the reason of the obstruction. Surgical laparotomy was performed under general anesthesia and a mass 1 cm in diameter was found on the abdominal wall showing adhesion with increased adipose tissue to mesenteric margin of the colon descendens. The mass and the increased adhesive adipose tissue were completely removed, and the omentalization of the area was carried out. The mass was submitted to Pathology Department of IUC Veterinary Faculty for histopathological examination. Postoperative treatment was provided with intestinal diet (digestive care i/d, Hills) and with metoclopramide (Metpamid; Sifar) 1.0 - 2.0 mg/kg/d IV as a constant rate infusion with isotonic serum for 72 h as a parenteral fluid replacement to treat the severe dehydration and general condition of the animal. Then the additional application for metoclopramide (Metpamid; Sifar) was initially provided with 0.2 mg/kg, SC, q8h for 4 days and then given orally

Fig 1. Radiographic appearance of the cat 72 h after contrast agent administration. The obstruction could be seen in the colon descendens

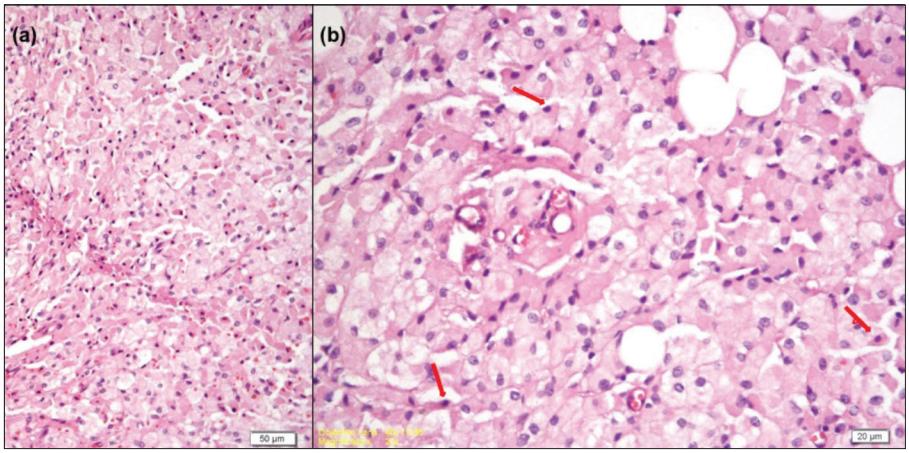

Fig 2. a,b: Abdominal mass. The cells have eosinophilic cytoplasm with numerous small vacuoles and centrally or eccentrically located nucleus (some of these cells have picnotic nucleus, red arrows), Hematoxylin and eosin (X 200 and X 400)

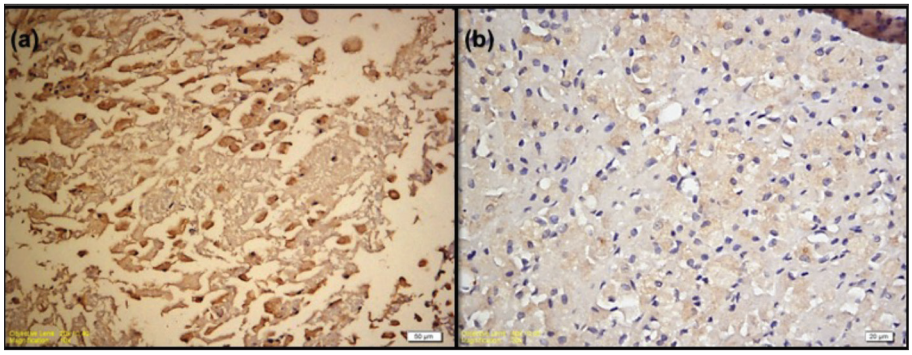

Fig 3. a: Abdominal mass. Brown fat tissue cells show moderate to a strong positive reaction in their cytoplasm after staining with anti-S100 antibody, Peroxidase immunohistochemistry (X 400); **b:** Abdominal mass. Brown fat tissue cells give weak positive immune reaction to osteopontin, Peroxidase immunohistochemistry (X 400)

for 7 days, and with enrofloxacin (Baytril; Bayer) 5 mg/kg, q24h, SC, for 10 days.

The mass was cut into small pieces, then was fixed in 10% formaldehyde solution. The tissue pieces were routinely processed and embedded in paraffin blocks. Tissue sections of 4 µm thickness were cut and stained with Hematoxylin & Eosin for histological examination. In addition, immunohistochemical analyses were performed on tissue sections using S-100 protein and osteopontin antibodies. The tissue sections were incubated in citrate buffer (pH.6) in the microwave oven at 800W for 20 minutes for the antigen retrieval. Endogenous peroxidase activity was blocked with 3% hydrogen peroxide. Tissue sections were covered with anti S-100 protein antibody (RTU-S100p, Novocastra, Leica, Newcastle, UK) (ready to use), and anti-osteopontin antibody (Ab8448, Abcam, Cambridge, UK) (ready to use) for 1 h at room temperature. Thereafter, incubation with peroxidase-conjugated HRP-conjugated secondary antibodies (ready to use) (859043, Life Technologies, Frederick, USA) were applied on the sections for both primary antibodies. The immunochemical reaction was developed using 3,3-diaminobenzidine tetrahydrochloride (DAB) (002020, Invitrogen, Frederick, USA).

On macroscopic examination, the mass was 1 cm in diameter, well demarcated, greasy, lobulated, grey to light brown color and had soft consistency. The cut surface of the mass was also light brown color and in soft consistency. Histopathological examination revealed randomly distributed lobules, which were supported by thin fibrovascular septa. The cells were large, round to polygonal adipocytic cells and ramified small capillaries. They had eosinophilic cytoplasm with numerous small vacuoles and centrally or eccentrically located nucleus *(Fig. 2-a,b)*. In addition, there were only a few mononuclear cells scattered between the brown fat tissue cells. According to these typical histological properties, the case was diagnosed as hibernoma. Immunohistochemistry for S-100 revealed a moderate to strong positive reaction in the cytoplasm of the brown fat tissue cells *(Fig. 3-a)*, but weak positive immune reaction to osteopontin was observed in the cytoplasm of the brown fat tissue cells *(Fig. 3-b)*.

DISCUSSION

Hibernoma is an uncommon, benign soft tissue tumor, and so far has been reported in human beings [5-7], rats [8,9] and dogs [10-13]. Hibernoma is thought to have derived from residual brown fat tissues which are most frequently found in the periscapular and interscapular region, the neck, axilla and shoulder, thorax, retroperitoneum and less frequently in thigh, popliteal fossa, buttock, intracranial sites [1] and breast [14]. Among them, thigh has been reported as the most common anatomical localization for hibernomas in human medicine [5,15], rather than neck, shoulder, back, axilla, mediastinum and abdominal cavity [5,16]. In veterinary medicine, brown fat tissue has been demonstrated in interscapular, perirenal, and caudal subcutaneous adipose depots of adult cats [17]. On the other hand, hibernomas have been documented in varying locations in rats [8] and in dogs, they have been documented in corneum [12], subcorneum [13] and omentum [10,11]. In this case report, hibernoma was diagnosed in the abdominal wall and showed adhesion to the mesenteric margin of the colon descendens.

Clinical observation of hibernoma manifests slowly growing-painless soft tissue mass [1]. However, the clinical manifestation in this case was different. The adhesion of the mass and increased adipose tissue together had a compressive effect on the serosa of the colon which led to intestinal motility disorder.

Macroscopic findings of the tumor in this case was compatible with the macroscopic description for hibernoma [1]. Histo-pathology revealed typical features of hibernomas by showing large, oval to polygonal brown fat cells with small capillary proliferation and the stromal background. The adipocytes were multivacuolated and had abundant, eosinophilic cytoplasm and a small central nucleus. The histopathologic features were found consistent with the pathological findings of hibernoma described in a study [5]. In the same study, histopathological findings of hibernoma have been divided in different variants, which are myxoid, spindle cell and lipoma-like hibernomas. Histopathologic findings in this case were attributed to lipoma-like hibernoma among these variants.

In this case, the positive immunoreactivity with S-100 protein supported the findings of other studies in which hibernomas give positive reaction to S-100 protein [5,10,18] in 85% of all hibernoma cases and in all histopathologic variants [5]; although it is not a specific marker for hibernoma. Furthermore, the case was also evaluated by osteopontin immunostaining to evaluate the biological behavior of the tumor. Because osteopontin is an important molecular marker for determining the behavior of the soft tissue tumors and extensive studies confirm that highly expressed osteopontin refers a malignant potential [19]. Here, a very weak positive reaction obtained with osteopontin was attributed to be the benign behavior of hibernoma.

Curative treatment can be possible by complete surgical excision for hibernomas [5,20,21]. Reoccurrence does not happen and neither metastases nor malignancy has been reported [1]. In this report, the intestinal motility disorder of the cat was treated by the complete removal of the mass and omentalization of the surgical area. In addition, post-operative treatment was provided to treat the general condition of the cat. No recurrence has been observed since the post-operative period.

As a conclusion, this case report contributes to literature by presenting hibernoma in a cat. Histopathologic features of the tumor were found characteristic for hibernoma. Immunohistochemical findings for S-100 were compatible with the previous studies. Furthermore, the weak immune reaction to osteopontin confirmed the benign behavior of hibernoma. The intestinal motility disorder of the cat was improved by the surgical excision of the mass. The condition of the cat is known to have remained stable since the termination of the treatment.

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