



DOI: 10.5958/2277-940X.2015.00070.4

A Retrospective Study of Tumors of the Nasal and Paranasal Regions of Dog in Grenada, West Indies

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Received: 29 July, 2015

Accepted: 21 August, 2015

ABSTRACT

This retrospective study on tumors of canine nasal and paranasal regions covered the period from 2001 to 2014. It involved review of biopsy and necropsy reports submitted to Pathobiology laboratory of the St George's University, School of Veterinary Medicine, Grenada, West Indies. Out of a total 987 dogs with neoplasia in various sites of the body, 14 (1.4%) were diagnosed in nasal and paranasal regions. The type and number of these tumors were in descending order as follows: Transmissible venereal Tumor 4 (29%), Adenocarcinoma 4 (29%), Chondrosarcoma 3 (21%), Squamous cell Carcinoma 2 (14%), and Adenosquamous Carcinoma 1 (7%). Majority of dogs affected with tumors in nasal and paranasal regions were local mixed breed referred to as Pothounds (7), others were Collie/mix (1), and a few were pure breeds: Rott weiler (3), Pitbull (1), German shepherd (1) and Doberman (1). The mean and median age of the affected dogs was 8 years with a range of 2.5 years to 14 years. As far as authors are aware, there is no published report on neoplasms in the nasal and paranasal regions of dogs from Grenada and the wider Caribbean. This is the first report on neoplasia of nasal and para nasal regions of dogs from Grenada.

Keywords: dog, Grenada, nasal and paranasal region, tumors

Primary tumors in the nasal and paranasal region in domestic animals are rare, but often reported in dogs and cats (Dungworth *et al.*, 1999). According to the World health organization (WHO), classification of tumors of nasal and paranasal regions include epithelial and mesenchymal tumors (Dungworth *et al.*, 1999). Benign epithelial tumors are papilloma and adenoma. Malignant epithelial tumors, which are more common, are classified as squamous cell carcinoma, transitional carcinoma, adenocarcinoma, adenosquamous carcinoma, adenoid cystic carcinoma, acinic cell carcinoma, undifferentiated carcinoma, olfactory neuroblastoma and neuroendocrine carcinoma. Mesenchymal tumors arise from adjacent soft tissues, blood vessels, bone or cartilage. Common mesenchymal tumors are chondrosarcoma, fibrosarcoma and osteosarcoma.

Studies on tumors of nasal and paranasal regions of dogs from different geographical regions report similarities, differences and relative frequencies. Such studies include

those from South Africa (Lobetti, 2009), Brazil (Kimura *et al.*, 2012), Korea (Jung *et al.* 2008, Kang *et al.* 2008), Japan (Nimoniya *et al.*, 2008), Italy (Pietra *et al.*, 2010) and the USA (Confer and De Paoli, 1978). Bhaiyat *et al.* (2013) recorded occurrence of tumors on various tissues of the body in dogs of Grenada, from 2001 through 2012.

This communication, based on the archive of tumors from the pathology diagnostic record of the School of Veterinary Medicine, St George's University Grenada (SGU/SVM), reports the tumors in nasal and paranasal regions of dogs in Grenada.

MATERIALS AND METHODS

Ethical approval

Since the study was made on previously collected and stored samples, it did not require approval from the Institutional Animal Care and Use Committee (IACUC).

**Diagnostic data**

Base of SVM/SGU from January, 2001 to December, 2014 was searched for the tumor cases that were recorded in the nasal and paranasal regions of dogs. Demographics such as age, sex, breed and tumor specifications (size, metastasis etc) were recorded. The sample size of the dogs was not based on random statistical methods but on the sequential dogs that were recorded from the data base. Therefore, this was a convenient sample.

All available tumor slides recorded from nasal and paranasal regions, were reviewed for histological details. In cases where histopathology slides were of poor quality, due to age of slides or storage damage, previously formalin preserved tissues were obtained and new histologic slides were prepared and examined. Sections were cut at 4-5µ thickness through the paraffin embedding method.

Sections were stained with Hematoxylin and eosin and examined under the light microscope.

RESULTS AND DISCUSSION

Between 2001 through 2014, 987 dogs were recorded with tumors in various tissues of the body. Out of the total recorded tumors 14 (1.4%) were found affecting nasal and paranasal regions. These included 7 epithelial, 3 mesenchymal and 4 miscellaneous tumors. In epithelial tumors 4 were adenocarcinoma, 2 squamous cell carcinoma and 1 adenosquamous carcinoma. Mesenchymal tumors included 3 chondrosarcoma. The type of tumors, age, sex and breed are presented in table 1. Histological pictures of adenocarcinoma, squamous cell carcinoma, adenosquamous cell carcinoma and chondrosarcoma are presented in Figure 1.

Table 1. Morphologic tumor type, age, sex and breed affecting nasal and paranasal regions of dogs in Grenada, West Indies

Morphological type of tumor	Number with percent	Age (in years)-number	Sex (M male, F female)	Breed
Epithelial	7/14 (50%)	10.2	M	Mix
Adenocarcinoma	4/7 (57.2%)	9.1	M	Pothound
Squamous cell carcinoma	2/7 (28.5%)	8.1	F	Mix
Adenosquamous cell carcinoma	1/7 (14.2%)	8.1	M	Pothound
		3.1	M	Rotweiler
		8.1	M	Rotweiler
Mesenchymal	3/14 (21%)	14.1	F	Pitbull (1)
Chondrosarcoma	3/3 (100%)	10.2	M	Pibull/collie mixed (2)
Miscellaneous	4/14 (28%)	4.2	All 4 M	All4 pothound
Transmissible Venereal tumor	4/4 (100%)	2.5	1 Unknown	age 1

We report a small proportion (1.4%) of tumors observed in nasal and paranasal regions in relation to all diagnosed tumors of dog in Grenada. This falls within 1% to 2% of all tumors reported by previous researchers (Mac Ewen *et al.*, 1977; Patnaik, 1989; Kuehn, 2013; Priester and McKay, 1980). We found 50% malignant epithelial tumors in the nasal and paranasal region of dog in Grenada, which is in agreement with published studies (Lobetti, 2009; Jung *et*

al., 2008; Kang *et al.*, 2008, Confer and DePaoli, 1978; Leslie and King, 1998). These researchers reported 51% to 75% malignant tumors in the nasal and paranasal region of dogs originating from the epithelial tissue. In malignant epithelial tumors, adenocarcinoma is the most common followed by squamous cell carcinoma (Jung *et al.*, 2008; Nimoniya *et al.*, 2008; Pietra *et al.*, 2010). In the present study 4 cases were adenocarcinoma followed by 2 cases of

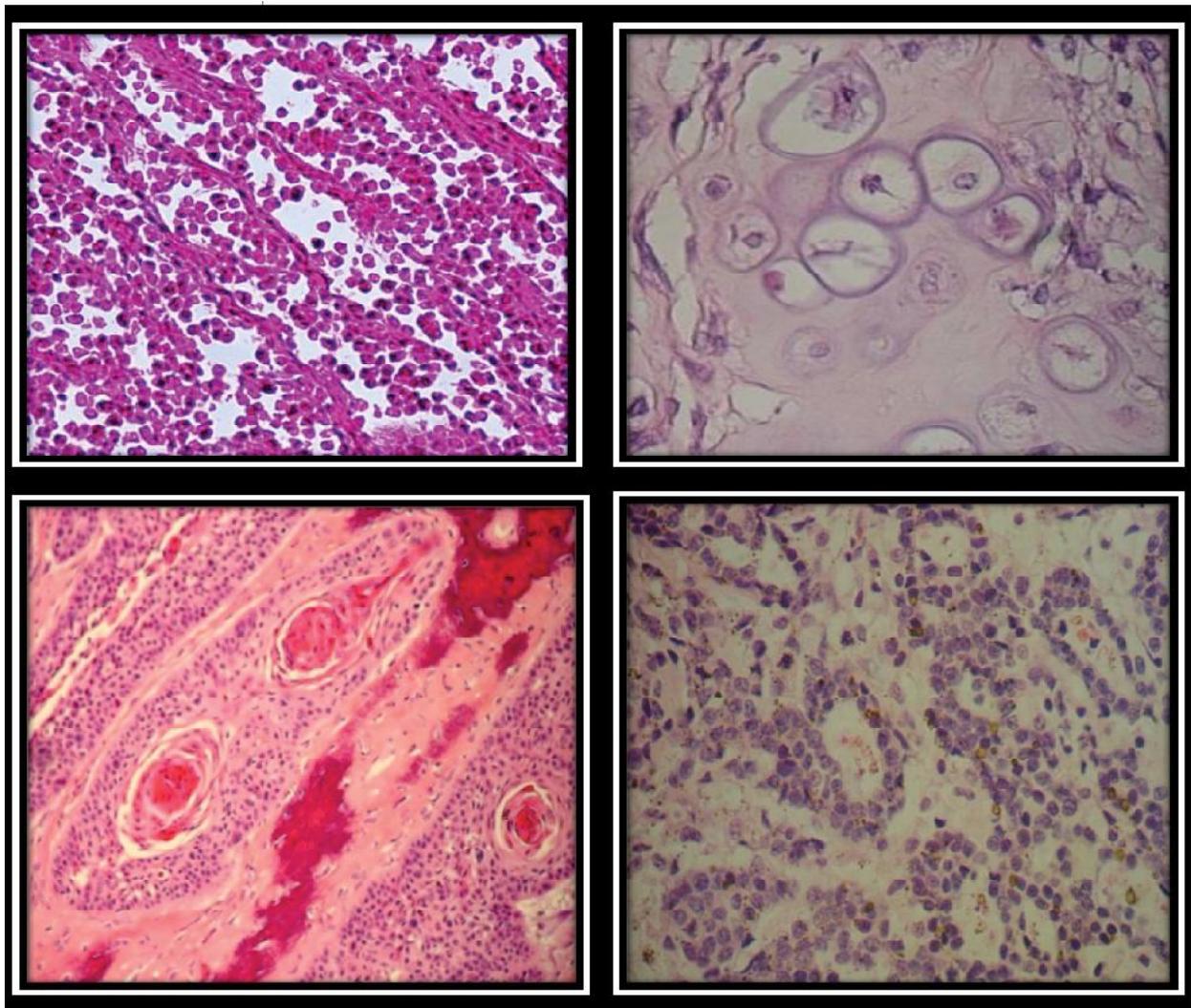


Figure 1. Histologic features of of transmissible venereal tumor (1), Chondrosarcoma (2), Squamous cell carcinoma (3) and Adenocarcinoma (4).

squamous cell carcinoma, which is in agreement with the WHO classification of tumors (Dungworth *et al.*, 1999).

Out of 14 dogs with tumors in nasal and paranasal regions, 4 dogs (21%) had chondrosarcoma, a malignant tumor of mesenchymal origin. Prevalence of chondrosarcoma was recorded at a lower level in Italy (6%) by Pietra *et al.* (2010) and in South Africa (9%) by Lobetti (2009). However, Confer and DePaoli (1978) reported 19% chondrosarcoma in the USA.

Four dogs with transmissible venereal tumor (TVT) in the nasal cavity were recorded during the present study.

Presence of TVT in the nasal cavity is rare. The only report of TVT in the nasal cavity of dogs is from Brazil by Kimura *et al.* (2012) who found 7 dogs (53%) with TVT out of 17 with nasal tumors. Free roaming sexually intact dogs get infected with TVT. Majority of owned dogs in Grenada are allowed to roam freely. There were no genital lesions in all 4 TVT affected dogs. It is thus suggested that these dogs got infected by sniffing the TVT lesions of other dogs. Absence of TVT cases in the nasal and paranasal region of dogs in developed countries of the world could be because of better dog care.



In present study males (12/14; 85%) were predominantly affected with tumors in nasal and paranasal region. A few researchers mentioned male gender predilection (Kuehn 2013) but majority reports indicate no gender predilection for nasal and paranasal tumors in dogs (Lobetti, 2009; Patnail, 1989; Looper *et al.*, 2014).

Dogs of various ages can be affected with nasal tumors, however, it is more common in older dogs with a median age of 10 years (Leslie and King, 1998; Pierre, 2008). Chondrosarcomas typically occur in younger animals (average age =7 years old, (Leslie and King, 1998). Contrary, dogs in this study with chondrosarcomas were older (10 years 2 dogs and 14 years 1 dog). Two dogs had squamous cell carcinoma; one 8 years old while other was of very young age (3years). The latter dog falls under exception for age with the findings of previous researchers. Dogs affected with Transmissible venereal tumor in the present study were of younger age group which fell within literature's age range of 2 to 5 years old.

ACKNOWLEDGEMENT

Authors thank Dr Keshaw Tiwari , Dr. Muhammad Iqbal Bhaiyat and Dr. Claude DeAllie for their support.

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