Recognizing and Diagnosing Periodontal Disease

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Periodontal disease is the loss of the periodontal attachment apparatus (periodontium = periodontal ligament, alveolar bone, cementum and gingiva). Since 75% of these structures are identified below the soft tissues (gingiva and alveolar mucosa), a thorough clinical subgingival evaluation and intraoral radiographs are necessary to diagnose and assess periodontal disease. Therefore, general anesthesia is necessary to diagnose and treat periodontal disease.

Periodontal disease (loss of periodontium) is considered to be the most prevalent disease in dogs and cats over the age of 3. However, periodontal disease starts much earlier in life. Gingivitis, stage 1 periodontal disease, is reversible with professional care and daily home care. Therefore it is important to intervene before there is significant loss of attachment.

Brief pathophysiology of periodontal disease

Periodontitis is active inflammation of the periodontium. It begins with the accumulation of the dental pellicle (e.g., salivary glycoproteins and enzymes) that occurs within seconds of a tooth being cleaned. As first colonizing oral bacterial colonize the pellicle, within hours, the plaque biofilm is formed. The plaque biofilm matures within days and mineralization resulting in calculus occurs. Periodontal disease is caused by a bacterial biofilm (plaque) and the associated inflammatory response. Significant periodontal disease can be present without calculus. Likewise, some patients can have significant calculus with minimal periodontal disease. Calculus (tarter) is NOT the cause of periodontal disease.

As the plaque biofilm matures early bacterial colonizers, gram positive aerobic cocci, become less predominant as the biofilm switches to gram negative anaerobes and spirochetes found deeper in the periodontal pockets. Bacterial products such as ammonia, volatile sulfur compounds, and proteolytic enzymes contribute to the destruction of the periodontium. The host inflammatory response, matrix metalloproteinases that degrade collagen of the periodontal ligament, elastase (break down collagen and elastin), and prostaglandins (PGE_2) are directly responsible for tissue damage and/or stimulate osteoclastic bone resorption (PGE_2, IL-1β, TNF-α). The calcium carbonate in the saliva of cats and dogs combines with the plaque to form calculus. Calculus increases surface area for bacterial attachment and can mechanically disrupt and damage the gingiva.

Periodontal disease may be potentiated by, but not limited to, malocclusions, crowding and rotation of teeth, systemic disease, nutritional status, individual patient susceptibility, genetics, trauma, and increased tooth to jaw size ratios.

Clinical signs of periodontal disease

The clinical signs of periodontal disease are often hidden and insidious. Halitosis, gingivitis, supragingival plaque and calculus, reluctance to chew, head shyness, pawing at the mouth, dropping food, sneezing, nasal discharge, are clinical signs. Unfortunately, many of those clinical signs require astute client observation and/or careful questioning from the clinician. Most commonly, there may be no obvious signs.

American Animal Hospital Association Dental Guidelines and Canine and Feline Life Stages Guidelines recommend annual evaluations of the oral cavity. The recommended time to start professional evaluations and cleanings, in order to prevent disease, is in the 1^{st}-2^{nd} year of life.

Diagnosis of periodontal disease

General anesthesia, professional examination, periodontal probing, charting, and intraoral radiographs are all required to successfully diagnose and treat periodontal disease.

Conscious oral examination

Periodontal assessment begins in the examination room with the client and the conscious patient. A complete medical and oral history, general physical exam, and conscious oral examination are necessary. A complete history and evaluation of the chief complaint is investigated. Questions such as, but not limited to, onset, duration, environment, chew toys, oral health care, current medications, diet, past illness, past anesthetic episodes, behavioral changes, etc. are explored. Many patients with oral disease do not have obvious clinical signs.

The maxillofacial skeletal is palpated and the eyes retropulsed. The three basic skull types are brachycephalic (e.g., Pugs, Bulldogs, Persian Cats), mesocephalic (e.g., Labrador, DSH), and dolichocephalic (e.g., Sighthounds, Collies). The regional lymph nodes and salivary glands are palpated. Facial symmetry and occlusion are noted. The range of motion of the temporomandibular joints should be palpated and the patient observed for pain and/or difficulty in opening and closing the mouth. The lips and mucocutaneous junctions should be observed for ulcerations that might indicate an autoimmune disease. Finally, the dentition is evaluated and the teeth counted to determine if all teeth are present. Discolored teeth, persistent deciduous teeth, root and furcation exposure, oral mucosal lesions, sinus tracts, tongue, oral masses, plaque and calculus are noted.

The owner is counseled that, although we do our best to estimate the extent of disease, anesthesia, anesthetized oral exam, periodontal probing, and intraoral radiographs will often identify hidden disease subgingivally and the conscious exam and plan is our best good faith estimate

Anesthetized examination

While the patient is under anesthesia a full oral examination and dental charting is performed. For the purpose of this lecture, periodontal indices are discussed (nomenclature www.avdc.org).

During the periodontal examination, crowded teeth, missing teeth, rotated teeth, mobile teeth, teeth with furcation exposures, gingival recession (root exposure), sinus tracts, gingival enlargements, and periodontal probing depths are noted (The normal gingival sulcus depth in a dog is 0-3 mm and less than 0.5 to 1.0 mm in a cat).

A gingival indice of 1 includes inflammation and swelling of the gingiva with no bleeding during periodontal probing. A gingival indice of 2 includes bleeding during periodontal probing. A gingival indice of 3 includes spontaneously bleeding of the inflamed gingiva prior to periodontal probing.

Furcation exposure (involvement) occurs when a periodontal probe can extend between the roots, under the crown, of multi-rooted teeth as a result of attachment loss. A Stage 1 furcation involvement exists when the probe extends less than half way. A Stage 2 furcation involvement exists when the probe extends greater than halfway. A Stage 3 furcation exists when the probe extends from one side to the other, through and through.

Gingival recession and root exposure will be discussed in the following lecture on periodontal pockets.

Veterinary dental nomenclature allows us to classify periodontal disease into stages (www.avdc.org). A clinically normal oral cavity with no gingival inflammation and periodontitis is stage 0 (PD0). Gingivitis without attachment loss (normal height and architecture of alveolar margin) is stage 1 (PD1). Stage 2 (PD2) is early periodontitis with less than 25% attachment loss (intraoral radiographs) and/or a stage 1 furcation in multi-rooted teeth. Stage 3 (PD3) is 25-50% attachment loss and/or stage 2 furcation in multi-rooted teeth. Greater than 50% bone loss and/or stage 3 furcation in multi-rooted teeth is stage 4 (PD4). Treatment plans can be designed based on the individual tooth stage as well as the overall periodontal stage of the oral cavity. Keep in mind that there are 42 teeth in the adult dog and 30 in the adult cat. That means 42 or 30 individual patients to diagnose and treat.

Intraoral radiographs

In order to accurately assess periodontal attachment loss, intraoral radiographs are required. Periodontal disease is a subgingival disease and the only diagnostic modality to fully assess the attachment of the periodontium is with imaging. The value of intraoral radiographs is well documented and undisputed as a diagnostic, treatment planning, and post-treatment tool for all disciplines within veterinary dentistry.

Roentgen signs of periodontal disease include loss of the marginal alveolar bone crest, loss of the lamina dura, widening of the lamina lucida, and horizontal and vertical bone loss due to the resorption of bone (see Periodontal Lecture – Plaque and Pockets as well as Intraoral Radiographic Interpretation Lectures). Horizontal bone loss occurs when the cortical supporting bone around the tooth and adjacent teeth is lost at a similar rate.

References available upon request