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Original Article
Small Animal Diseases

Lesions of the oral cavity of dogs: 720 cases[1]

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ABSTRACT.- Blume G.R., Eloi R.S.A, Oliveira L.B., Sonne L., Rezende L.P.O. & Sant'Ana F.J.F. 2023. **Lesions of the oral cavity of dogs: 720 cases.** *Pesquisa Veterinária Brasileira 43:e07073, 2023.* Laboratório de Diagnóstico Patológico Veterinário, Universidade de Brasília, Brasília, DF, 70636-020, Brazil. E-mail: santanafjf@yahoo.com

Seven hundred twenty cases of oral cavity lesions in dogs were diagnosed from 2015 to 2020 in Distrito Federal, Brazil. Four hundred thirty-two (60%) lesions were neoplastic, and 288 (40%) were non-neoplastic. Of the neoplasms, 229 (53%) were considered malignant and 203 (47%) benign, affecting mainly males, of 43 different breeds, with an average age of 9.4 years, mainly the gum and lip. Melanoma was the most (96/432, 22.2%) commonly diagnosed neoplasm, followed by peripheral odontogenic fibroma (68/432, 15.7%), papilloma (63/432, 14.5%) and squamous cell carcinoma (SCC) (56/432, 12.9%). Non-neoplastic lesions also affected males predominantly, from 41 different breeds, with an average age of 8.9 years, mainly in the gums, lip, and tongue. These lesions were diagnosed as inflammatory (230/288, 79.8%), hyperplastic (47/288, 16.3%) and other lesions (11/288, 3.8%).

INDEX TERMS: Oral pathology, diseases of dogs, neoplasm, canine visceral leishmaniosis, dogs.

RESUMO.- [**Lesões da cavidade oral de cães: 720 casos.**] Foram estudados 720 casos de lesões na cavidade oral em cães diagnosticados entre 2015 e 2020, no Distrito Federal. Dessas alterações, 432 (60%) foram neoplásicas e 288 (40%) não neoplásicas. Dentre os neoplasmas, 229 (53%) foram consideradas malignos e 203 (47%) benignos, acometendo principalmente machos, de 43 raças diferentes, com idade média 9,4 anos, afetando principalmente gengiva e lábio. Melanoma foi o neoplasma mais comumente diagnosticado (96/432; 22,2%), seguido do fibroma odontogênico periférico (68/432; 15,7%), papiloma (63/432; 14,5%) e carcinoma de células escamosas (56/432; 12,9%). As lesões não neoplásicas também acometeram predominantemente machos, de 41 raças diferentes, com idade média 8,9 anos, afetando principalmente gengiva, lábio e língua. Essas lesões foram diagnosticadas como inflamatórias (230/288; 79,8%), hiperplásicas (47/288; 16,3%) e como outras alterações (11/288; 3,8%).
TERMOS DE INDEXAÇÃO: Patologia oral, doenças de cães, neoplasma, leishmaniose visceral canina, cães.

INTRODUCTION

The oral cavity is a complex structure composed of different tissues in different anatomical and histological regions. Therefore, many neoplastic and non-neoplastic lesions occur at this site (Vos & van der Gaag 1987, Niemiec 2008, Gelberg 2013, Lommer 2013, Putnová et al. 2020). The frequency of oral neoplasms in dogs is variable and corresponds to approximately 0.5 to 10% of all neoplasms that affect this species (Vascellari et al. 2009, Requicha 2010, Grüntzig et al. 2015, Cray et al. 2020). The main non-neoplastic alterations found in dogs are inflammatory (Dennis et al. 2006, Bonfanti et al. 2015, Wingo 2018) and hyperplastic lesions (Svendenius & Warfvinge 2010, Mikiewicz et al. 2019).

Due to the macroscopic similarity of many oral lesions, determining a clinical diagnosis might be difficult. Therefore, a biopsy is necessary to differentiate lesions and determine causes (Mikiewicz et al. 2019). Few studies compare and provide detailed information on neoplastic and non-neoplastic lesions of the oral cavity of dogs, especially in the Brazilian scientific literature (Venturini 2016, Svendenius & Warfvinge

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2010, Bonfanti et al. 2015, Wingo 2018, Mikiewicz et al. 2019, Putnová et al. 2020). Given the lack of this information, it is opportune to highlight the collection of these data, primarily to assist veterinarians who work with clinics and surgery on small animals. Thus, the present study aims to determine the frequency and pathological characteristics of 720 primary oral lesions of dogs, submitted as biopsies to a veterinary pathology service in Brazilian midwestern.

MATERIALS AND METHODS

A retrospective study of primary lesions affecting the oral cavity of dogs and submitted as surgical biopsies was performed (2015-2020). The research was carried out manually in the archives of the "Laboratório de Diagnóstico Patológico Veterinário" of "Universidade de Brasília" (LDPV-UnB) and of the "Laboratório Histopato Análise Anatomopatológica Veterinária", in Brasília/DF, Brazil. All samples were fixed in 10% buffered formalin, processed routinely, and stained with hematoxylin and eosin (HE).

The data collected from the archives of histopathological exams of canine tissues included age, gender, breed, and the affected oral anatomical region. The following structures were considered as possible primary sites: gingiva, lip, palate (hard and soft), mandibular and maxillary bone, tongue, and salivary glands (Gioso & Carvalho 2005, Murphy et al. 2020). Based on the morphological diagnoses found in each case, these were classified into neoplastic and non-neoplastic lesions. Morphologically, the neoplasms were classified as epithelial, mesenchymal, or round cell tumors (Munday et al. 2017). Non-neoplastic lesions were distributed in three categories: inflammatory, hyperplastic, and other changes. When regional lymph nodes were submitted, they were also evaluated. All cases were reviewed by three pathologists (GRB, RSAE, FJFS) from the project, who described histopathological findings and classified the lesions.

In some inconclusive cases after routine histopathological diagnosis, other complementary techniques were used. In cases suspected of leishmaniasis, immunohistochemistry (IHC) and polymerase chain reaction (PCR) was performed to extract kDNA from *Leishmania infantum* (Blume et al. 2019). In suspected cases of mast cell tumor, we used toluidine blue in the histological sections. In granulomatous alterations, we used special stains such as Grocott's methenamine silver (GMS), Fite Faraco, and periodic acid-Schiff (PAS) to detect possible etiologic agents involved.

RESULTS

Seven hundred twenty oral lesions were observed: 432 (60%) neoplastic and 288 (40%) non-neoplastic (Table 1). Most of the samples analyzed (447/720, 62.1%) were in dogs between six to 14 years old, with 389 males (54%) and 331 females (46%) of 50 different breeds. The highest frequency was mixed-breed dogs (21.8%), Shih-Tzu (8.2%), Poodle (7.8%), Schnauzer (6.4%) and Yorkshire (5.1%). In 22 cases (3.1%), the breed was not informed. The lesions were more frequent in the gingiva (65.8%), followed by the lip (17.4%), tongue (9.7%), hard and soft palate (5.5%), salivary gland (0.9%) and mandible (0.7%). Twenty-five dogs had lesions in more than one anatomical region.

Neoplastic lesions

The frequency and morphological diagnoses of the neoplasms are shown in Table 1. The main neoplasms were melanoma (Fig.1-2), squamous cell carcinoma (SCC) (Fig.3-4), peripheral odontogenic fibroma (POF) (Fig.5-8), and papilloma (Fig.9-11). Some skin tumors were inserted in the search because they are located on the lip.

From 432 neoplasms, 229 (53%) were malignant and 203 (47%) benign, affecting 228 males (52.8%) and 204 females (47.2%) from 43 different breeds, with a higher frequency in mixed-breed dogs (23.1%), Shih-Tzu (8.3%), Poodle (8.1%), Schnauzer (6.0%) and Golden Retriever (4.6%). Sixteen animals (3.7%) did not have their breed informed, as well as 56 dogs (13.0%) had no information about age. Therefore, from 376 dogs with informed age, 9 (2.1%) were less than one year old, 63 (14.6%) were between 1 and 5 years old, in 141 (32.6%) the age ranged from 6 to 10 years old, 133 (30.8%) were between 11 and 15 years old and 30 (6.9%) dogs were 16 years old or older. The age of the dogs ranged from 4 months to 20 years, with a mean of 9.4 years (median = 10 years).

The distribution of neoplasms by anatomical location can be seen in Table 2. It is noteworthy that 15 animals presented neoplasm in more than one region.

Sixty-five out of 96 cases of melanoma (67.7%) were diagnosed as melanotic and 31 (32.3%) amelanotic. Tumors containing little or no intracytoplasmic pigment were considered amelanotic. In four melanomas (4.1%), chondroid metaplasia was observed in neoplastic cells.

The mandibular lymph node was submitted in only six cases, with three cases of melanoma metastasis, one of fibrosarcoma and two with lymphoid hyperplasia.

Non-neoplastic lesions

The most frequent non-neoplastic lesions (NNL) were lymphoplasmacytic stomatitis (Fig.12 and 13), gingival hyperplasia (Fig.14), and suppurative or granulomatous stomatitis (Table 1). Two hundred and thirty (79.8%) NNLs were inflammatory, 47 (16.3%) hyperplastic, and 11 (3.8%) sundry changes such as sialocele/mucocele, calcinosis circumscripta, collagenous hamartoma, and dentigerous cyst. They affected 161 males (55.9%), and 127 females (44.1%) from 41 different breeds, with higher frequency in mixed-breed dogs (19.8%), Shih-Tzu (8.0%), Yorkshire (7.3%), Poodle (7.3%), Schnauzer (6.9%) and Labrador (8.2%). Six dogs (2.1%) did not have their breed informed. In 27 cases (9.4%), clinical archives did not notify the dog's age. Therefore, from 261 dogs that contained this information, 7 (2.7%) were less than one year old, 57 (21.8%) were between 1 and 5 years old, in 104 (39.8%), the age ranged from 6 to 10 years of age, 59 (22.6%) were between 11 and 15 years old, and 7 (2.7%) dogs were aged over 16 years. The age of the dogs ranged from four months to 18 years (average of 8.9 years) and a median of 10 years. The distribution of non-neoplastic changes by anatomical location can be seen in Table 3. Ten dogs had lesions in more than one anatomical region. The inflammatory lesions were classified according to the morphological diagnosis, and the cases of hyperplasia were divided into gingival and sublingual.

In 47 cases (corresponding to 6.5% of the total and 16.3% of non-neoplastic lesions), infectious agents were observed: 38 with bacterial colonies and nine with amastigote forms of *Leishmania* spp. Of the nine cases confirmed for canine visceral leishmaniasis (CVL), six were caused by *Leishmania infantum*, and the histopathological and immunohistochemical findings and molecular confirmation by PCR were previously

Table 1. Classification of 720 neoplastic and non-neoplastic lesions diagnosed in the oral cavity of dogs in Distrito Federal, Brazil (2015-2020)

Type of lesion	N			%
Neoplastic lesions	Benign	Malignant	Total	
Epithelial neoplasm	108	64	172	23.9
Papilloma	63			
Squamous cell carcinoma		56		
Acanthomatous ameloblastoma	38			
Basosquamous carcinoma		3		
Trichoblastoma	3			
Sebaceous epithelioma	2			
Salivary adenocarcinoma		2		
Basal cell carcinoma		1		
Sebaceous carcinoma		1		
Sebaceous adenoma	1			
Sebaceous epithelioma + papilloma	1			
Round cell neoplasm	25	126	151	21.0
Melanoma		96		
Undifferentiated round cell neoplasm		27		
Plasma cell tumor	16			
Histiocytoma	6			
Mast cell tumor		3		
Transmissible venereal tumor	2			
Melanocytoma	1			
Mesenchymal neoplasm	69	40	109	15.1
Odontogenic fibroma	68			
Fibrosarcoma		29		
Osteosarcoma		5		
Hemangiosarcoma		5		
Hemangioma	1			
Malignant peripheral nerve sheath tumor		1		
Non-neoplastic lesions				
Inflammatory lesion		230		31.9
Lymphoplasmocytic stomatitis		143		
Suppurative stomatitis		40		
Granulomatous stomatitis		32		
Leishmaniasis		9		
Contact cheilitis		3		
Lupus		2		
Actinic keratosis		1		
Hyperplasia		47		6.5
Gingival hyperplasia		43		
Hyperplastic glossitis		4		
Other lesions		11		1.5
Sialocele/mucocele		5		
Calcinosis		4		
Collagenous hamartoma		1		
Dentigerous cyst		1		
TOTAL		720		100.0

published (Blume et al. 2019). No granulomatous stomatitis was positive for microorganisms in the histochemical stains, such as GMS, Fite Faraco, or PAS. In the group "other changes", the most common lesions included five cases of sialocele/mucocele (1.7%), four cases of calcinosis circumscripta (1.3%), one of collagenous hamartoma (0.34%), and one of dentigerous cyst (0.34%).

DISCUSSION AND CONCLUSION

Some studies have analyzed the frequency and characteristics of oral lesions in dogs in some countries (Voss & van der Gaag 1987, Dennis et al. 2006, Sapierzynski et al. 2007, Requicha 2010, Svendenius & Warfvinge 2010, Simons 2015, Bonfanti et al. 2015, Wingo 2018, Mikiewicz et al. 2019, Cray et al. 2020, Putnová et al. 2020). Few of them evaluated retrospectively numerous samples, as in the present article. In addition, few Brazilian studies in recent decades, analyzing oral tumor-like lesions in dogs are available (Ferro et al. 2004, Venturini 2016, Gomes et al. 2009, Luz 2017, Sousa 2018).

In the present study, the diagnosis of neoplastic lesions was more frequent than non-neoplastic changes, as observed in other retrospective studies (Dennis et al. 2006, Bonfanti et al. 2015, Wingo 2018, Mikiewicz et al. 2019), but diverging from others, where the predominance was the opposite (Venturini 2016, Svendenius & Warfvinge 2010). The reduced number of oral inflammatory lesions in dogs, compared to tumor-like lesions, can be explained by the fact that some animals with mild gingivitis/periodontitis may be asymptomatic or have a good response to clinical treatment, without the necessity of a surgery and subsequent histopathological evaluation (Willard 2010). Biopsies of the tongue represent about 0.8% of all biopsies performed on dogs and, among the causes for this procedure, 54% are due to neoplasms, 33% inflammatory processes (glossitis) and 12% other causes, such as epithelial hyperplasia (Dennis et al. 2006). Although there are reports about neoplastic and non-neoplastic lesions in the oral cavity of dogs, surveys that contemplate these two groups of lesions are scarce, especially in Brazil.

The frequency of malignant neoplasms was higher compared to benign ones, similar to other previous studies (Vos & van der Gaag 1987, Ferro et al. 2004, Sapierzynski et al. 2007, Gomes et al. 2009, Willard 2010, Wingo 2018, Mikiewicz et

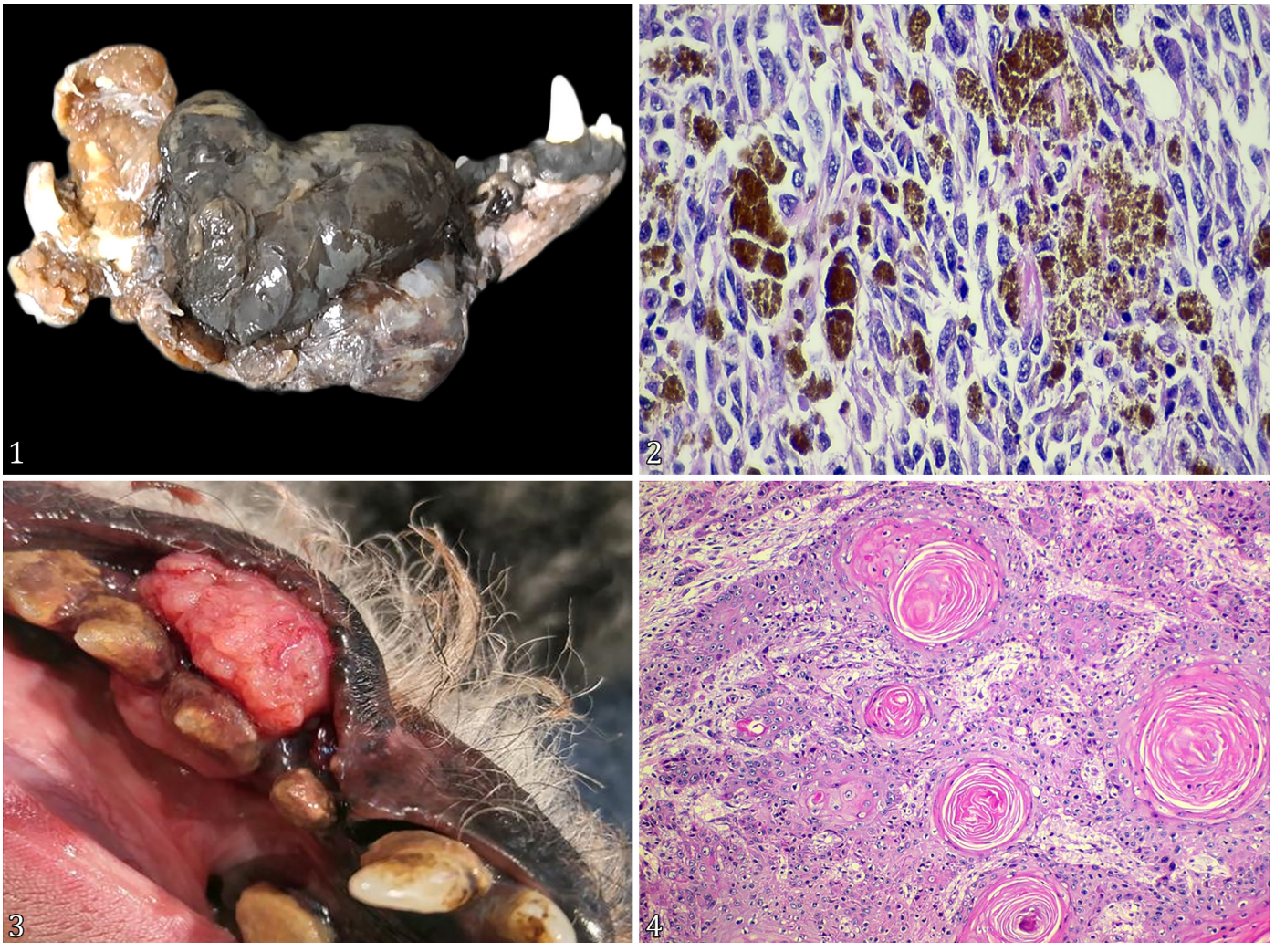

Fig.1-4. Canine oral malignant neoplasms. (**1**) Gross aspect of melanoma. (**2**) Neoplastic proliferation of pleomorphic melanocytes showing brown intracytoplasmic pigment. HE, obj.20x. (**3**) Gross view of squamous cell carcinoma affecting the gingiva. (**4**) Numerous nests of neoplastic keratinocytes with corneal pearls extending into the submucosa. HE, obj.10x.

al. 2019, Cray et al. 2020, Putnová et al. 2020) but diverging with others (Venturini 2016, Requicha 2010, Svendenius & Warfvinge 2010). The higher incidence of benign tumors in these latter studies can be explained due to the high casuistry of samples submitted from young animals for histopathological analysis (Munday et al. 2017).

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The main anatomical region affected by both injuries in the present study was the gingiva, corroborating with other authors (Cohen et al. 1974, Vos & van der Gaag 1987, Ferro et al. 2004, Simons 2015, Luz 2017, Sousa 2018, Mikiewicz et al. 2019, Cray et al. 2020). Lips and tongue were the second and third most affected sites, respectively. These locations have also been described as predisposing to oral lesions in dogs (Requicha 2010, Cray et al. 2020). Twenty-five animals (3.4%) presented the same oral lesion in more than one location, 15 with neoplastic and ten non-neoplastic disorders. Similar findings were previously identified with 14.28% (Luz 2017)

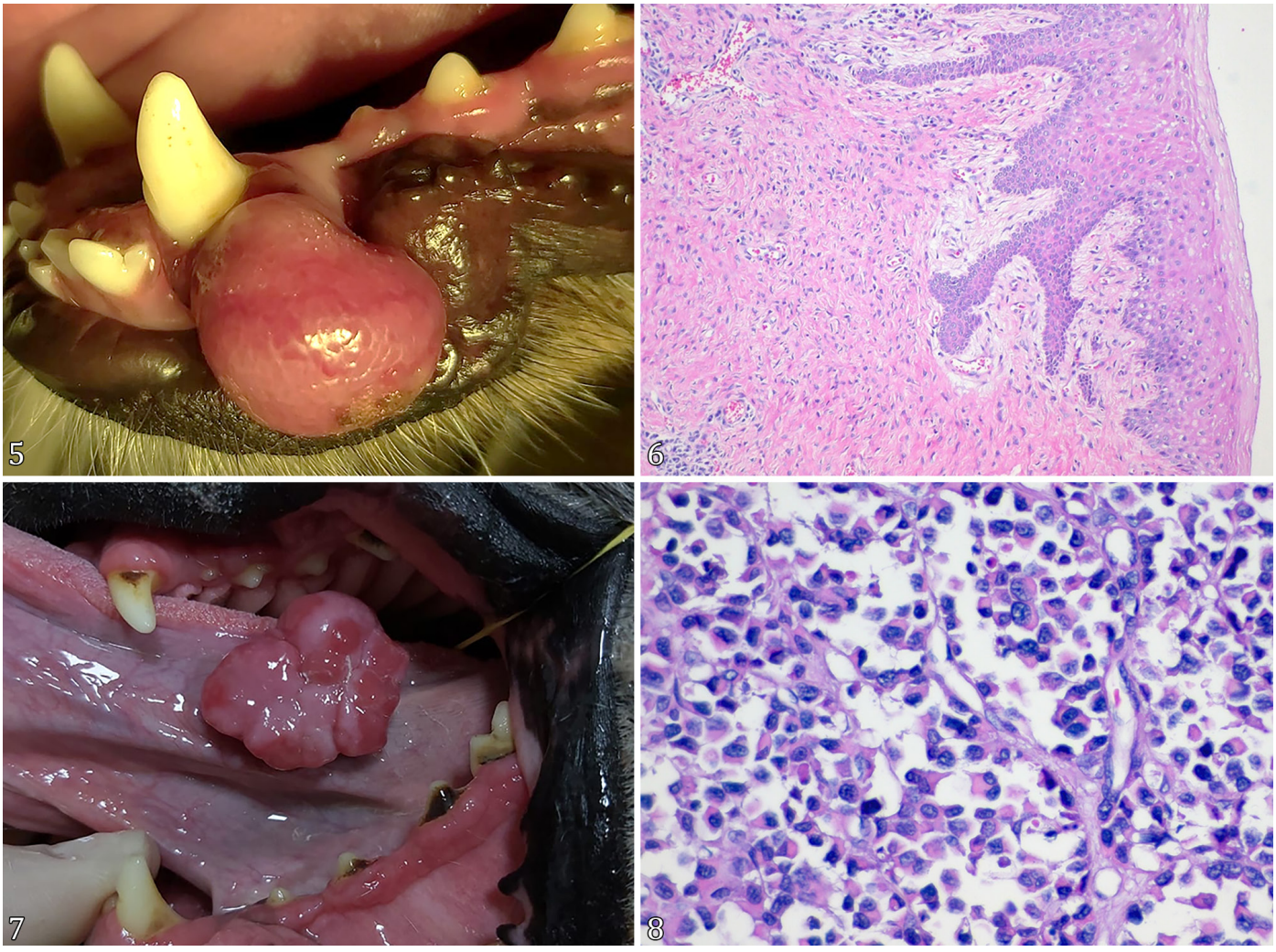

Fig.5-8. Canine oral benign neoplasms. (**5**) Gross aspect of odontogenic fibroma affecting the mandibular gingiva. (**6**) These neoplasm is composed of proliferated spindle cells expanding the subepithelial connective tissue with irregular epithelial hyperplasia. HE, obj.10x. (**7**) Plasmacytoma in the ventral aspect of tongue. (**8**) There is proliferation of neoplastic plasma cells. HE, obj.40x.

and 3.5% (Bonfanti et al. 2015) of dogs with more than one region with the same oral lesion.

Some studies indicate that melanoma is the leading oral neoplasm in dogs (Vos & van der Gaag 1987, Ferro et al. 2004, Venturini 2016, Gomes et al. 2009, Svendenius & Warfvinge 2010, Bonfanti et al. 2015, Sousa 2018, Putnová et al. 2020), as observed in our investigation. Others report the predominance of melanotic (Requicha 2010, Simons 2015, Putnová et al. 2020) or amelanotic (Sousa 2018) melanoma. Osseous/chondroid metaplasia in oral melanomas is uncommon, but when found, it still has the same prognosis as other types of oral melanomas. This neoplasm with metaplasia generally affects elderly animals and small breeds (Oyamada et al. 2007, Sánchez et al. 2007, Ellis et al. 2010). This information corroborates the findings of this study.

POF was the most common benign neoplasm of the oral cavity and the most frequent odontogenic neoplasm, as already described by other authors (Svendenius & Warfvinge 2010, Sousa 2018, Wingo 2018, Mikiewicz et al. 2019). In addition, POF was also the second most observed neoplasm in this study, similar to another study (Sousa 2018) and diverging from the frequency-related by other authors (Svendenius & Warfvinge 2010, Wingo 2018, Mikiewicz et al. 2019). A study suggested the racial predisposition of Boxer dogs to POF (Mikiewicz et al. 2019); however, in our case, only 3 (4.4%) of the 68 animals affected by this neoplasm were found, with a relevant frequency of mixed-breed dogs (20-29.4%) and Shih-Tzu (10-14.7%). Some authors consider this neoplasm a non-neoplastic reactive lesion (hyperplasia), mainly when there are no ribbons of odontogenic epithelium in histopathology (Murphy et al. 2020). On the other hand, the initials "POF" are now in use to refer to neoplastic lesions once referred to as "fibromatous epulis of the periodontal ligament" (Munday et al. 2017). The locally aggressive behavior of this lesion, sometimes with tooth displacement, is expected and should be considered in the diagnosis.

Plasma cell tumor was the primary neoplasm of round cells, as mentioned in the literature (Sousa 2018, Mikiewicz et al. 2019). In dogs, it represents about 5.2% of all oral tumors (Wright et al. 2008), reaching 9% (Kupanoff et al. 2006). In our study, plasma cell tumors were 3.7% of all neoplasms. Plasma cell tumors should be differentiated from multiple myeloma in the adjacent bones, especially those on the mandible. Other neoplasms of the same cell line can happen in the oral cavity of dogs, such as mast cell tumors (Patnaik et al. 1982, Gieger et al. 2003, Hillman et al. 2010, Elliott et al. 2016), histiocytoma (Daleck et al. 2007, Putnová et al. 2020), histiocytic sarcoma (Dennis et al. 2006) and lymphoma (Mikiewicz et al. 2019). At the same anatomical site, one animal presented oral involvement by two neoplasms (sebaceous epithelioma and squamous papilloma). Incidentally, it is reported that, although rarely, one can observe more than one oral tumor in the same animal (Pérez-Martínez et al. 2000, Sitzman 2000, Bonfanti et al. 2015, Simons 2015, Rodríguez et al. 2016). Regarding non-neoplastic lesions, there was a high frequency of inflammatory changes, a result similar to that of other studies (Dennis et al.

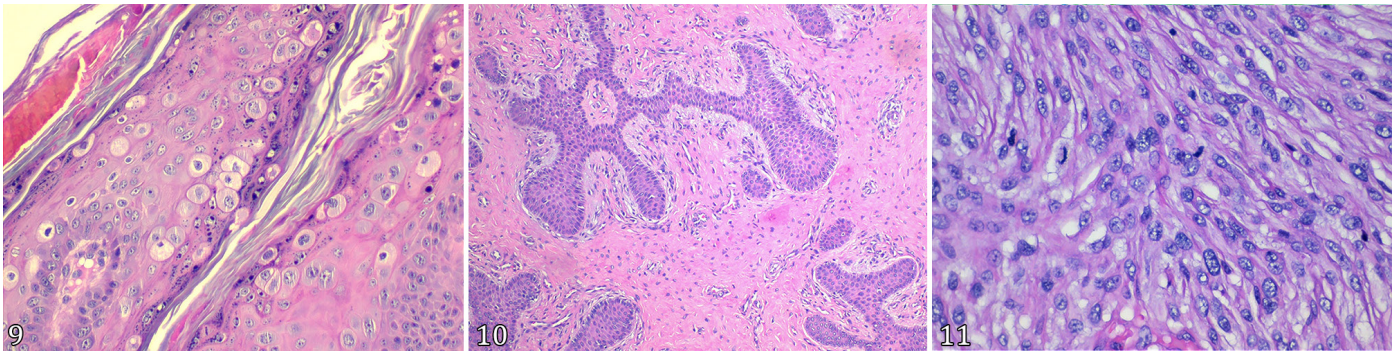

Fig.9-11. Canine oral benign and malignant neoplasms. (**9**) Histopathological view of papilloma. HE, obj.40x. (**10**) Acanthomatous ameloblastoma. HE, obj.10x. (**11**) Fibrosarcoma. HE, obj.40x.

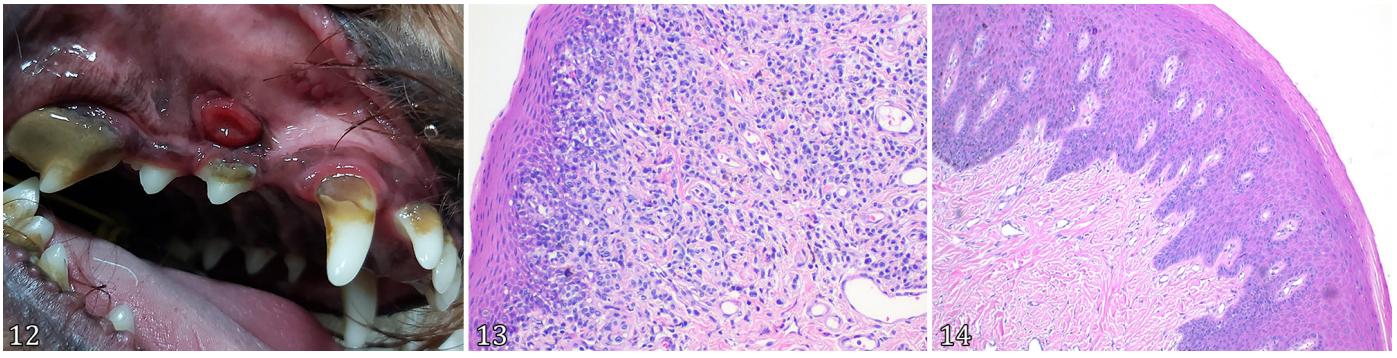

Fig.12-14. Non-neoplastic oral lesions. (**12**) Gross and (**13**) histopathological aspect of lymphplasmacytic stomatitis in a dog. (**13**) There are accentuated focally extensive infiltrate composed by lymphocytes and plasma cells. HE, obj.10x. (**14**) Canine gingival hyperplasia. There is epithelial thickening of the gingiva with hyperplasia of keratinocytes of the spinous layer. HE, obj.10x.

Table 2. Frequency and anatomical location of 432 neoplasms diagnosed in the oral cavity of dogs in Distrito Federal, Brazil (2015-2020)

Location	N	%
Gingiva	282	63.1
Odontogenic fibroma	68	
Melanoma	68	
Acanthomatous ameloblastoma	38	
Squamous cell carcinoma	32	
Papilloma	25	
Fibrosarcoma	22	
Undifferentiated round cell neoplasm	14	
Plasma cell tumor	8	
Hemangiosarcoma	2	
Transmissible venereal tumor	2	
Basosquamous carcinoma	1	
Melanocytoma	1	
Malignant peripheral nerve sheath tumor	1	
Lip	90	20.1
Papilloma	28	
Squamous cell carcinoma	15	
Melanoma	11	
Undifferentiated round cell neoplasm	8	
Histiocytoma	6	
Fibrosarcoma	3	
Trichoblastoma	3	
Plasma cell tumor	2	
Hemangiosarcoma	2	
Mast cell tumor	2	
Sebaceous epithelioma	2	
Basal cell carcinoma	2	
Basosquamous carcinoma	2	
Hemangioma	1	
Sebaceous carcinoma	1	
Sebaceous adenoma	1	
Sebaceous epithelioma + papilloma	1	
Tongue	38	8.5
Papilloma	10	
Melanoma	8	
Squamous cell carcinoma	6	
Plasma cell tumor	6	
Undifferentiated round cell neoplasm	5	
Fibrosarcoma	1	
Hemangiosarcoma	1	
Mast cell tumor	1	
Palate hard and soft	30	6.7
Melanoma	11	
Fibrosarcoma	9	
Squamous cell carcinoma	7	
Papilloma	2	
Plasma cell tumor	1	
Mandible	5	1.1
Osteosarcoma	5	
Salivary gland	2	0.4
Salivary adenocarcinoma	2	
TOTAL	447	100.0

2006, Bonfanti et al. 2015, Wingo 2018). The predominant infiltrate was the lymphoplasmacytic, as observed by other authors (Silva 2011, Mikiewicz et al. 2019). However, it was not possible to define the cause in these cases. It is possible that inflammation occurred secondary to periodontal disease, a common condition in dogs in which this type of inflammation has already been described (Venturini 2016, Silva 2011). The main cells needed to activate the immune response in cases of gingivitis include plasma cells and lymphocytes (T and B) (Lyon 2005). Inflammation in the gingiva, especially in the region of the gingival sulcus, is activated by the host's response due to continuous exposure to various antigens. The interaction between the bacterial plaque and the host and its immune response is complex and periodontal disease appears to result from an imbalance between the host and the microorganisms (Lyon 2005, Mikiewicz et al. 2019). This type of infiltrate can also be found in cases of chronic canine ulcerative gingivostomatitis, also called chronic ulcerative paradental stomatitis (CUPS), an exaggerated inflammatory response with ulcers and infiltration of lymphocytes and plasma cells results from the contact of the oral mucosa with dental plaques or tartar (Carmichael 2004, Gelberg 2013, Anderson et al. 2017, Murphy et al. 2020). There are indications that viral infections (canine parvovirus, for example) can affect the oral cavity, inducing this inflammatory response (Favrot et al. 2000).

In our study, gingival hyperplasia was a frequent non-neoplastic lesion, similar to findings of other investigations (Venturini 2016, Svendenius & Warfvinge 2010, Mikiewicz et al. 2019). This lesion was the most prevalent diagnosis among all neoplastic and non-neoplastic lesions (Svendenius & Warfvinge 2010). Although hyperplasia may be associated with inflammation in varying degrees (Mikiewicz et al. 2019), in the present study, hyperplasia was considered only in cases with excessive gingival enlargement, mainly epithelial, with mild or no associated inflammation. Macroscopically, it is challenging to differentiate hyperplasia from a neoplastic process (Gelberg 2013), so it is essential to perform histopathological analysis in these cases. In 47 cases (6.5% of the total, 16.3% of non-neoplastic lesions), infectious agents were observed, nine were cases of oral leishmaniasis, and in 38 samples, myriads of bacteria were seen with the inflammation of a total of 40 cases diagnosed morphologically as suppurative stomatitis. In six cases of visceral leishmaniasis with exclusively oral involvement, the clinical-pathological aspects were described for the first time (Blume et al. 2019). These lesions consisted mainly of granulomatous or lymphoplasmacytic stomatitis with intracytoplasmic amastigotes of *Leishmania* spp. The pathogenesis of these oral lesions in the absence of systemic leishmaniasis is still unclear, although some hypotheses include accidental ingestion of infected phlebotomine sandflies, migration of infected macrophages to sites of oral infection, or other undefined reasons (Lamothe & Poujade 2002, Manzillo et al. 2005). Bacterial lesions were common non-neoplastic changes in this study.

Infectious agents were not found in any of the 32 cases of granulomatous stomatitis, but in 20 dogs (2.7% of the total, 6.9% of non-neoplastic lesions), there was an infiltration of eosinophils, indicating that it was a canine eosinophilic granuloma, a disease little described in dogs (Bredal et al. 1996, German et al. 2002, Mendelsohn et al. 2019). Other authors also indicate a

low frequency of this lesion in the oral cavity of dogs, with 4.7% (Svendenius & Warfvinge 2010), 6% (Mikiewicz et al. 2019) and 14.3% (Bonfanti et al. 2015). In three cases of contact cheilitis, there was a mixed infiltration, with some eosinophils indicating hypersensitivity. In no case, parasites were identified.

Inflammatory lesions of the salivary gland were more frequent compared to neoplasms at that location. The sialocele/mucocele is the most frequent. This finding is similar to that described by Lieske & Rissi (2020) who diagnosed sialocele in 24 (26.9%) cases. In addition, the neoplasm most found in the present study was adenocarcinoma, as also described by the authors mentioned before. In another study, only one (0.9%) of 108 dogs with reactive oral lesions was observed mucocele (Svendenius & Warfvinge 2010). Four cases of calcinosis were found, all affecting the tongue, this being the main location of this lesion in the oral cavity in dogs (Jeong et al. 2004, Tafti et al. 2005, Dennis et al. 2006).

Four cases had sublingual hyperplasia, a proliferative lesion of the tongue epithelium that occurs secondary to recurrent trauma to the sublingual tissue, causing local inflammatory and hyperplastic reactions (Hawkins 1992). One case had diffuse gingival hyperplasia due to cyclosporine. Gingival hyperplasia may also be a consequence of the use of some medications, such as phenytoin and cyclosporine, and calcium channel blockers, such as amlodipine (Nyska et al. 1990, Lewis & Reiter 2005, Thomason et al. 2009, Pariser & Berdoulay 2011, Desmet & van der Meer 2017). For example, cyclosporine can cause this condition in about 3% of dogs after its administration. When its use is discontinued, it may take a few weeks or even months for the lesion to regress (Guaguère et al. 2004). In the case of amlodipine, the repair of the hyperplastic lesion begins two to eight weeks after stopping the medication and ends with up to three to six months (Thomason et al. 2009).

Table 3. Frequency and anatomical location of 288 non-neoplastic lesions diagnosed in the oral cavity of dogs in Distrito Federal, Brazil (2015-2020)

Location	N	%
Gingiva	208	69.8
Lymphoplasmacytic stomatitis	124	
Gingival hyperplasia	43	
Suppurative stomatitis	27	
Granulomatous stomatitis	8	
Lupus	2	
Leishmaniasis	2	
Calcinosis	1	
Dentigerous cyst	1	
Lip	40	13.4
Lymphoplasmacytic stomatitis	13	
Granulomatous stomatitis	10	
Suppurative stomatitis	6	
Contact cheilitis	3	
Leishmaniasis	3	
Lupus	2	
Calcinosis	1	
Collagenous hamartoma	1	
Actinic keratosis	1	
Tongue	34	11.4
Granulomatous stomatitis	13	
Suppurative stomatitis	7	
Hyperplasic glossitis	4	
Lymphoplasmacytic stomatitis	4	
Calcinosis	3	
Leishmaniasis	3	
Hard and soft palate	11	3.7
Lymphoplasmacytic stomatitis	9	
Granulomatous stomatitis	1	
Leishmaniasis	1	
Salivary gland	5	1.7
Sialocele/mucocele	5	
TOTAL	298	100.0

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