HOME CARE PREVENTION OF PERIODONTAL DISEASE

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INTRODUCTION

It has been said that the mouth is the mirror to the body. The mouth is challenged by a constant barrage of invaders and provides a warm, moist environment perfect for microbial growth. Maintaining oral health depends on professional periodontal management combined with appropriate, effective home care. Dental home care refers to the procedures and applications utilized by the client to provide plaque and tartar control for their pet. Determining a home care routine that is effective as well as orally and systemically safe can be challenging and optimal results require consistent communication and education between the veterinarian, the technician and the client.

PATHOPHYSIOLOGY OF PERIODONTAL DISEASE

Periodontal disease is a very common and serious disease of adult dogs and cats. Understanding the pathophysiology of periodontal disease, particularly the relationship between dental substrates and disease progression is important to successful periodontal management. Periodontal disease is an infection caused by bacteria in the biofilm (dental plaque) that forms on oral surfaces. Left untreated, periodontal disease leads to oral pain, dysfunction and tooth loss. These changes often lead to behavior changes such as changes in eating habits to general behavioral changes such as reluctance to grooming and socialization or signs of ‘depression’. There is an association between the severity of periodontal disease and pathologic changes in other organ systems. Systemic effects result from both bacteremia and by chronic systemic release of inflammatory mediators and bacterial degradation byproducts.

Periodontal disease commonly refers to gingivitis and periodontitis. Gingivitis is reversible and can be appropriately treated and largely prevented with thorough plaque removal and effective supragingival plaque control. Periodontitis is more severe and primarily irreversible, and may require advanced therapy and meticulous plaque control to prevent progression of the disease. Gingivitis may progress to periodontitis and although the course is unpredictable and heavily dependent on individual animal variability it is known that gingival inflammation is the first step in the development of more severe periodontitis.

Role of Dental Substrates

There are many risk factors associated with the prevalence and severity of periodontal disease. The primary cause results from bacterial colonization (plaque accumulation) and subsequent inflammation and infection. Several materials accumulate on tooth surfaces and participate in the pathophysiology of periodontal disease. These substances are commonly referred to as tooth-accumulated materials or dental substrates and are categorized as: 1) acquired enamel pellicle, 2) microbial plaque, 3) material alba/debris, 4) calculus, and 5) stain. Enamel pellicle is a thin film or cuticle. Early enamel pellicle is composed of protein and glycoproteins deposited from saliva and gingival crevicular fluid and serves to protect and lubricate the tooth. Pellicle and its components provide a framework for initial bacterial colonization and also function in the maturation of dental plaque. Pellicle deposition and subsequent bacterial colonization occur almost immediately after a dental prophylaxis. Studies have demonstrated that within minutes after polishing, approximately one million organisms are deposited per mm² of enamel surface. Aggregates of bacteria combine with salivary glycoproteins, extracellular polysaccharides, and epithelial and inflammatory cells to form a soft adherent plaque that covers tooth surfaces. Dental plaque has a specific composition and structure that change with time. Supragingival dental plaque forms above and along the free gingival margin; subgingival dental plaque is formed entirely within the gingival sulcus. Growth and maturation of supragingival plaque are necessary for subsequent colonization of subgingival surfaces by dental plaque. Supragingival plaque in dogs with clinically healthy gingivae is primarily composed of gram-positive organisms. As plaque matures, the bacterial composition shifts to a predominantly gram-negative anaerobic flora.

Plaque accumulation along the gingival margin induces inflammation in adjacent gingival tissues. Without plaque removal or control, gingivitis progresses in severity inducing local changes allowing subsequent bacterial colonization of subgingival sites. Inflammatory mediators damage the integrity of the gingival margin and sulcular epithelium, allowing further infiltration of bacteria. The immune response of the host attempts to localize the invasion of the periodontal tissues; the result may be further destruction of local tissues due to cytokines released from inflammatory cells. Bacterial plaque is the most important substrate in the development of periodontal disease. Materia alba is a soft mixture of salivary proteins, bacteria, desquamated epithelial cells and leukocyte fragments. Materia alba and dental plaque are two distinct materials. Materia alba does not have the organized bacterial structure or the adherence properties of dental plaque. The role of material alba in the etiopathogenesis of plaque accumulation and periodontal disease remains unclear. Other debris commonly observed in the oral cavity includes food, impacted hair and miscellaneous foreign materials acquired through chewing behaviors.

Dental calculus is mineralized plaque. Calculus is a hard substrate formed by the interactions of salivary and crevicular calcium and phosphate salts with existing plaque. Calculus accumulates supra- and subgingivally and calculus deposits thicken with time. It has been demonstrated that calculus control in the absence of plaque control is cosmetic; however, calculus provides a...
roughened surface that enhances bacterial attachment and plaque development and chronically irritates gingival tissues. Undisturbed calculus is always covered by vital dental plaque.

Acquired dental stain (extrinsic stain) is initially stained pellicle that becomes part of the mineralized, layered laminate of pellicle, plaque and calculus. Various nutritional, chemical and bacterial factors affect the presence and intensity of stain. Although nonpathogenic, dental stain is of aesthetic concern to some pet owners and is often a signal to clients to ask questions about their pet’s oral health.

THE IMPORTANCE OF DENTAL HOMECARE

Periodontal disease is a common, chronic infection in dogs and cats and oral health programs should be an integral component of veterinary care. Successful treatment and prevention of periodontal disease in pets requires identification and elimination of exacerbating factors, professional examination and care on a regular basis, and an effective dental home care program.

If examination reveals a healthy mouth, the appropriate home care regimen to maintain oral health should be recommended. If examination reveals periodontal disease, appropriate periodontal therapy followed by an effective home care regimen to prevent recurrence should be recommended. It is unreasonable to expect a pet’s mouth to stay healthy without appropriate plaque and tartar control between veterinary visits.

Periodontal therapy and home care recommendations depend on the both the degree of oral pathology and the extent of owner compliance. To make an effective home care recommendation, veterinarians and technicians should evaluate the pet’s oral pathology to frame the necessary degree of plaque control, be knowledgeable of products that provide proven, effective plaque control, understand the client’s willingness and ability to provide oral hygiene, and assess the pet’s response to oral applications or manipulations.

Categories of Dental Home Care Products

There are numerous veterinary exclusive and over-the-counter products available for pet dental care and the effectiveness as well as the evidence supporting claimed efficacy is highly variable. Dental hygiene products are typically divided into the following categories 1) mechanical plaque and calculus control, 2) chemical calculus control, 3) antimicrobial therapy and 4) barrier agents.

Mechanical plaque and tartar control refers to any means that physically disrupts the accumulation of or removes existing plaque and calculus. Commonly used methods include tooth brushing, the use of gauze sponge or finger cots, dietary cleansing and chew aids. The most effective means of mechanical plaque and calculus control when applied correctly and consistently is tooth brushing. The advantages of tooth brushing include effectiveness and affordability. Disadvantages can include difficulty of application and the potential for oral trauma if misused. There are several designs of pet toothbrushes available and the softness of the bristles combined with the handle and head design make these very desirable for use in pets. It is important to fit the appropriate head size and shape to the pets' mouth to allow for safe and effective oral cleansing. The brush stroke routinely recommended is a modified Bass technique, which involves placing the bristles at a 45º angle to the gingiva and applying gentle circular strokes beginning at the gingival sulcus and continuing coronally. The mechanical action of the brush is adequate to control plaque if used effectively and routinely. Application of flavored dentifrices, gels or powders to the brush head may increase palatability and acceptability to the pet, as well as compensate somewhat for inadequate brushing technique. Options to the use of a toothbrush include finger cots, gauze applicators, and oral swabs. These may be tolerated better by smaller pets, or in the early phases of oral hygiene training.

Mechanical plaque control can also be provided through dietary cleansing. It is common for veterinarians to recommend a dry dog food as part of an oral care routine. Typical dry pet foods may provide some cleansing benefit particularly in comparison to moist sticky foods; however, the dental cleansing provided is far from optimal. There are dental foods available through veterinarians that effectively reduce plaque and calculus accumulation and gingival inflammation. The advantages of feeding a dental diet include effectiveness, owner convenience, pet acceptance and optimal nutrition. Dental foods should be assessed for dental efficacy as well as nutrient compatibility appropriate for the animal’s life stage and health status.

Dietary snack foods have long claimed dental benefits for dogs and cats. Unfortunately, most of these claims are unsubstantiated and should be regarded with skepticism. Rawhide chews have demonstrated plaque and calculus reduction when compared to plain cereal biscuits. There are also oral hygiene chews that have reported oral health benefits. Advantages of dental treats include increased compliance and reinforcement of the human–animal bond. The disadvantages of these products may include pet acceptance, potential for gastrointestinal side effects, cost and dietary influences such as caloric excess and nutrient imbalances.

There are numerous chew toys available that claim oral benefits through increased chewing behavior. Most of these claims are unsubstantiated. Inappropriate use or use by aggressive chewers may cause gingival abrasions, fractured teeth, and gastrointestinal disturbances.

Chemical agents used for calculus control refer primarily to polyphosphate compounds such as hexametaphosphate and pyrophosphate. These agents act as calcium chelators, binding calcium and decreasing mineralization of plaque into calculus. The purported benefits of polyphosphates are that they are released during chewing and remain for prolonged periods of time in the oral cavity. It has been demonstrated that the addition of hexametaphosphate to the surface of baked biscuit treats, rawhide chews and
Chemical means of plaque control may be applied alone or in conjunction with mechanical procedures. Antimicrobial agents are available for use in veterinary dentistry either topically or systemically. Chlorhexidine is a very effective plaque antimicrobial agent. It has broad-spectrum activity and binds to oral tissues providing some residual antibacterial activity. The effectiveness and safety of chlorhexidine has been well documented. Potential disadvantages include staining of the teeth and tongue, unpleasant taste, cost and the potential to increase calculus formation. Chlorhexidine digluconate formulation at 0.1–0.2% are recommended. Fluoride has been reported to decrease tooth hypersensitivity and inhibit bacterial growth and metabolism, and is often applied following professional prophylaxis or therapy. Fluoride is potentially toxic and should not be used indiscriminately. Other products available that have reported anti-plaque activity include zinc ascorbate and zinc chlorhexidine solutions. Zinc has been demonstrated to exhibit some antiplaque properties and zinc and vitamin C have been associated with wound healing. There are products available that combine antimicrobial and calcium chelating agents. Caution should be exercised when combining products to avoid negation or potentiation of effects. Augmentation of the salivary peroxidase system is reportedly provided by application of a hydrogen peroxide producing formula and additional enzymes, glucose oxidase and lactoperoxidase. Systemic antibiotic therapy should not be used indiscriminately but may be appropriate in animals with moderate to severe periodontitis, concurrent systemic disease or compromise, or in geriatric patients.

One of the newer categories of plaque and calculus control in pets is the use of a barrier method, or dental sealant. Following a dental prophylaxis, an odorless, tasteless invisible barrier sealant is applied by the veterinarian along the gingival margins of the buccal surface of the dental arcade and is then continued by the animal owner at home on a weekly basis. The inert polymer forms a physical bond to the tooth enamel and creates a barrier that repels attachment of bacterial plaque.

Many oral hygiene aids have varying degrees or claim varying degrees of plaque and calculus control. Caution should be utilized when extrapolating results to individual patients. It is important for the healthcare team to evaluate the evidence that supports the product efficacy and the product effectiveness. Products that demonstrate efficacy under ideal conditions, for example, in a research colony setting, may demonstrate variable effectiveness in the home environment. For example, effectiveness of a dental treat may vary if the client feeds less than the number of treats tested to deliver the claimed efficacy. An understanding of the product, the evidence that supports the product claims, and the expected client application will support a successful outcome.

Client Education and Compliance
Dental home care begins with educating the client on the pathophysiology of periodontal disease and discussing the degree of plaque control appropriate for maintenance of oral health in their pet. Most clients are aware of the importance of oral hygiene for themselves and this awareness can be utilized to discuss the importance of oral hygiene for their pets. Demonstrating the degree of oral disease present in the client’s pet also effectively stresses the importance of oral care. Discussing oral health as part of systemic health and detailing the client about potential infection to other organ systems can reinforce the importance of oral hygiene.

Owner compliance is critical to determining the type of periodontal therapy applied as well as the home care recommendations. Owner compliance is a function of both owner commitment and capability. Some clients may lack the commitment necessary to provide effective plaque control to their pet and some pets may not tolerate oral manipulation. It may take consistent training and handling over time to accustom a pet to an oral hygiene routine. The client should be instructed in techniques to condition their pet to accept oral manipulations and applications of oral hygiene tools or materials. Other factors affecting owner compliance is the lack of ability of the client to apply effective oral hygiene due to lifestyle demands or lack of manual dexterity. It may be necessary for the pet to be brought to the clinic for routine plaque control by a staff member although this may be inconvenient for some clients. The healthcare team should combine their knowledge of the pet’s oral condition and degree of periodontal therapy with an understanding of the level of owner and pet compliance when recommending appropriate home care. Long-term success depends on the degree of plaque control the client is capable of providing between professional visits.

Training the pet to accept oral hygiene is best started at a young age. Handling the mouth, introducing a brushing device and application of oral hygiene products should be a routine part of puppy and kitten training. Adult animals may be more difficult to train, however, with consistent behavior modification and positive reinforcement; most pets will learn to tolerate oral manipulations and application of oral hygiene. The training should begin with the animal and the owner in a relaxed and comfortable atmosphere. The owner should begin with simply handling the pets head and mouth, stroking and lifting the lips. When the animal is accustomed to oral manipulations the owner can precede to rubbing the teeth and gingivae with gauze, finger cots, sponge or cotton tipped applicators. Following acceptance of these procedures, use of a pet toothbrush may be introduced. Caution should be used when cleansing the caudal premolar and molar areas to avoid injury to the owner and to the pet. Lingual manipulations should only be done on very compliant
pets as the risk to the owner and the pet, as well as increased avoidance behaviors by the pet are greater.

There are no definitive constraints dictating which method or combination of methods of plaque control is appropriate for all pets. There are a wide variety of oral hygiene aids and the veterinarian and technician should be familiar with their actions and utilize his or her knowledge of the client and the pet to recommend safe and appropriate home care. A convenient method of recognizing effective products is through identification of the Veterinary Oral Health Council (VOHC) seal of acceptance. The VOHC recognizes products with proven efficacy for mechanical control of plaque and/or mechanical and/or chemical control of calculus through a data review system. More information about the VOHC and a listing of products that carry the VOHC seal is available through the VOHC web site at www.vohc.org.

The following basic guidelines are provided for reference and may be used as a starting point to customize home care procedures. In dogs and cats with healthy gingivae or gingivitis, initiation of routine tooth brushing combined with dietary cleansing is appropriate. The rate of brushing necessary for adequate plaque control may vary from daily to weekly depending on the individual animal and the skill of the client. Application of a flavored dentifrice may enhance acceptance and concurrent use of a chemical gel or dentifrice may enhance plaque control. Feeding a daily dental diet is an excellent adjunct therapy to reduce plaque accumulation and provides those clients who do not comply with tooth brushing an effective and convenient means of oral hygiene for their pets. The addition of daily dental treats may provide a benefit but should not exceed 10% of the diet to avoid caloric excess and nutrient imbalance. Chew toys and devices provide nominal efficacy and have the potential to cause oral trauma. Caution must be taken in using the correct device appropriate for the age, size and chewing behavior of the pet. Aggressive chewers may demolish a chew toy within minutes while other pets may ignore the device altogether.

Dogs and cats with severe gingivitis and periodontitis need more vigorous plaque control (following appropriate periodontal therapy) to prevent disease progression. Chemical plaque control agents are very beneficial in pets with moderate to severe periodontitis. Additionally, depending on the extent of oral pathology and periodontal therapy some animals may exhibit oral discomfort following treatment. The use of chemical agents applied gently through swabbing or spraying for several days following therapy will help control plaque accumulation and aid in the healing process. Typically, chemical agents are used for short time periods and then replaced with mechanical control agents for longer-term plaque control.

Regardless of the type of dental home care recommended, plaque control will only be successful if applied effectively by the client and accepted by the pet. Healthcare team members should be informed about the benefits and the disadvantages of oral hygiene products. Home care goals include control of supragingival plaque consistent with maintenance of periodontal health, prevention of disease progression and maintenance of oral health between professional visits. Idealistic oral hygiene procedures may not be realistic for every case and appropriate home care should be customized to fit the degree of oral pathology and the level of owner compliance.

References