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A Subcutaneous Lipoma in a Male Red Fox

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Abstract : An 8-year-old male red fox (*Vulpes vulpes*) in Species Restoration Technology Institute of Korea National Park Service (KNPS), revealed nodular growths in its ventro-cervical region. The fox was introduced from Young-Yang Gun in 2012 to KNPS for re-introduction of the red fox. It has been cared in captive facility and showed the mass in August 2013 that was sent to Wildlife Medical Center. For the diagnosis of underlying disease and cervical mass, radiographical and sonographical examinations, complete blood count, serum chemistry analysis, peripheral blood smear examination and surgical removal of the mass were performed. The mass was fixed in 10% neutral buffered formalin and processed routinely for haematoxylin and eosin (HE) stain. Based on hematological and serum chemical examination, the fox showed mild leukocytosis, thrombopenia, increase of creatine kinase MB (CKMB) and uric acid. However, it was considered as no clinical relevance since the fox showed no related clinical signs. Macroscopically, the mass was round shape, whitish and well-demarcated. Microscopically, it was diagnosed as a lipoma consisting of mature adipose tissue. Lipoma is a common benign tumor in most domestic animals, however it has never been reported in the red fox. The present case report provides comprehensive diagnosis of a subcutaneous lipoma in a red fox.

Key words **:** Lipoma, Ultrasonography, Red fox, *Vulpes vulpes.*

Introduction

Lipoma is a common benign tumor of well-differentiated adipocytes, which seen in most domestic animals (10). It is detected in diverse regions such as panniculus adiposus, peritoneum, mediastinum, stomach and bone (6).

In human medicine, sex ratio of cervical lipoma was 9 : 4 (male : female) (12), while female is more common in dog (7). The etiology of most lipomas is idiopathic. However, they may also appear on a hereditary basis in patients with familial multiple lipomatosis or Gardner syndrome (9,14,17).

Female dogs and castrated cats appear to be predisposed to the formation of these tumors, and lipoma commonly occurs on the trunk and aberrant locations including the epiglottis, peritoneum, orbit and pericardium (2,5,8,16). It has been found in other species such as foals, guinea-pigs, leopards, swine, baboons, laboratory rats and prairie dog (11,13). However, it has not been reported in red fox (*Vulpes vulpes*), and herein we first present a case of lipoma in the cervical subcutaneous region of a male red fox.

Case

An 8-year-old male red fox from Species Restoration Technology Institute of Korea National Park Service (KNPS), of 8.5 kg body weight, revealed nodular growths in August 2013 in its ventro-cervical region of dimensions 8.3 × 13.8 × 4.1 cm (Fig 1). The fox was introduced from Young-Yang Gun in 2012 to KNPS for re-introduction of the red fox. It has been cared in captive facility and sent to Wildlife Medical Center to examine cervical mass in August 2013. The animal has been fed with meat (chicken, beef, deer, rabbit, etc.) and live chicks once a day in captive facility (10,000 m^2) which is similar with natural habitat.

For the diagnosis of underlying disease and the mass, radiographical (Titan 2000v, Gemss, Korea) and ultrasonographical (Prosound alpha 7, Hitachi-Aloka, Japan) examinations, complete blood count (Vetscan HM5, Abaxis, CA, USA), serum chemistry analysis (Dri-chem 3500i, Fuji, Japan), peripheral blood smear examination (Wright-Giemsa stain, Wright-Gimsa solution, Sigma-aldrich, MO, USA) and surgical removal of the mass were performed. Tissue samples from the mass were fixed in 10% neutral buffered formalin, processed routinely and sections were stained with hematoxylin (Hematoxylin solution, Sigma-aldrich, MO, USA) and eosin (Eosin soulution, Sigma-aldrich, MO, USA). To minimize stress, all of the procedures were performed under general anesthesia induced by 4 mg/kg zolazepam-tiletamin (Zoletil 50, Virbac, France) and 0.08 mg/kg medetomidine (Dormitor injectable solution, Pfizer animal health, PA, USA) intramuscularly. After all of procedure it was antagonized by 0.4 mg/kg intramuscularly.

Hematological value of the fox showed no significant difference from those of normal red foxes. However, the number of platelets was slightly low, and the number of white blood cells, creatine kinase MB (CKMB) and uric acid were elevated (Table 1).

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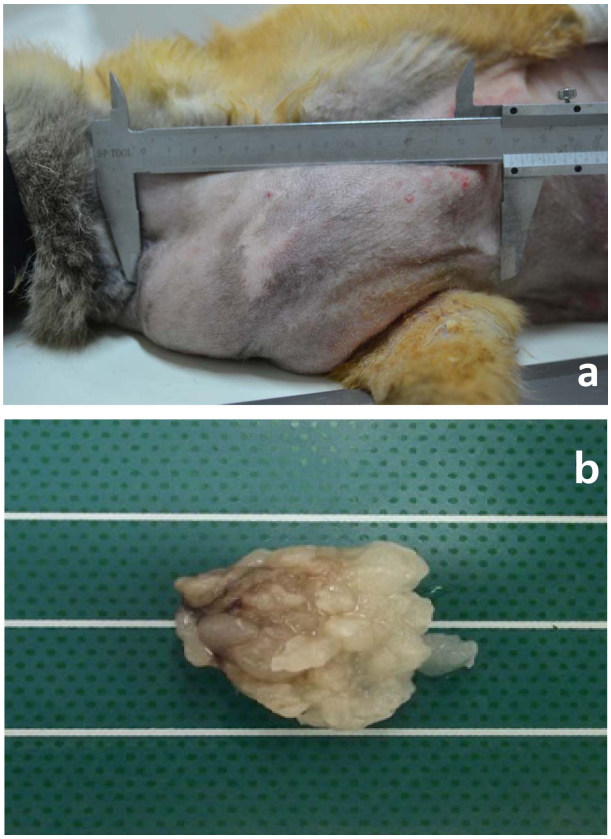

Fig 1. a. Nodular mass in cervical region of the red fox, dimensions: 8.3 × 13.8 × 4.1 cm. b. Gelatinous cut surface of the mass.

Table 1. Complete blood count (CBC) and serum chemistry analysis values of the red fox

	Parameter	Reference		Value
		Min	Max	Patient
CBC	WBC (10^9/ L)	2.5	15.0	24.1
	LYM (10^9/ L)	0.2	4.3	1.6
	MON (10^9/ L)	0.0	1.2	0.7
	RBC (10^{12}/ L)	6.6	92.8	10.6
	HGB (g/dl)	11.0	20.3	14.9
	HCT (%)	23.0	58.9	41.0
	MCV (fl)	5.3	55.7	39.0
	MCH (pg)	1.7	17.7	14.1
	MCHC (g/dl)	29.4	45.2	36.3
	PLT (10^9/ L)	243.0	855.0	100.0
Chemistry	CKMB-PS (U/l)	18.0	162.0	301
	UA-PS (mg/dl)	0.1	0.5	0.7

*Not included blood chemistry parameters of normal range in this table
*Reference ranges are adopted from previous studies (3, 4)

Cervical mass had same opacity with the surrounding soft tissue and no specific result in radiographic examination. On the ultrasonography, the mass was hypo-echoic relative to adjacent muscle. However, several hyper-echoic lines was detected inside the mass, and the lines formed atypical capsules ranged in size from 10 × 13 mm to 40 × 125 mm. It was

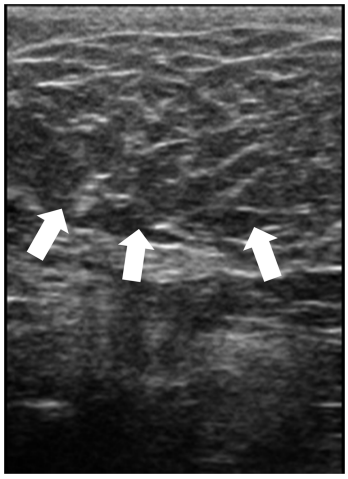

Fig 2. Longitudinal ultrasonogram shows a lipoma (*large arrow*) that is hypo-echoic relative to adjacent muscle.

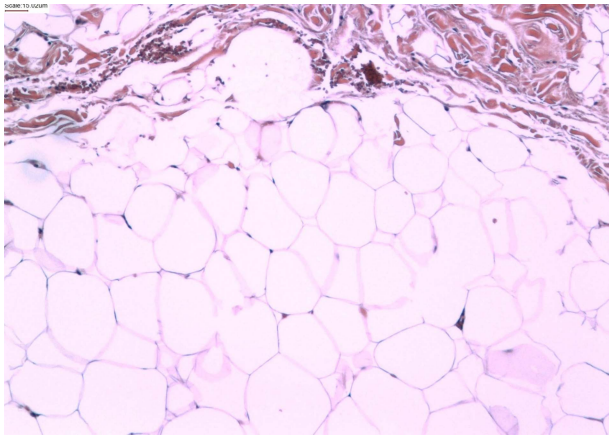

Fig 3. Lipoma in the red fox. Expansile mass of mature lipocytes indistinguished from normal fat cells (× 200). H&E.

elliptical and the longest diameter ran parallel to the skin surface. There was no posterior enhancement or attenuation, and it was compressible with moderate transducer pressure (Fig 2).

Macroscopically, the mass was round shape, well-circumscribed. The whole size of the mass was 8.3 × 13.8 × 4.1 cm, and the cut surface was whitish and gelatinous. Microscopically, it was diagnosed as a lipoma consisting of mature adipose tissue that contains large clear vacuoles in the cytoplasm with peripherally compressed nuclei. Some amount of collagenous fibers and fibroblasts were occasionally seen. Nuclear pleomorphism and mitotic figures were absent (Fig 3).

Discussion

Although some of the hematologic and chemical values were out of range from normal values, it was considered as no clinical relevance since there were no related clinical signs, no inflammatory reaction, no cardio-pathological response and abnormal range of other serum chemistry parameters. In a case of canine breast lipoma, morphologic changes in erythrocytes such as eccentrocytes were revealed by oxidant damage and alkaline phosphatase (ALP) was elevated (15). However, in the present case, the shape of erythrocytes was normal

and ALP was not elevated.

As a differential diagnosis based on ultrasonography, subcutaneous lipoma on the ventral neck has to be distinguished from dermoid cyst, epidermoid cyst, thyroglossal duct cyst, angioma, branchial cleft cyst and liposarcoma, etc (1). Epidermoid cyst is well bounded and hyperechoic compared with surrounding muscles. In angioma, overall shape is similar with lipoma, but the difference is that angioma has sinusoidal space as a heterogeneous hypoechoic mass. Thyroglossal duct cyst and branchial cleft cyst is easily diagnosed. However, when there are cholesterol crystals or cellular materials in the cyst, they have to be differentiated from lipoma because of their formal and echogenic similarity (12).

Conclusion

In summary, the present study is the first report of lipoma in the red fox, although it has been found in many species with different forms. For the diagnosis of lipoma in the red fox, ultrasonography can be considered as a primary method, because it is less invasive than surgical biopsy, more economic than computed tomography (CT) or magnetic resonance imaging (MRI) and more accurate than radiography. However, for more definitive diagnosis and knowing of physiological status, it is necessary to confirm through the hematologic and histopathologic examinations together.

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여우에서 피하지방종의 진단

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요 약 : 국립공원관리공단 종복원기술원의 수컷 여우(8년령, 8.5 kg)에서 경부에 결절상의 증식물이 발견되었다. 진단을 위하여 방사선 검사와 초음파, 일반혈액검사, 혈청 화학분석, 혈액 도말 검사를 실시하였고 증식물은 외과적으로 절제하였다. 절제술 후 얻은 조직 샘플을 10% 중성 포르말린 고정 후 HE 염색하였다. 해당 동물의 혈액 수치는 일반 여우와 크게 다르지 않았다 증식물은 육안으로 보았을 때 주변조직과 잘 구획되어 있었으며 둥글고 하얀 형태였다. 조직 슬라이드 현미경 검사 후 이는 성숙 지방 조직으로 이루어진 지방종으로 진단되었다. 지방종은 반려동물에서 흔히 발생하는 양성 종양이나 현재까지 여우에서는 보고된 적이 없으며, 이 증례는 여우에서 지방종을 종합적으로 진단 · 평가한 최초 증례이다.

주요어 : 지방종, 초음파, 붉은 여우, *Vulpes vulpes*