RESEARCH ARTICLE

Radiological Staging and Management of the Periodontal Disease in Canines

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Abstract

Dental diseases are very prevalent in pet animals among which periodontal diseases are very common; by the two years of the age 80% of the pets will be having one or the other dental disease. The periodontal disease is characterised by loss of tooth attachment and the gingival recession. A total of 24 clinical cases were included in the study, in which complete oral cavity examination was carried out in an anaesthetised patient to record the clinical signs. Dental radiography was done to record the percentage of attachment loss. Radiography was taken in an anaesthetised animal by placing the cassette intra-orally for maxillary and mandibular incisors and canines, whereas for premolars and molars of maxilla and mandible, patient was positioned laterally with slight elevation of head. Attachment loss appeared as bone loss surrounding and across the tooth and this was calculated by measuring the alveolar margin from the cemento enamel junction relative to the root length. Based on the attachment loss staging of the periodontal disease was done. Staging the periodontal index helped in the treatment plans like chlorhexidine lavage, home care practices (tooth brushing, addition of dental treats, chews and prophylactic antibiotic therapy), dental scaling and tooth extraction procedures.

Key words: Dental radiography, Dogs, Periodontal disease, Periodontal index

Ind J Vet Sci and Biotech (2024): 10.48165/ijvsbt.20.4.04

Introduction

Periodontal disease is probably the single most common disease observed in small animal veterinary practice. Many investigations revealed infection in the oral cavity causing the disease in the distance organs. An association has been shown between periodontal disease and histopathologic changes in kidney, myocardium (papillary muscle), and liver (De Bowes *et al*., 1996). Periodontitis also cause discomfort and pain to the affected animal. Consequently, diagnosis, prevention and treatment of periodontal disease are of paramount importance for the general health and well-being of our pets.

Periodontal disease is a collective term for a number of plaque-induced inflammatory conditions affecting the periodontium of the tooth (Gorrel, 2000). Dental plaque is composed of aggregates of bacteria and their by-products, salivary components, oral debris, and occasional epithelial and inflammatory cells. However, periodontal disease is described in two stages, gingivitis and periodontitis. Gingivitis is the initial, reversible stage of the disease process which is created by plaque bacteria and may be reversed with a thorough dental prophylaxis and consistent home care. Periodontitis is the later stage of the disease process in which inflammation of the deeper surrounding structures of the tooth (periodontal ligament and alveolar bone) is affected (Novak, 2006). Though clinical signs are obvious, radiographs should always be obtained during periodontal disease as they give indication of attachment loss and the severity of the periodontal disease (Gorman, 2012). Based on the radiography periodontal diseases can be classified into different stages which will determine the extent of the disease and further aid in the treatment options. This study was aimed to evaluate radiological staging and management of the periodontal diseases in canines.

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How to cite this article: Anjali, K., Raghunath, M., Prasad, V. D., Srinivas, M., & Sreenu, M. (2024). Radiological Staging and Management of the Periodontal Disease in Canines. Ind J Vet Sci and Biotech. 20(4), 17-20.

Source of support: Nil

Conflict of interest: None

Submitted 23/02/2024 **Accepted** 22/03/2024 **Published** 10/07/2024

Materials and Methods

The study was carried out on 24 clinical cases of dogs with different dental affections that were presented to Veterinary

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Clinical Complex and Department of Veterinary Surgery and Radiology, NTR College of Veterinary Science, Gannavaram (AP, India). All the dogs showing the symptoms of the dental disease like halitosis, purulent discharges from oral cavity, drooling of saliva, plaque, calculus deposition and anorexia were subjected for general physical examination, oral cavity examination in conscious patient and complete oral cavity examination was done in an anaesthetised animal. All the dogs were premedicated with Atropine sulphate @ 0.04 mg/kg b.wt., SC, given 15-20 min before induction, followed by induction of general anaesthesia by using inj. Ketamine hydrochloride @ 5 mg/kg b.wt. and inj. Midazolam @ 0.2 mg/kg b.wt., IV. Later, the dogs were intubated with cuffed endotracheal tubes of suitable size and were maintained on anaesthesia using 1 to 3% of Isoflurane mixed with oxygen.

After anaesthetising, the patients were subjected for assessing the stage of gingivitis and periodontal disease. The patients that were diagnosed as having periodontal disease were subjected for radiological examination for determining the various changes associated with the dental disease. The radiographs were taken using 500 mA X ray machine with computed radiographic system with focal film distance as 40 cm and the patient positioned in sternal recumbency with cassette placed intra-orally (Fig. 1) for radiographing the maxillary incisors and canines, whereas for mandibular incisors and canines the animal was positioned in dorsal recumbency with cassette placing intra-orally (Fig. 2). For radiographing the maxillary and mandibular premolars and molars the animal was positioned in lateral recumbency with an oblique position and slight elevation of the head. The radiological changes associated with periodontal were recorded and Staging of the periodontal disease was also done based on the radiography by determining attachment loss of the alveolar margin from the cement-enamel junction relative to the root length and was staged into four different stages. The inflammation of periodontium, radiographical findings and the loss of tooth substance was the basis for staging (Holmstrom, 2012).

Dogs with stage I and stage 2 periodontitis, were managed by chlorhexidine lavage, home care practices like brushing addition of dental treats, chews and prophylactic antibiotic therapy. Stage 3 periodontal disease was treated by mechanical dental scaling supra- and sub- gingivally along with home dental care. In dogs with stage 4 periodontitis closed extraction of the tooth was performed.

Results and Discussion

In the present study, out of 24 dogs that were included in the study, periodontal stage 0 which was clinically normal without any inflammation of gingivitis or periodontitis was recorded in 2 (8.33%) dogs. Periodontal stage 1, with gingivitis and without any attachment loss where the height and architecture of the alveolar margin were normal was recorded in 2 (8.33%) dogs. Periodontal stage 2 early periodontitis, with less than 25 % attachment loss was recorded in 5 (20.83%) dogs (Fig. 3). In this the mean length of cemento-enamel junction to apex of the tooth was 1.72±0.17 cm and the mean attachment loss from the alveolar margin was 0.44±0.05 cm and the percentage loss was less than 25. Periodontal stage 3, moderate periodontitis with 25-50% attachment loss was recorded in 5 (20.83%) dogs (Fig. 4). The mean length of cemento- enamel junction to apex of the tooth in these cases was 1.52±0.11 cm and the mean attachment loss from the alveolar margin was 0.5±0.07 cm and the percentage loss was between 25 and 50. Periodontal stage 4, with more than 50% attachment loss was recorded in 10 (41.66%) dogs (Figs. 5, 6). The mean length of cemento-enamel junction to apex of the tooth in these cases was 1.59±0.11 cm and the mean attachment loss from the alveolar margin was 1.1±0.10 cm and the percentage loss was more than 50.

The clinical signs associated with dental diseases were correlated with stage of periodontal disease and severity of the clinical signs increased with increase in the stage of the periodontal disease. The major clinical sign in the present study was gingivitis, in which mild to moderate reddening and erythema of the gingival tissue was observed. Ranjan *et al.* (2010) and Oxford (2015) also stated that periodontal disease is associated with gingivitis and periodontitis. The clinical sign of halitosis was observed in 19 dogs (79.16%) with halitosis being increased from stage 1 to stage 4 of the periodontal disease. This was in close alignment with the observations of Mielnik and Hamlin (2012) and Oxford (2015). Mobile tooth was observed in 20.83% of dogs with stage 3 and 4 periodontitis. This was in accordance with Klein (2000) and Bellows (2019), who also stated that mobile tooth were found in dogs with stage 3 and stage 4 periodontitis

Ulceration of the gingival mucosa was observed in 5 (20.83%) dogs with severe periodontitis and bleeding gums were observed in 5 (20.83%) dogs with stage 3 and 4 periodontal disease. Salivation and purulent discharges were observed in 16.66% each of the cases, these were observed in dogs with severe periodontitis. Caifa (2007) and Bello *et al*. (2014) also stated that in severe periodontitis, the gingival inflammation which was a reversible condition with clinical signs such as reddening, edema of gingiva, which might progress to ulceration of the gingiva and visible bleeding. They also stated that in advance stages of periodontal disease purulent discharges were observed. Plaque and calculus formation was observed in dogs with stage 1 to stage 4 of periodontal disease. The amount of calculus deposition was high in dogs with stage 3 and 4 periodontal diseases and less amount of calculus was observed in dogs with stage 1 and stage 2 periodontal diseases.

The clinical signs exhibited by the dogs during the disease process, such as gingivitis, halitosis, plaque, calculus and purulent discharges reduced after the treatment, thus indicating response to treatment by chlorhexidine lavage, dental treats, dental scaling, tooth extraction and antibiotic therapy. Similar findings were made by Roudebush *et al.*

(2005) and Gorman (2012), who stated chlorhexidine was most effective for supra-gingival plaque control as it gets adsorbed to the tissues of the mouth and gradually released over 24 h in therapeutic concentrations and kills the bacteria within the plaque, thus reducing the bacterial aerosol. Dogs presented with calculus formation, furcation loss and mobile teeth were treated by scaling, calculus removal and tooth extraction. There was immediate loss of the symptoms in majority of the dogs. Holmstrom *et al.* (2005) stated that treatment options for the removal of plaque and calculus were supra-gingival scaling, sub-gingival scaling and root planning to remove the plaque and calculus, cementum on the root surface will aid in the reattachment of the periodontal ligament and restoring the normal gingiva. Thus, periodontal disease can be effectively controlled by professional supra and sub gingival scaling combined with home care. Neimiec (2008) described the mechanical hand scaling by the use of hand scaler and curette. In dogs that did not receive home dental care or dental treats showed reformation of dental plaque. Bonello and Squarzoni (2008) and Pieri *et al.* (2012) stated that professional dental treatment was of little value unless followed by home oral health care.

Fig. 1: Dog showing radiographic positioning (open mouth DV) for maxillary incisors and canines.

Fig. 2: Dog showing radiographic positioning (open mouth VD) for mandibular incisors and canines.

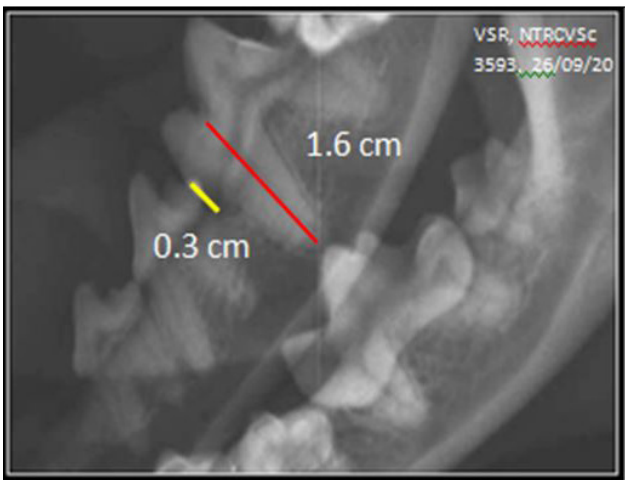

Fig. 3: Lateral radiograph of dog showing stage 2 periodontal disease with less than 25% attachment loss in the right mandibular 2nd and 3rd premolar.

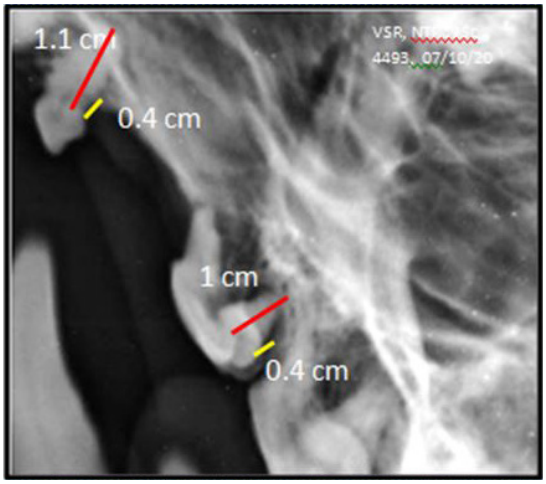

Fig. 4: Lateral radiograph of dog showing stage 3 periodontal disease with attachment loss between 25-50 % in the right maxillary 1st and 3rd premolar.

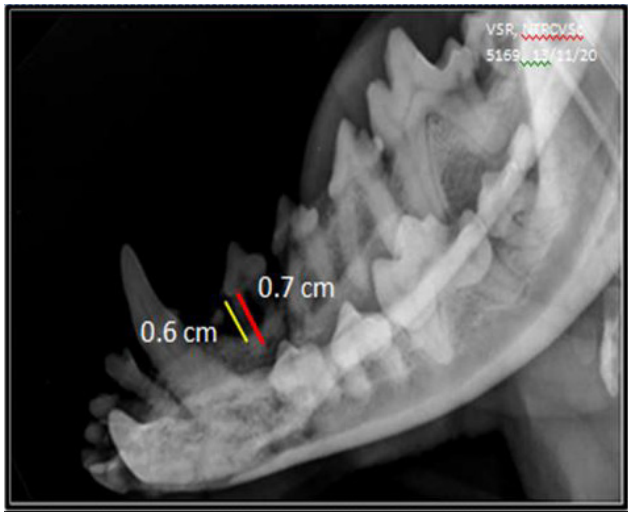

Fig. 5: Lateral radiograph of dog showing stage 4 periodontal disease with attachment loss greater than 50 % in the right mandibular 2nd and 3rd premolar.

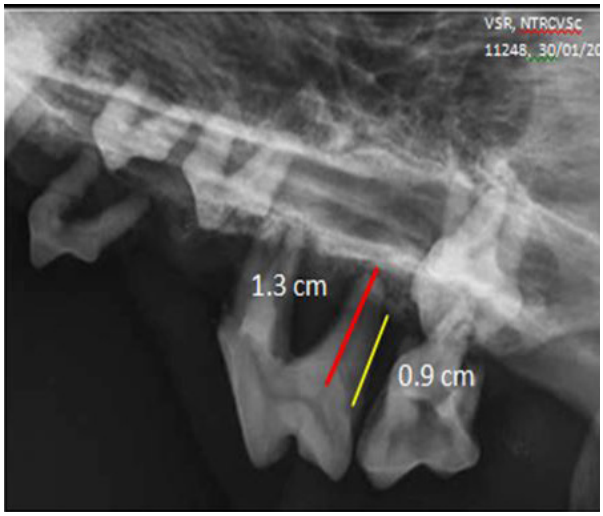

Fig. 6: Lateral radiograph of dog showing stage 4 periodontal disease with attachment loss greater than 50 % in the right maxillary 4th premolar.

Acknowledgement

The author wishes to acknowledge the faculty and staff of the department of Veterinary Surgery and Radiology and Department of Veterinary Clinical Complex, Veterinary College, Gannavaram for their cooperation.

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