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Case Report

Mast Cell Tumour in an African Wild Dog (*Lycaon pictus*)

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Abstract

The report is about a case of a female 3½-year-old African wild dog with a pedunculated mass on ventral cervical region. The dog was immobilized using a combination of ketamine (5mg/kg) and medetomidine (0.1mg/kg). Blood samples were collected for FBC and biochemistry, and an excision biopsy was performed on the lesion. Hematology results showed an increased erythron, consistent with relative polycythaemia. The leukogram showed moderate lymphocytosis with neutrophils and monocytes on the upper limit consistent with mild to moderate chronic inflammation. Histology sections showed round cells with hyperchromatic nuclei with course chromatin, and moderate to abundant lightly basophilic, granular cytoplasm. The cells tended to form sheets or linear cords with low mitotic index, suggestive of a low-grade mast cell tumour. The dog was however, lost from the pack before surgical intervention could be performed. The report highlights the dearth of data on wild dog neoplasms and emphasizes the need for more surveillance on diseases affecting African wildlife species under threat.

Keywords: Mast Cell Tumour; African Wild Dog; Neoplasms

Abbreviations

MCT: Mast Cell Tumour

Introduction

Tumours or neoplasms are tissues of abnormal growth resulting from unregulated cell proliferation [1]. They are classified into benign and malignant tumours. Benign tumours do not invade or spread to surrounding tissues or other parts of the body, whilst malignant tumours spread or metastasise to other parts of the body. Mast cell tumours (MCTs) are one of the most common tumours in domestic dogs, accounting for up to 21% of all skin tumour [2]. Normal mast cells contain granules, which release a number of bioactive molecules including histamine, heparin, prostaglandins and cytokines. Degranulation is triggered by antigens and results in release of the molecules into circulation, facilitating immune response to bacterial and parasitic infections, and playing a role in allergic reactions [3]. Neoplastic mast cells however, can degranulate spontaneously, releasing the molecules that can have serious and potentially fatal effects such as anaphylaxis, gastric and duodenal ulceration or perforation, glomerular disease and haemorrhage

[3]. In domestic dogs, some of the risk factors to mast cell tumours include age, with the odds of developing the tumour increasing with age; and sex, with female dogs more likely to develop mast cell tumours compared to males. There is also a breed predisposition with Boxers, American pit bull terriers and French Bull dogs and Labrador retrievers were found to be more likely to develop the MCTs compared to other breeds [4]. though the specific breed predisposition patterns tend to vary with demographics of the study population.

The genetic pathogenesis of MCTs is partly based on mutations on the proto-oncogene c-kit which is present in 15% of all dogs with MCT and up to 35% of dogs with high-grade tumours [5]. Mutations in the gene drive uncontrolled cell proliferation and survival, which are key to the development and progression of MCTs [6]. Chronic inflammation and exposure to irritating substances are also cited as possible causes MCTs [7].

MCTs have been classified according to the 3-grade Patnaik scale, which distinguishes well, moderately and poorly differentiated cells into GI, GII and GIII [8], with the tendency to metastasise increasing with grade number. Tumours in GI have a good prognosis; those in GII have a guarded prognosis while those in GIII have a negative prognosis. This classification however, was considered inadequate to predict the clinical course and /or prognosis of the disease. Consequently, a 2-grade classification system based on the tumor cells' nucleus morphology and the number of mitotic division figures was developed [8,9]. The 2-tier grading system is regarded as better at predicting the clinical outcome compared to the 3-tier system [10].

Case history and management

A female African wild dog (*Lycaon pictus*) aged 3½ years belonging to the Nyamepi Pack in the Mana Pools National Park in northern Zimbabwe, presented with a pedunculated mass of approximately 4 cm diameter in the ventral cervical region.

The dog was immobilized by darting using a combination of ketamine (5mg/kg) and medetomidine (0.1mg/kg) using a Pneu-Dart® gun. On physical examination, a pedunculated mass with some ulceration was observed. There were warts of various sizes distributed over the whole body. Several scars in different stages of healing were also observed.

Two tubes of blood samples were collected; 5ml in a purple tube for FBC and another 5 ml in a plain tube for biochemistry. An excision biopsy sample was collected from the mass and transported in 10% formalin. The blood samples were placed on ice packs during transportation and refridgerated overnight at approximately 8^0C and later transported on reusable ice packs to the laboratory for processing and analyses. Hydration status was maintained using an IV line of normal saline during physical examination and sample collection.

The patient was given penicillin (Procaben) at 1 ml/10 kg as an antibiotic cover. A wound spray was applied to the surgical wound and some incompletely healed scars. The dart wound was treated using an intramammary injector with ampicillin and cloxacillin. Because of the known history of worm infestation in the packs, ivermectin at 0.2mg/kg was administered. A multivitamin at 1ml/10kg and an anti-inflammatory (dexamethasone) at 3mg/kgwere also administered to improve appetite and promote smooth recovery respectively. The patient was reversed using Atipamezole, administered at five times the dosage of medetomidine.

Laboratory findings

Haematology results showed an increased erythron, consistent with relative polycythemia. The leukogram showed moderate lymphocytosis with neutrophils and monocytes on the upper limit consistent with mild to moderate chronic inflammation (Table 1). Histology sections from the skin showed two well-circumscribed non-encapsulated masses of varying cellularity. The moderately to sparsely cellular mass was composed of loosely round cells in a severely oedematous interstitium. The cells had round hyperchromatic nuclei with course chromatin, moderate to abundant lightly basophilic cytoplasm that was finely granular and distinct cell borders. Numerous eosinophils were present in the background. The densely cellular mass was composed of similar appearing cells forming sheets showing a tendency to form linear cords. The mass was moderately vascularised, and had focal areas of interstitial edema as well as plenty of eosinophils in a fibrovascular stromal background. The sections had dirt margins. There was no pleomorphism in the cells from both masses and no mitoses were detected (Figure 1). The findings from the evaluated sections were highly suggestive of a low-grade cutaneous mast cell tumour.

Parameter	Value	Units	Flag	Reference range[§]
WBC	16.3	$x10^9$	H	10.7 ± 3.53
RBC	7.3	$x10^{12}$	WRI	7.98 ± 1.61
Haemoglobin	19.3	g/dl	H	15.1 ± 2.43
HCT	59.6	%	H	43.7 ± 7.33
MCV	59.3	Fl	WRI	55.6 ± 4.53
MCH	19.2	Pg	WRI	19 ± 1.75
MCHC	32.4	g/dl	WRI	34.1 ± 2.08
Platelets	402	$x10^9$/L	WRI	451 ± 183.8
Neutrophils	10.6	x 10^9/L	WRI	7.44 ± 3.34
Lymphocytes	4.89	x 10^9/L	H	1.9 ± 5.37
Monocytes	0.82	x 10^9/L	WRI	0.458 ± 1.396

Table 1: Hematology results obtained from the painted dog.

[§]Langan JN and Jankowski G. Overview of African Wild Dog Medicine. Editors: Miller RE., Lamberski N., Calle PP. in Fowler's Zoo and Wild Animal Medicine Current Therapy, W.B. Saunders, 2019; 9: 539-547. ISBN 9780323552288, https://doi.org/10.1016/B978-0-323-55228-8.00077-1.

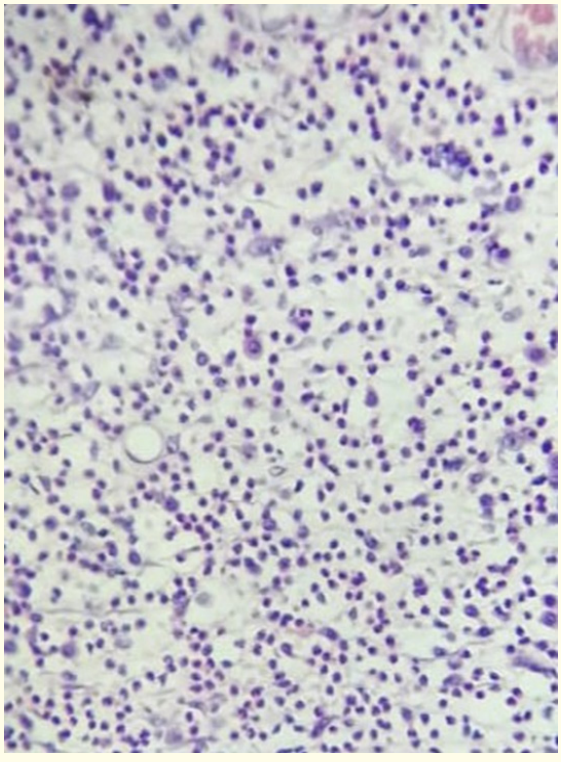

Figure 1: H and E section of lump from a painted dog showing round cells in a severely oedematous interstitium. The cells have round hyperchromatic nuclei with course chromatin, moderate to abundant lightly basophilic cytoplasm that is finely granular.

Outcome

The patient was lost from the pack before surgical intervention was done.As a result, no post mortem to determine cause of death could be performed.

Discussion

To the authors' knowledge, this is the first report of an MCT in a *Lycaon pictus* in the wild. MCTs in other wildlife species have been reported in the captive Bush dog (*Speothos venaticus*) [11], in a reptile (*Boa imperator*) [12], in a free-ranging Pacific Walrus (*Odobenus rosmarus divergens*) [13], and in zoo-housed cheetahs (*Acinonyx jubatus*) [14].

The treatment and prognosis of canine MCTs is influenced by a number of factors including signalment, clinical signs, anatomical location, clinical stage, metastasis and histological stage [6]. The main method of treatment in cases of MCT is surgical excision [6]. However; the outcome is subject to the patient's prior clinical condition and the histological stage of the MCT.

The clinical presentation of concern that was present prior to immobilisation was lesion ulceration [10,15]. As the case was wild, other clinical signs such as gastrointestinal signs could not be ascertained prior to immobilisation and biopsy**.** The cutaneous signs seen are known to impact recovery negatively [16]. All these factors could have contributed to the assumed demise of our case. Degranulation of the remaining cells could have worsened the clinical presentation that was present prior to immobilisation, resulting in the dog falling out of the pack.

Ideally, cytological evaluation should have been performed prior to surgical excision had the dog been in captivity. This could have helped in coming up with diagnosis of MCT, and the subsequent use of adjuvant treatments to minimise degranulations and its subsequent effects. Antihistamines and chemotherapy can be indicated as preoperative treatment that allows arrest of further growth of the tumour and also reducing tumour dimensions for more adequate local control [16], and in cases where the tumour is located in anatomical sites where surgical approach is difficult, and in the presence of metastasis. However due to the limited resources in the wild, this was not performed.

Data on wild painted dog neoplasms are scarce. The common neoplasms reported in literature include apocrine gland tumours, haemangiosarcoma, fibromatous epulis, adrenocortical adenoma/carcinoma, and mammary and uterine neoplasia predominantly seen in captivity [17], The scarcity of information is mainly because of the limited studies done in wild species relative to domestic animals and also because veterinarians have little opportunity to perform post mortem to determine cause of death as carcasses are too decomposed or scavenged by the time this is attempted. Animals with tumours are likely to be in poor body condition and harbour infectious agents [17], thus biasing cause of death towards proximate causes. Further, animals with cancers and infectious agents are at higher risk of predation [18], which leads to an underestimation of the prevalence of cancer in wild animals. This makes monitoring and surveillance for diseases of species under threat important, as disease is an additional risk to species population decline.

Conclusion

Data on wildlife diseases is scarce, mainly because of the cost sampling, and because cases can be lost before a full follow-up is completed, and carcasses are scavenged before a post mortem is performed. This report showed that some MCTs that are common in the domestic dog also affect the African wild dog, and may be an important contributor to wild dog mortality.

Ethical Statement

Handling of the patient in this case was for the purposes of diagnosis and treatment only, and followed best practice for veterinary care.

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Disclosure

The authors report no conflict of interest in the case.

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