

# Periodontal Basics: What Not to Forget

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With the high prevalence of periodontal disease in pets, and the potential for impacting systemic health, most of us are aware that providing periodontal care is good medicine. It is also good business, as a complete dental care program encompasses the entire life of the pet, particularly in the ‘micro-dog’ breeds (under 20-25 pounds as adults), as the prevalence of disease in these patients is higher than in larger breeds. An emphasis on senior care entails sound dental care also. Dental care is one facet of our practice that is preventable in most cases, so wellness programs that encourage regular visits should always include evaluation of oral and dental health.

## **In the exam room**

Though some patients are presented for specific dental problems, it is more common that the veterinary team will examine, discover and point out areas of concern to the owner. The extent of plaque and calculus can be ascertained in most patients, and providing a photo to the client (on their own cellphone?) can help point out the problems seen. While some might not be impressed with the presence of plaque, calculus or even oral malodor, education as to the importance of managing the extent of infection in the oral cavity can help them decide to get professional care. At times, pointing out additional lesions – or red flags – such as tooth resorptions, broken teeth or areas of advanced infections, may be necessary to encourage care.

## **Complete dental examination**

Having the patient under general anesthesia is the only way a complete evaluation – with intraoral radiographs – and thorough treatment can be provided. The tissue of the periodontium surrounding the tooth are the structures that are evaluated, and their loss can lead to tooth loss.

- Attached gingiva – the first line of defense, the attached gingiva is secured to underlying alveolar bone by connective tissue rete pegs. A minimum of 2-3 mm of attached gingiva is preferred for optimal periodontal health
  - Free gingival margin – borders the gingival sulcus
    - Normal sulcus: 2-3 mm for dogs; 0.5mm for cats
  - At the mucogingival border /junction– transitions to looser alveolar mucosa
- Cementum – the outer layer of the tooth root, is partially cellular, allowing for the attachment of the periodontal ligament that suspends the tooth in the alveolar socket
- Alveolus – indentation in the jaw as the tooth socket – provides support for the tooth as it is suspended in the alveolus by the periodontal ligament
- Periodontal ligament – a connective tissue shock absorber that keeps the tooth root in the alveolus; evaluation of the periodontal ligament space is key in periodontal assessment.

## **Progression of periodontal disease**

The term periodontitis refers to inflammation of these tissues, and is initiated by bacteria, collecting with a matrix of salivary glycoproteins and extracellular polysaccharides deposit on the tooth surfaces. This plaque then becomes mineralized to form calculus, upon which additional plaque accumulated. While the calculus can be quite extensive, it is not as active as the plaque in the actual progression of oral disease. The bacteria in supragingival plaque on the crown tend to be Gram-positive, non-motile, aerobic cocci, but as the debris accumulates and the infection progresses deeper into the sulcus, the population evolves into Gram-negative, motile, anaerobic rods and flagellates that are more virulent. The direct effect of the bacteria and toxins cause significant periodontal inflammation and destruction, but it is also the hosts’ response to the bacteria that can cause additional loss of attachment.

The different levels of periodontal inflammation can be determined by complete evaluation of the tissues, including a thorough oral examination, probing of periodontal pockets and oral radiography. The levels of plaque, calculus and gingival inflammation are all important markers on the extent of debris accumulation and inflammation, but it is attachment level that determines the actual stage of disease. One of the most important ways to assess periodontal disease is to determine the depth of the periodontal sulcus or pocket.

When the bacterial plaque and host response cause inflammation of the periodontal tissues, their destruction can lead to formation of periodontal pockets. The periodontal probe should be used around the tooth to determine the depth of any pockets, and these are then accurately recorded. At times, there will be sufficient gingival and bone loss that the levels recede down the root, causing root exposure and even furcation (the space between two roots of the same tooth) exposure. The true level of attachment loss is a summation of root exposure and periodontal pocket – measuring the loss of attachment from where it once was.

With all cases, it is vital to take intraoral radiographs to see the extent of bone loss, as well as the type of bone loss. A level amount of bone loss across the roots of several adjacent teeth is termed horizontal bone loss. If the gingival is not loss, this will cause the formation of periodontal pockets. If the gingival recedes as well, then root surfaces will be exposed, and sometimes no pocket will be formed. If the attachment loss extends down a specific root or area, a deep infrabony pocket is formed between the tooth root and the wall of the pocket. With enough tissue loss, a tooth may become mobile and even be lost eventually.

### **Stages of periodontal disease**

Stage I Periodontal disease refers to those cases with inflammation primarily in the gingiva itself, with no actual loss of attachment in the sulcus - soft or osseous. At times the sulcus depth will be greater than normal, but this is an increased height of the gingival margin due to inflammation and edema. Once the area is thoroughly cleaned, the inflammation should resolve, returning pocket depth to normal values. As such, this is the one stage of periodontal disease that is considered reversible. Therapy consists of professional cleaning as needed, with regular home care to minimize further damage. The term “prophylaxis” to describe dental cleaning is probably accurate only at this stage, since it is true prevention; once periodontal attachment loss is realized, prevention is no longer possible, so “periodontal therapy” is a more accurate term.

Stage II Periodontal disease, or early periodontitis, is the first stage with measurable amounts of attachment loss. Amounts of loss up to 25% in this stage necessitates a thorough cleaning and evaluation, in order to adequately treat the areas and arrest any further loss. More frequent cleanings and more advanced periodontal therapy (root planing, perioceutics) can minimize any further damage, and home care to keep plaque and calculus from extensive accumulation can be vital in preserving the teeth.

Stage III Periodontal disease includes cases with up to 50% attachment loss, as determined by periodontal probing and radiographs. Some teeth in this category will start to become mobile, and if continued care cannot be given, occasionally extractions may be necessary. This can be appropriate with particular teeth (non-strategic) such as lower corner incisors or fourth premolars or upper third premolars that are adjacent to larger, more strategic teeth. If the smaller teeth continue to contribute to bone loss that could also affect their neighbors, sometimes the smaller teeth should be extracted to be able to maintain the larger teeth’s health. More extensive periodontal therapy, including perioceutic therapy and even regenerative therapy may be selected to improve the prognosis on important teeth such as the canines or carnassial teeth.

Stage IV Periodontitis involves teeth that have greater than 50% attachment loss, and as such are often candidates for extraction. With such extensive loss, particularly if osseous, heroic attempts at salvaging will require more advanced periodontal therapy and owners committed to regular care, both professional and at home. Without such care, retention of such teeth will often result in the persistent presence of plaque, calculus and bacteria in the deeper pockets, putting the patient’s overall health at risk. While saving teeth is a noble cause, if extraction will improve the general health, it is sometimes the best choice.

### **Periodontal therapy**

When looking at periodontal disease, therapy is determined by a number of factors, such as the stage of the disease, and the desired outcome. There are several goals to set, including removal of all debris or biofilm (plaque, calculus), keeping the maximum amount of attached gingiva, minimizing attachment loss and minimizing the pocket depth. Certainly, all foreign material, from bacteria to desquamated cells must be removed from the tooth surfaces and pockets in order to attain healing. Since the attached gingiva is the first line of defense against bacteria, a minimum of 2-3 mm is necessary to protect underlying tissues, as the looser alveolar mucosa doesn’t afford that protection. The inability to halt attachment loss will eventually lead to tooth loss, and with smaller cat teeth, tooth loss can occur quickly, due to small alveolar bone mass. Minimizing pocket depth is related to attachment loss, but is a more specific parameter, because pocket depth in itself directly affects the ability for effective home care and maintenance. There are even times where excessive gingiva will be removed to decrease pocket depth (hyperplastic gingiva) or the gingiva will be sutured further down the root (apically repositioned flap) for the same effect.

These goals are best realized with a comprehensive program of dental care for the patient. At every patient visit, the oral exam should be evaluated. When appropriate, professional care under general anesthesia should be administered, and effective home care can help keep the tissues as healthy as possible. Periodontal disease is ultimately a preventable disease, with a lifetime of dental care.

### **Professional dental care**

The most common dental procedure performed in practice is usually called a prophylaxis. Since this term means “prevention”, about the only time it is truly applicable is in Stage I Periodontal disease cases with just gingivitis present. All other procedures would more correctly termed “periodontal therapy”, because you truly are treating the periodontium. By staying with a methodical process following the correct steps, you can offer the best treatment possible for your patients. Since the aerosolization of bacteria occurs during dental cleaning, both operators and patients should be protected. Flush the oral cavity at the beginning of the procedure with chlorhexidine solutions can help decrease the bacterial assault.

Certainly, the gross removal of calculus and plaque is the most obvious step of cleaning, but this is literally only scraping the surface! Most practices have some form of dental scaler, often an ultrasonic type. There are many units available, and you should be familiar with your particular unit. Most units can generate some heat, and so should be used with adequate water flow. Some newer units have tips with water flow that can be introduced under the gumline in shallow pockets, but for the most part this should be avoided with other models, as damage can be caused to the root surface. Sonic units (on a high-speed handpiece, air-driven unit) don't generate as much heat, but require adequate air pressure for maximum effectiveness. Rotary burs on a highspeed handpiece can be quite damaging, especially to feline teeth, and should be avoided.

A periodontal probe is one of the most vital tools in dealing with periodontal disease. The probe is marked in millimeters, so the depths of pockets can be accurately measured. Especially with inflamed pockets, it is important to use the probe gently, as force can push the probe tip through the fragile junctional epithelium at the bottom of a pocket. Measuring pocket depth at six points around the tooth will give a fairly accurate picture of the extent of the pocket. The explorer tip of the instrument is a thin, sharp-tipped hook that can be used as a tactile instrument in pockets (gently) to detect remaining calculus or debris. The tip can also be used to determine if the pulp canal is exposed in broken teeth, if a carious lesion is present (soft enamel), or if a resorptive lesion is present on the tooth surface.

For most areas of subgingival scaling, periodontal curettes are the instrument of choice. They differ from hand periodontal scalers in that the curettes have a rounded back and toe as compared to the scalers' sharp tip and back (triangular in cross-section). While pocket formation is not as common in cats as in dogs, it is important to clean these areas. You should choose a curette with a small, delicate working head that can be inserted gently into the pocket without causing more damage or stretching of the gingiva. The curette is introduced gently into the depth of the pocket and pulled against the tooth with its cutting edge (regular sharpening is essential) to scrape biofilm off the tooth and root surfaces. Overlapping strokes help clean the root surface thoroughly (root planing), avoiding excessive force. Curettes can be used in closed root planing (pockets up to 5 mm – a pretty deep pocket for most cat teeth), and the upper edge of the curette can also gently scrape the inner lining of the gingival sulcus or pocket, termed subgingival curettage. Both root planing and subgingival curettage should not be done too aggressively. Placing a doxycycline hyclate gel in moderate pockets that have been scaled has been shown to help decrease pocket depth.

With pockets deeper than 5-6 mm, often a gingival flap must be elevated to allow further exposure of the lesion. Hand curettes can't reach further than that effectively, and visualization is nearly impossible. Teeth with this much attachment loss should be thoroughly assessed, because few teeth with pockets of this depth are salvageable.

Polishing should always follow a scaling procedure, to smooth the roughened tooth/root surface, but damage can be caused if it is done improperly. The rotational speed of the prophylaxis cup should not exceed 3000 RPM (watch the speed on variable speed units), and the foot of the cup should be gently splayed, with adequate amounts of prophylaxis paste used. Complete irrigation of the teeth, including reaching into the sulci or pockets (use a blunt-tipped needle), with anything from water to saline to dilute chlorhexidine or fluoride will wash away any remnants of biofilm and even prophylaxis paste. If any material is left in the sulcus, a periodontal abscess may result. Complete charting of any lesions is essential, not only for good medical records, but also to be able to follow out the progression of the disease in the future.

### **Home care**

The level of home care attainable will depend on both the pet and the owner, and their ability to "cooperate". Cats in particular can pose a variety of problems with attempts at brushing, but if the owner starts out slowly, gently rubbing the side of the face with a small cat toothbrush and using solutions with good flavors initially (save the water from a can of tuna), many pets can tolerate at least some brushing. There are many products available for use, so become familiar with a few that you can keep in stock. Soft-bristled toothbrushes or finger cots are useful, and specific toothpastes formulated for pets come in many flavors. Clients should be instructed never to use human toothpastes on their pets, as they contain detergents for foaming and fluorides, which can upset the stomach and cause renal toxicity, if ingested on a regular basis. Oral antimicrobials, such as chlorhexidine in paste or solution, and oral cleaning solutions with zinc ascorbate can be used in patients that resist brushing efforts. However, chlorhexidine products can sometimes be bitter, and gels that are more viscous are more effective than solutions. Newer gel products have removed the ascorbic acid that can sometimes have a negative taste effect. Fluoride gels can be used in select cases with sensitive or worn teeth, but sparingly with monitoring for renal function.

Whether an uncomplicated case of periodontal disease or a patient with advanced disease, regular and systematic examination and therapy can help provide optimal oral and dental health for these patients. Education of the clients is critical in getting them involved in the total process. Treating the oral cavity can also have a positive effect on the rest of the patient. Providing a broader range of dental care to more patients can help make your practice healthier as well!