

# Periodontal Diseases and their Surgical Management in Dogs

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## ABSTRACT

The present retrospective surveillance (n = 48) and actual dental scaling (n = 20) work were conducted on dogs of either sex from 2 to 12 years in different breeds with periodontal diseases (PD) presented to the VCC, Junagadh. Among the 48 retrospective cases, the higher incidence was recorded in dogs above 6 years of age (56.25 %) followed by 3–6 years (37.5 %) and < 3 years of age (6.25 %), particularly affecting male dogs (70.83 %). Pomeranian/Spitz breed was affected the most (39.58 %, 19/48), followed by German shepherd (16.67 %), Labrador retriever (14.58 %), non-descript (14.58 %), and other 4 to 6%. The highest incidence of stage 4 PD was noticed in the dogs of > 6 years of age (53.84 %). Among 20 dogs of the current year, the major complaint was halitosis (70 %) and sticky salivation (55 %), followed by anorexia (35 %), pawing at mouth (20 %) and facial swelling (15 %). 11 out of 20 dogs (55 %) were maintained on a purely vegetarian diet and rest 9 (45 %) on veg and non-veg diet. Oral examination of dogs revealed a varying degree of dental plaque in all 20 cases (100 %), followed by dental calculus (85 %), gingival recession (45 %), gingival hyperplasia (30 %) and tooth fracture (15 %). Plaque index (PI) 2 was observed maximum in 11 (55 %) dogs, followed by PI 1 in 7 (35 %) and PI 3 in 2 (10 %) dogs. Dogs suffered maximum with CI 2 type calculus (45 %), followed by CI 1 (25 %) and CI 3 (20 %). Furcation of a varying degree was noticed only in 8 40% dogs out of 20, which was classified as FE 1 in 4 (20 %), followed by FE 3 and FE 2 in 2 cases each (10 %). In 13 out of 20 dogs, periodontal probing depth was < 3 mm, whereas it was 4 mm and > 5 mm in 4 (20 %) and 3 (15 %) dogs, respectively. Most effective dental scaling could be performed under diazepam-ketamine general anesthesia by using an ultrasonic piezo scaler tip at a 45° angle to the tooth surface for removal of calculus.

**Keywords:** Canine, Dental scaling, Dental tartar, Incidence, Periodontal disease.

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## INTRODUCTION

Prevention and treatment of dental diseases are of utmost importance for the general health of companion animals but are underrated. Dental problems are frequently observed in small animals, and these conditions encompass the whole spectrum of problems, as seen in man. The lack of oral hygiene cause plaque deposition and calculus formation, which harbors the bacteria and eventually induces gingival inflammation (Page and Schroeder, 1982). Periodontal disease (PD) refers to a group of inflammatory diseases caused by bacterial plaque in the periodontium. PD is progressive and involves two stages: gingivitis and periodontitis (Ford and Mazzaferro, 2007). Conditions primarily affecting the periodontium or oral mucosa are chemical or thermal burns, gingival hyperplasia, gingivitis, gingivostomatitis, neoplasia, periapical abscess, periodontitis and ulcers (Ellen *et al.*, 2010). Early detection, diagnosis, and treatment are essential in the control of this disease, as it has an enormous impact on human and veterinary medicine due to its high prevalence (Carlos *et al.*, 2012). PD is clinically manifested by halitosis, gingival recession, loss of supporting bone, tooth mobility, furcation exposure, and periodontal pocket formation depending upon the severity of disease present and damage inflicted upon the tissue supporting teeth (Rawlinson, 2003). PD itself does not cause the only discomfort to the affected animal, but it also causes disease in other organs and tissues (De Bowes, 1994). The key factor of periodontal prevention and treatment remains

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the elimination and control of sub-gingival plaque (Andrew, 2004). Traditionally, this has been achieved by manual or mechanical scaling of coronal calculus, manual debridement of sub-gingival (surgical and nonsurgical), and polishing. In recent years, several other modalities of treatment have been introduced (Haake, 1996). The present study was undertaken to note the incidence of periodontal diseases and their surgical management in the dogs presented to VCC, Junagadh.

## MATERIALS AND METHODS

The present study was accomplished in two parts: retrospective surveillance and case studies. For the retrospective study, the records of a total of 2006 dogs presented at the Department of Surgery and Radiology of the College, JAU, Junagadh over the past three years were screened, which revealed 48 dogs with heavy periodontal diseases (PD). These cases were classified under different age groups, viz., < 3 years, 3-6 years, and > 6 years, as well as in relation to stage of PD, breed, and sex of dogs affected.

The actual clinical case studies included 20 dogs that were presented at VCC during the current year with complaints of halitosis, sticky salivation, facial swelling, and others. All these 20 dogs were subjected to a detailed history and clinical examination. Details of symptoms exhibited such as halitosis, pawing at the mouth, abnormal salivation, facial swelling, as well as details regarding dental home care such as brushing teeth, mouth wash, type of food supply, details of earlier treatment if any and relevant data were collected.

Oral examination of affected dogs included general oral and soft tissue examination, supragingival and sub-gingival tooth examinations and the findings like Gingival Index (GI), Plaque Index (PI), Calculus Index (CI), Furcation Exposure (FE) and periodontal pocket depth using periodontal probe were recorded (Loe and Silness, 1963). The affected dogs with periodontal diseases were graded depending upon the severity of periodontal disease on four stages, i.e., Stage 1 to 4 PD, as described by AVDC Nomenclature Committee. Stage 1 (PD1): Gingivitis only, without attachment loss. Stage 2 (PD2): Early periodontitis; less than 25 % of attachment loss, or at most, there is a stage 1 furcation involvement. Stage 3 (PD3): Moderate periodontitis; 25–50 % of attachment loss. Stage 4 (PD4): Advanced periodontitis; more than 50 % of attachment loss, there is a stage 3 furcation involvement in multi-rooted teeth.

Oral lavage with Chlorhexidine gluconate 1% solution was carried out before and after dental scaling to reduce bacterial load in the oral cavity. Dental scaling was performed in atropine sulphate (@ 0.04 mg/kg subcutaneously) pre-medicated dogs (n=20) under general anesthesia by

administering mixture of diazepam @ 0.5 mg/kg and ketamine hydrochloride @ 10 mg/kg b.wt. intravenously, and it was maintained by I/V administration of 1/3<sup>rd</sup> induction dose of the diazepam-ketamine mixture as per the requirement.

After flushing the oral cavity with water by three-way syringe, complete removal of plaque and tartar from affected teeth was carried out with the help of a handpiece of an ultrasonic piezo scaler unit (Figure 1). Debridement of periodontal pockets and irrigation of gingival sulcus was carried out by a three-way syringe. Teeth showing severe mobility (M3) were extracted (Figure 2). The bleeding was controlled by digital pressure using a gauge sponge. Continuous intravenous fluid support as needed was given to patients with monitoring vital signs until the recovery from anesthesia. In cases of moderate to severe gingivitis, antibiotic Cefotaxime @ 15 mg/kg b. wt. was given. Post-operative findings of treated cases were recorded for up to 10 days. The data were analyzed to work out the frequency distribution of various ailments studied.

## RESULTS AND DISCUSSION

### Retrospective Surveillance of Periodontal Diseases (n = 48)

A total of 2006 dogs were presented at the Department of Surgery and Radiology of the College over past three years, in which only 48 dogs had heavy periodontal diseases (PD). The dogs of both the sex were affected with periodontal diseases. However, the incidence of PD was higher in male 34 (70.83 %) than female 14 (29.17 %) dogs. The breed-wise distribution of cases revealed that Pomeranian/Spitz breed of dogs was affected the most 19 (39.58 %) with periodontal diseases followed by German shepherd 8 (16.66 %), Labrador retriever 7 (14.58 %), Non-descript 7 (14.58 %), Great Dane 3 (6.25 %), Doberman pinscher 2 (4.17 %) and Lhasa apso 2 (4.17 %). The occurrence of PD was most common in older dogs > 6 years age 27 (56.25 %) followed by the dogs aged 3-6 years 18 (37.5 %) and younger dogs < 3 years of age 3 (6.25 %). Oral examination revealed a varying degree of plaque accumulation in all 48 dogs (100 %).

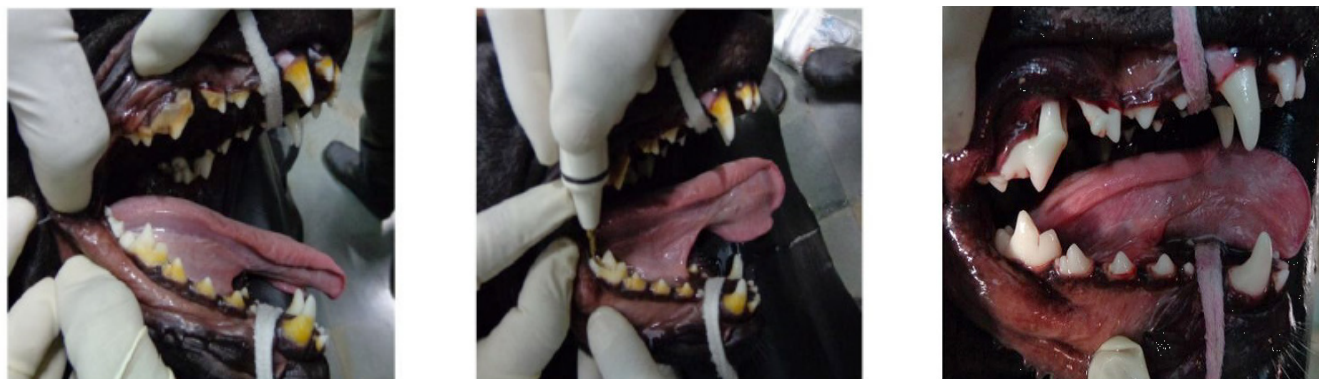


Figure 1: Dental plaque inspection, scaling by ultrasonic piezo scaler and post-scaling view



**Figure 2:** Dentistry showing the mobility of premolar teeth and their extraction in 2 out of 20 dogs

Kyllar and Witter (2005) reported the prevalence of dental disorders in 348 dogs (85%) out of 408 presented as clinical cases. Lyon (2000) opined that the prevalence of dental diseases in dogs increases up to more than 80% by 5 years of age.

#### Periodontal Diseases and Scaling (n = 20)

Oral examination of current year 20 dogs revealed varying degree of plaque accumulation in all 20 dogs (100 %) with PDs, followed by dental calculus in 17 (85 %) cases, gingival recession 9 (45 %), gingival hyperplasia 6 (30%), tooth fracture 3 (15 %) and persistent deciduous tooth and pulpitis 1 each (5 % each). Grading of periodontal diseases (PD) in 20 dogs indicated that most of the dogs suffered from Stage 3 (7/20, 35 %), followed by Stage 4 (6/20, 30 %), Stage 2 (5/20, 25 %) and stage 1 (2/20, 10 %) periodontal disease. Further, the occurrence of Stage 4 and stage 3 PD was noticed maximum in the age group of >6 years (11/20) followed by 3-6-year-old dogs (6/20).

Periodontal disease, the formation of dental calculus, and crown abrasion were scored according to a modified indexing system commonly used in human beings. A total of 20 dogs presented were with the complaint of halitosis, sticky salivation, anorexia, facial swelling, and pawing at the mouth. Halitosis was the most common complaint and was reported in 14 (70 %) dogs. sticky salivation was the second most common complaint in 11 (55 %), followed by anorexia 7 (35 %), pawing at mouth 5 (20 %), and facial swelling in 3 (15 %) dogs. Anamnesis revealed that out of total of 20 dogs with periodontal problems, 11 (55 %) were maintained on a pure vegetarian diet, and 9 (45 %) dogs on mixed (Veg and Non-Veg) diet.

Carlos *et al.* (2012) reported that halitosis and salivation were the most obvious complaint from owners followed by

ptyalism, anorexia, behavioral alterations, gingival bleeding, nasal discharge, and sneezing. Lindhe *et al.* (1975) and Page and Schroeder (1982) suggested that the lack of oral hygiene causes plaque deposition and calculus formation, which harbors the bacteria and eventually induces gingival inflammation.

#### Gradation and Indices of Periodontal Diseases

The dogs suffering from stage 1 PD exhibited signs like generalized gingivitis without attachment loss and with low dental plaque and calculus deposits. The dogs suffering from stage 2 PD showed clinical signs like inflamed gums, presence of subgingival, and supragingival plaque/tartar with some degrees of hyperplasia of gingival. Whereas, severe gingivitis with generalized edema, spontaneous gingival bleeding, presence of a large amount of subgingival and supragingival plaque and tartar with 4-5 mm deep periodontal pockets were noticed in dogs suffering from stage 3 PD. The dogs with stage 4 PD, exhibited severe signs like acute inflammation of gum tissue, deep periodontal pockets (> 5 mm) with purulent exudates, exposed furcation, and abnormal mobility of affected tooth under different degrees.

##### Plaque Index (PI)

Plaque and gingivitis were noticed in the majority of dogs of the present study. However, PI 2 was observed in 11 out of 20 dogs (55%), followed by PI 1 in 7 (35%) and PI 3 in 2 dogs (10%). Watson (2006) also reported similar findings and stated that plaque was the key factor in the genesis of periodontal diseases.

##### Calculus Index (CI)

The presence of dental calculus was recorded in 17 (85 %) out of 20 dogs of either sex and was considered as the second

most common dental problem. Dogs suffered maximum with CI 2 type calculus (45 %), followed by CI 1 (25 %), CI 3 (20 %), and CI 0 (10 %) type of calculus.

#### *Furcation Exposure (FE)*

In the present study, out of 20 dogs furcation was noticed only in 8 dogs in varying degree and was classified as FE 1 in 4 dogs (20 %), followed by FE 3 in 2 dogs (10 %) and FE 2 in 2 dogs (10 %), while in rest 12 dogs the FE was scored as 0. Similar findings were noticed by Wiggs and Lobprise (1997) and Gorrel (2004). Samsar *et al.* (2003) stated that multi-rooted teeth with furcation exposure are directly correlated with the existence of periodontal diseases with either horizontal or vertical bone loss.

#### *Periodontal Probing Depth*

Based on observations of periodontal probing depth, in 13 out of 20 dogs probing depth was < 3 mm, whereas probing depth of 4 mm and > 5 mm was recorded in 4 (20 %) and 3 (15 %) dogs, respectively. Similar findings were reported by Gioso (2007). Periodontal probing depth above 3 mm means loss of clinical attachment of the junction epithelium with bone destruction and periodontal pocket formation.

#### *Anesthesia and Ultrasonic Dental Scaling*

The diazepam-ketamine general anesthesia was given in all 20 dogs for dental scaling. After achieving general anesthesia, the mouth cavity was cleaned with Chlorhexidine solution 1 %, and then it was flushed with tap water. After that, the plaque and tartar were removed with a handpiece of the ultrasonic piezo scaler machine (Fig. 1). It was easy to operate and found effective in removing all deposits of plaque and tartar without any damage to a tooth. While using the ultrasonic piezo scaler, the tip at 45-90° angle to the tooth surface was observed to be the most effective working angle for the removal of supragingival calculus. The tip was found to be most efficient for the removal of heavy calculus and plaque deposits from lingual/palatal and labial/buccal surfaces of teeth. It was convenient to handle the handpiece and satisfactorily removed complete plaque and tartar. It was easy to remove the debris present in gingival sulcus and between the teeth by flushing with a three-way syringe device. The use of ultrasonic piezo scaler with G2 and G3 caused minimal injury to gingival and thermal injury to the tooth due to continuous irrigation with water during scaling. Similar observations were earlier recorded by Sisodiya (2005) and Kumar (2006) after induction of general anesthesia using the similar anesthetic agents in the dogs for the treatment of periodontal diseases.

The routine diazepam- general ketamine anesthesia used for dental scaling was satisfactory in all 20 cases. All dogs showed signs of optimum depression of the central nervous system and lack of excitement during the induction of anesthesia. There was no remarkable complication seen during the dental scaling procedure and smooth recovery

was seen in all dogs. Further, anesthetic used was found satisfactory for the treatment of PD in dogs, and the duration of anesthesia was sufficient enough for completing dental scaling and polishing procedures.

#### *Dental Extractions*

Teeth showing severe mobility on definitive oral examination in 2 out of 20 dogs, were extracted. In one dog, severe periodontitis teeth showed severe mobility, and attachment loss of mandibular 2<sup>nd</sup> and 3<sup>rd</sup> premolars, which were extracted, and bleeding was controlled by digital pressure (Figure 2). Bojrab *et al.* (1990) also advised the extraction of a tooth in cases of severe caries with gross decay of teeth.

#### **Compliance with Oral Hygiene Recommendations**

A preoperative and postoperative questionnaire survey of 20 dog owners revealed details about compliance with oral hygiene recommendations following dental therapy. At the time of post-dental prophylaxis therapy survey, out of 20 dog owners only 7 (35 %) continued teeth brushing of their pets 1 to 2 times in a week at the time of dog bath, 13 (65 %) had not brushed the teeth, 14 (70 %) dog owners had started providing dental chew sticks or artificial bones to gnaw, and 6 (30 %) had ignored the instruction. The owners who started giving dental homecare after dental scaling noticed a maximum reduction in bad breath and salivation. Kyller and Witter (2005) stated that follow up studies were necessary to test the effectiveness of pet owner education, training, and alerting of veterinarians for improved dental hygiene care in a given dog population.

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