Acta Scientiae Veterinariae
ISSN: 1678-0345
ActaSciVet@ufrgs.br
Universidade Federal do Rio Grande do Sul
Brasil

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Acta Scientiae Veterinariae, vol. 44, 2016, pp. 1-5
Universidade Federal do Rio Grande do Sul
Porto Alegre, Brasil

Acta Scientiae Veterinariae, 2016. 44(Suppl. 1): 134.

CASE REPORT
Pub. 134

ISSN 1679-9216

Idiopathic Diffuse Lipomatosis in Dogs

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ABSTRACT

***Background*:** Idiopathic diffuse lipomatosis is a rare disease in veterinary medicine. It is characterized by excessive proliferation of adipocytes, which results in the formation of fatty tumours throughout the body. In humans, this disease is also known as Madelung's disease or multiple symmetric lipomatosis and is classified as type I and II. The aim of this study was to investigate two cases of dogs diagnosed with idiopathic diffuse lipomatosis and compare their characteristics with those found in humans.

***Cases*:** *Case 1* - A 3-year-old standard poodle female was taken for veterinary evaluation for a slow-growing tumoural lesion over the neck and trunk. The tumours measured >30 cm in diameter that caused irregular and protruding folds resulting in a significant loss of body architecture. No clinical signs of adjacent systemic disease were observed. Elliptical excisions of the skin revealed diffuse mature adipocytes and hyperplastic and dysplastic lipoblast hypertrophy of the panniculus, which was associated with epidermodermal hypotrophy and skin appendages. The combination of these findings supported a diagnosis of idiopathic diffuse lipomatosis. The animal underwent surgical therapy. However, the clinical symptoms recurred within two months. Owing to the continuous recurrence of tumours and history of three other surgeries, it was decided to euthanize the animal. *Case 2* - An 11-year-old female cocker spaniel preenting tumoural lesions of insidious evolution and widespread distribution. Clinical examination revealed the presence of multiple subcutaneous tumours in the lateral, lumbosacral, and abdominal regions of the pelvic limb. No clinical signs of adjacent systemic disease were observed. Biopsies of tumoural lesions also supported the diagnosis of idiopathic diffuse lipomatosis. The animal was fed a low-calorie diet, after which its body weight decreased without inducing any changes in tumour size. In addition, the animal underwent surgical treatment for removal of the largest tumours. After surgery, the animal was monitored for 1 year and showed no tumour recurrence.

***Discussion*:** In veterinary medicine, lipomatosis is an extremely rare disease. Therefore, before diagnosing a case, it is necessary to exclude other proliferative disorders of the adipose tissue, among which, the most common are lipomas and liposarcomas. There are no genetic studies related to lipolytic activity or adipocyte proliferation in animals. However, it is believed that the aetiology of idiopathic diffuse lipomatosis is similar to the pathophysiology of the human form of multiple symmetrical lipomatosis, and could be associated with a primary lipid metabolism disorder. In this study, the two cases described showed a distinct distribution in the type of tumours. In case 1, the tumours were well defined and focused in the cervical and thoracic region, a pattern similar to human type I lipomatosis. However, in case 2, the fat accumulations were diffuse and mainly located in the posterior region of the animal's body similar to type II lipomatosis. No animals presented intra-abdominal or intrathoracic fat infiltration, diagnosed by ultrasound or radiography. There is no description of any treatment capable of being effective. However, surgical procedures are recommended to minimize the occurrence of tumours and improve the quality of life of the affected animals. In the two cases described in this study, it was difficult to completely resect the tumours. In the first case, the recurrence of fatty deposits and performance of multiple interventions resulted in a poor quality of life of the animal, which was finally euthanized to avoid further suffering. Therefore, frequent recurrences might correlate with a poor prognosis in dogs.

Keywords: fat, subcutaneous, tumour, skin.

Received: 26 October 2015 Accepted: 18 June 2016 Published: 29 July 2016

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INTRODUCTION

Multiple symmetric lipomatosis is a rare human disease, characterized by symmetric or diffuse deposition of non-encapsulated adipose tissue [1,12]. The aetiology of this disease is still unknown. It has been speculated that patients suffering from this disease exhibit genetic changes, resulting in decreased mitochondrial lipolytic activity [9,11].

The clinical presentations of this disease in humans are divided into type I and type II, according to the tumour distribution. In type I, fat is accumulated in the cervical region, shoulders, and upper region of the arms and trunk. In type II, the distribution of the lesions is more diffuse, and the fat accumulates in the upper region of trunk, arms, thighs, hips, deltoid region, and surrounding areas, thus resembling normal obesity [11].

In veterinary medicine, there is only one description relating a similar condition, which is known as idiopathic diffuse lipomatosis. However, this is considered an extremely rare disease in animals [2,3].

This disease was first described in dogs in 1990 by Gilbert *et al*. [2]. They reported the occurrence of a single case in a 5-year-old Dachshund dog, presenting a progressive, hanging lesion with increasing volume, consisting of a subcutaneous bilateral tumour in the neck and trunk. In cats, only one case of lipomatosis was reported. The patient was a 4-year-old domestic cat that presented with symmetric skin tumours in the caudal region of the thighs [3].

Owing to the clinical similarities with regard to the morbidity of this disease in dogs and humans, we herein describe two cases of idiopathic diffuse lipomatosis in dogs and relate and compare their clinical and pathophysiological aspects.

CASES

Case 1 - A 3-year-old standard poodle female (*Canis lupus familiaris*) was taken for veterinary evaluation for a slow-growing tumoural lesion over the neck and trunk. A clinical examination revealed the presence of multiple, coalescing, subcutaneous, floating tumours that were distributed dorsolaterally to the left cervicothoracic region. The tumours measured >30 cm in diameter that caused irregular and protruding folds resulting in a significant loss of body architecture (Figures 1a & 1b). Lipodystrophy of the bilateral cornea was also observed.

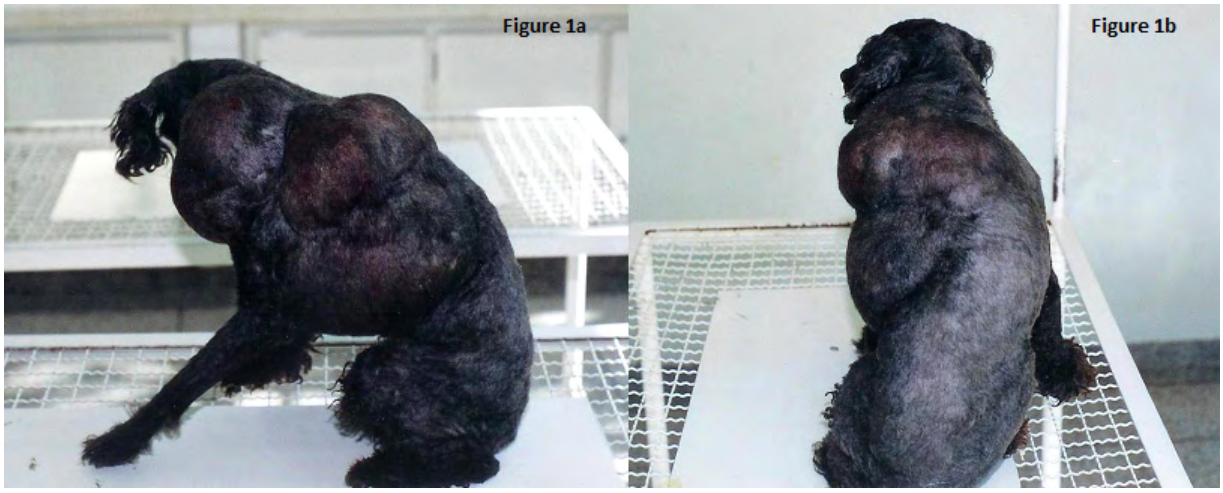

Figure 1. A 3-year-old standard poodle female diagnosed with idiopathic diffuse lipomatosis. a) Lateral view showing coalescing, subcutaneous, and floating tumours which caused causing loss of cervico-thoracic dorsal architecture. b) Dorsal view, showing large tumours associated with multiple confluent subcutaneous tumours.

Elliptical excisions of the skin stained with hematoxylin and eosin revealed diffuse mature adipocytes and hyperplastic and dysplastic lipoblast hypertrophy of the panniculus, which was associated with epidermodermal hypotrophy, and skin appendages (Figure 2). The combination of these findings supported a diagnosis of idiopathic diffuse lipomatosis.

The animal underwent surgical therapy. However, the clinical symptoms recurred within two months. Owing to the continuous recurrence of tumours and history of three other surgeries, it was decided to euthanize the animal, as it was severely emaciated as well. Diffuse paniculate hypertrophy was the chief finding on autopsy.

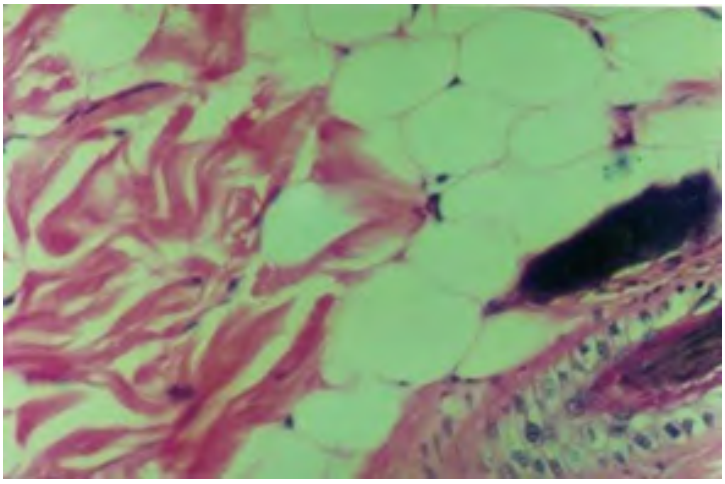

Figure 2. Microscopy image of the tumour exhibiting diffuse mature adipocytes, hyperplastic, and dysplastic lipoblast hypertrophy (hematoxylin and eosin staining, 100× magnification).

Case 2 - An 11-year-old female cocker spaniel (*Canis lupus familiaris*) was taken for a veterinary evaluation for tumoural lesions of insidious evolution and widespread distribution. Clinical examination revealed the presence of multiple subcutaneous tumours in the lateral, lumbosacral, and abdominal regions of the pelvic limb (Figure 3a & 3b). The animal did not present systemic clinical symptoms and the hematologic profile, serum biochemistry, total free T4 dosage by dialysis, and measurement of the cortisol levels after low-dose dexamethasone suppression test were within normal ranges, as shown by radioimmunoassay techniques.

Biopsies of tumoral lesions, stained with hematoxylin and eosin, showed intense adipocyte proliferation. This was associated with an inflammatory infiltrate composed of lymphocytes, macrophages, and neutrophils. No signs of malignancy were observed. The combination of these findings also supported the diagnosis of idiopathic diffuse lipomatosis.

The animal was fed a low-calorie diet, after which its body weight decreased without inducing any changes in tumour size. In addition, the animal underwent surgical treatment for removal of the largest tumours. After surgery, the animal was monitored for 1 year and showed no tumour recurrence.

Figure 3. An 11-year-old cocker spaniel female diagnosed with idiopathic diffuse lipomatosis. a) Lateral view showing a large tumour on the lateral region of the left thigh. Multiple tumours were also seen distributed throughout the body. b) The abdominal view showing multiple firm subcutaneous nodules in the mammary chain.

DISCUSSION

In veterinary medicine, lipomatosis is an extremely rare disease [3]. Therefore, before diagnosing a case, it is necessary to exclude other proliferative disorders of the adipose tissue, among which, the most common are lipomas and liposarcomas [2,3,7].

There are no genetic studies related to lipolytic activity or adipocyte proliferation in animals. However, it is believed that the aetiology of idiopathic diffuse lipomatosis is similar to the pathophysiology of the human form of multiple symmetrical lipomatosis [3,7,13]. The two cases described in this study did not present any clinical signs and biochemical or hematological changes consistent with a systemic or endocrine disease. Therefore, it is suspect that in dogs, as in humans, lipomatosis could be associated with a primary lipid metabolism disorder [4,8,10].

In this study, the two cases described showed a distinct distribution in the type of tumours. In case 1, the tumours were well defined and focused in the cervical and thoracic region, a pattern similar to human type I lipomatosis. However, in case 2, the fat accumulations were diffuse and mainly located in the posterior region of the animal's body, similar to the condition that was first reported in dogs [2] and coinciding with the features presented by humans in type II lipomatosis [5,6]. This shows that the distribution of fat accumulation does not follow a common pattern.

No animals presented intra-abdominal or intrathoracic fat infiltration, diagnosed by ultrasound or radiography. However, in these animals, magnetic resonance imaging was recommended to eliminate the possibility of tumours capable of compressing vessels or other internal structures, which cannot be visualized using conventional diagnostic systems.

In veterinary medicine, there is no description of any treatment capable of being effective [7]. However, surgical procedures are recommended to minimize the occurrence of tumours and improve the quality of life of the affected animals. In the two cases described in this study, it was difficult to completely resect the tumours. In the first case, the recurrence of fatty deposits and performance of multiple interventions resulted in a poor quality of life of the animal, which was finally euthanized to avoid further suffering. Therefore, frequent recurrences might correlate with a poor prognosis in dogs.

***Declaration of interest*.** The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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