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Lipid rich carcinoma in a male dog: Cytological and histopathological analysis

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Abstract

A nine-year-old intact male Spitz dog was brought to the Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli, with a history of swelling in the left caudal thoracic mammary gland over the last six months which slowly increased in size. Physical examination revealed the presence of a painless, fatty-soft elongated mass about 19x10 cm. On clinical examination, all vital parameters were under normal range. On fine needle aspiration cytology, the case was diagnosed as lipid-rich carcinoma. Pre-operative haemato-biochemistry values were under normal range and thoracic radiograph showed no metastasis. The excised mass was analyzed by gross, cytology and histopathology. Post-operative follow-up was done for 8 months and the owner reported that the animal died after 8 months post-surgery.

Keywords: Mammary gland tumour, lipid-rich carcinoma, cytology and pathology

Introduction

Breast cancer is less common in men than in women. Male breast cancers (MBCs) are uncommon conditions which were account for less than 1% of all malignancies in men and around 1% of all breast cancers (Park *et al.*, 2021) [7]. Elderly men are affected and risk factors for this disorder include age, obesity, gynecomastia, Klinefelter's syndrome, testicular injury, and a family history of breast cancer (Saba *et al.*, 2007) [5]. Of all malignant breast tumours, lipid-rich carcinoma of the breast (LRCB) accounts for about 1%–1.7% of cases. It is an incredibly rare type of breast cancer. Clinicians have grown interested in this tumour because of its high aggressiveness, rapid development, unfavourable prognosis, and hazy clinical signs (Zhang *et al.*, 2023) [1]. Mammary tumours, are commonly associated with intact female dogs (50% of all tumours in female are mammary tumours). Mammary tumours in dogs are the second most prevalent type of tumour after skin cancer. They often affect dogs older than seven years and makeup 50–70% of all neoplasia found in non-spayed female dogs. Similarly, canine mammary tumours affect only 1% of male canines and are an uncommon condition (Kwon *et al.*, 2017) [8]. Mammary gland neoplasms are rare in male dogs. Male dogs are 62 times less likely to develop mammary gland tumours than female dogs. However, despite the low incidence, the aggressiveness may be high. The majority of these tumours are malignant and about 65-80% is ER⁺ positive. Some studies indicate that the prognosis of breast cancer in men is worse than in women. However, some studies show little differences between the sexes. The majority of mammary gland tumours in female origin occur most often in middle-aged to older dogs with low incidence in younger dogs. The main suspected risk factors are age, hormone exposure and breed. Early detection and routine oncological treatment may help improve overall survival in individuals with lipid rich cancer. The present paper reports on the incidence of lipid rich carcinoma in a male dog with survival analysis.

Materials and Methods

A nine year old male Spitz was presented to the small animal surgery ward, Veterinary Clinical Complex, Veterinary College and Research Institute, Tirunelveli. Clinical examination revealed a mass with ulceration on the left caudal thoracic mammary for the past 6 months. The size of the tumour was 19 x 10 cm (Fig-1) multinodular, soft, elongated mass with multiple minute nodules. On sectioning, grayish yellow coloured and easy to cut. Fine needle aspiration cytology was taken by using a 23G needle attached to a 5 mL syringe and slides were stained with Leishman and Giemsa stain (LG). The surgically resected tumour mass was received and tissue pieces were processed for histopathological examination.

For this purpose, after processing tissues were embedded in paraffin and 4 µm thickness sections were cut and stained with haematoxylin and eosin (H&E) stain for histopathological evaluation.

Results and Discussion

The risk of developing mammary gland tumours is 62 times higher in females than males (Saba *et al.*, 2007) [5]. Mostly it is recorded in older age females (Bearss *et al.*, 2012) [4] but also reported in male with an average age of 9.2 years. In our report incidence was found in nine year old male dog. There is limited information available on the clinical treatment and prognosis of lipid rich carcinoma due to its rarity. The management of lipid rich carcinoma is still a matter of controversy as it is prone to malignant transformation. Most experts recommend surgical treatment as soon as possible, either after confirming the diagnosis or after neoadjuvant chemotherapy followed by surgical treatment and postoperative adjuvant treatment (Zhang *et al.*, 2023) [1]. Monteros *et al.* (2003) [2] in their analysis did not find any metastasis either proximal or distant metastases or both, and none of the tumours had either estrogen or progesterone receptors. In the present case, no evidence of metastasis was noticed at the time of clinical examination. Cytological examination revealed clusters of epithelial cells with high cellularity. Neoplastic cells had basophilic cytoplasm with small to medium-sized vacuoles (Fig-2) and the nucleus was peripherally placed. Anisocytosis and anisokaryosis with abundant lipid droplets were seen. A similar cytological pattern of small to large lipid vacuoles of various sizes within the cytoplasm of neoplastic cells is present in lipid rich carcinoma by (Kumar *et al.*, 2023) [6]. Histopathologically, cells were arranged in small to medium-sized solid sheets which were separated by fibrovascular stroma. Neoplastic cells were obscured by variable-sized cytoplasmic fat vacuoles (Fig-3) and the nuclei were peripherally placed. Moderate to marked anisocytosis and anisokaryosis (Fig-4) were also noticed. The stroma was diffusely infiltrated with lymphocytes, plasma cells and eosinophils. Based on histopathological examination it was diagnosed as grade II lipid rich carcinoma. Martinez *et al.* (2005) [3] also reported the tumour cells with a large, single vacuole arranged in a lobular pattern in one case, while the other neoplasm showed an intraductal growth of tumour cells with fine vacuolated cytoplasm. However, there were also histological and immunohistochemical differences between these tumours. After surgical excision of the tumour, the dog died within 240 days which correlates with Zhang *et al.* (2023) [1] who mentioned that lipid-rich carcinoma appears to be an extremely poor prognosis in dogs.



Fig 1: Multinodular, soft, elongated mass-Spitz, male, 9 yrs

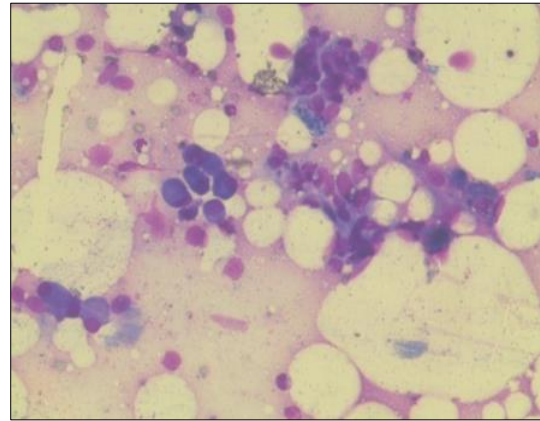


Fig 2: Cytology – small to large fat vacuoles with few cluster of epithelial cell

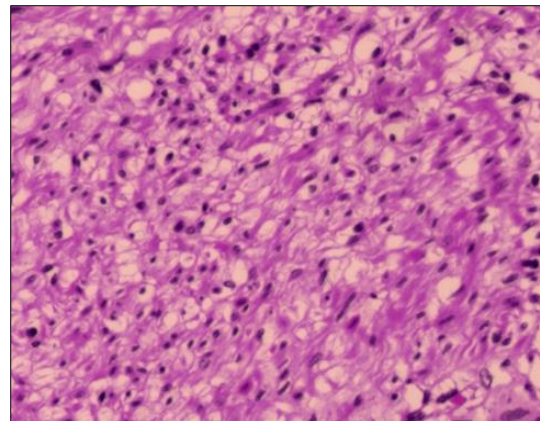


Fig 3: Variable-sized cytoplasmic fat vacuoles within the neoplastic cells -H&E 200x

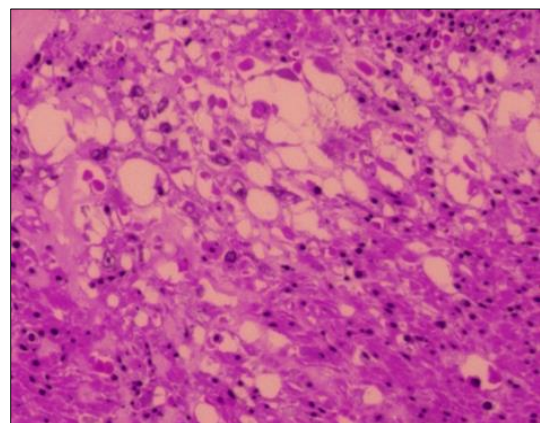


Fig 4: Moderate to marked anisocytosis and anisokaryosis - H&E-200x

Conclusion

The current report concluded by analyzing the clinical characteristics, imaging findings, cytology, histopathology and prognosis that had lipid-rich carcinoma of the mammary gland in male dog. Based on cytological and histopathological findings the case was confirmed as a Grade II tumour. Because of its aggressive clinical behaviour, lipid-rich carcinoma is a distinct type of mammary gland tumour that occurs in dog. Based on overall survival analysis the dog died 240 days after surgery.

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