

The Importance of Feline Oral Health
Central Veterinary Conference, Kansas City
October 2007

Susan Little, DVM, DABVP (Feline)
Winn Feline Foundation
www.winnfelinehealth.org

Introduction

In a recent survey of the health status of over 31,000 dogs and over 15,000 cats examined at veterinary practices in the United States, the most commonly reported disorders were dental calculus (20.5% prevalence in dogs; 24.2% in cats) and gingivitis (19.5% prevalence in dogs; 13.1% in cats) (Lund, Armstrong et al. 1999). Yet according to the 2003 AAHA compliance study, only 35% of dogs and cats with grade 2 or higher periodontal disease receive treatment, and only 15% of those with grade 1 disease receive treatment (*The Path to High-Quality Care*, American Animal Hospital Assoc., 2003). Since periodontal disease is often preventable, veterinarians have an excellent opportunity to educate clients and improve wellness care for cats by developing an oral health care program.

It is generally accepted that cats lag behind dogs in oral health care, in parallel with the gap in providing overall veterinary care to cats versus dogs. When it comes to oral care, there are several additional factors that may limit oral health care for cats. For example, it may not be easy to perform an oral exam in the conscious cat, and owners are less likely to notice oral disease in cats compared to dogs. Owners do not always understand the importance or value of oral care for either cats or dogs.

Many common oral diseases, such as feline odontoclastic resorptive lesions (FORLs), are painful and impair quality of life. A reluctance to eat due to oral pain can lead to poor body condition, especially in geriatric cats. Chronic oral pain can cause behavior changes such as irritability, lethargy, depression or aggression. Since periodontal disease develops gradually, the cat has time to adapt to the pain, and the owner may misinterpret any changes as simply due to "old age." Often the impact of dental disease on a particular cat is not evident until the owner notices the dramatic improvement after treatment.

In human dentistry, there is increasing recognition of the potential systemic risks associated with periodontal disease, such as cardiovascular disease and bacterial pneumonia. People with diabetes mellitus are 15 times more likely to have tooth loss than people without diabetes. The increased risk appears to be due to several factors, including an impaired host defense against bacterial infection. Cats with diabetes mellitus often have periodontal disease. Part of the management plan for a diabetic cat with poor glycemic control must include management of periodontal disease.

The majority of periodontal pathogens are gram-negative bacteria. In addition to the local inflammatory response causing the periodontitis, systemic bacteremia or endotoxemia with elaboration of inflammatory mediators may occur. Target organs that may sustain damage include the liver, kidneys and lungs. While little research has been conducted on this topic in the cat, evidence from other species, particularly humans and dogs (DeBowes, Mosier et al. 1996), would appear to validate concerns. Other known complications from untreated periodontal disease include osteomyelitis, tooth root abscesses, and oronasal fistulas.

Oral disease may also be a marker for more serious systemic disease in cats. In a 2006 nationwide study of 8,982 cats with oral disease, 14.2% were retrovirus positive (IDEXX Laboratories, data on file). This is much higher than the general population rate of about 3% (Levy, Scott et al. 2006). Knowing the retrovirus status of a cat is essential for optimal assessment, wellness management, and treatment.

Oral ATP (Assessment, Treatment, Prevention) for cats

Assessment:

All cats should receive an oral exam as part of annual wellness care. A good oral exam should include the gingiva, the vestibule (area between the gums and the cheek), palatal and lingual surfaces of the mouth, dorsal and ventral surfaces of the tongue, and the visible pharynx. The sublingual space warrants special attention as it is a common site for neoplasia, particularly squamous cell carcinoma. To examine this area, push the base of the tongue toward the palate with a finger between the rami of the mandible. Local lymph nodes should be palpated for enlargement and the maxilla and mandible should be palpated for swellings or pain. Examine the cat for occlusal abnormalities before opening the mouth, particularly in brachycephalic or dolicocephalic breeds.

All the teeth (30 in the adult cat, 26 in kittens) should be visually assessed if possible. Sedation may be necessary in some patients to permit a full oral exam without injury to the owner or veterinary staff, either due to the cat's nature or because of oral pain. Since feline oral exams can be challenging, take advantage of any opportunity to examine a feline patient's oral health, such as when a cat is sedated or anesthetized for another procedure. The owner should be asked about the cat's diet (including treats) and about signs of oral disease, such as drooling, blood-tinged saliva, dropping food, or difficulty chewing. Unfortunately, oral disease may be well advanced before the owner notes changes in the cat's behavior or appetite. All history and examination findings should be noted in the cat's medical record.

A preliminary assessment of oral health is made in the exam room, but a more thorough assessment and charting is performed under anesthesia, along with radiographs. Radiography is very useful for diagnosis of FORLs and periodontitis (Lommer and Verstraete 2001). In one study of 115 cats referred for dental treatment, radiography provided additional clinically useful information in 86% of the patients (Verstraete, Kass et al. 1998).

Periodontal disease is a plaque-induced inflammatory disease. Plaque is composed primarily of bacteria in a mixed organic/inorganic matrix. Plaque begins to calcify into calculus within 2-3 days of deposition. Gingivitis will develop in response to plaque, but it can be reversed in most cases if the plaque is removed. Periodontitis involves the destruction of the periodontal ligament and alveolar bone and is not reversible, eventually leading to tooth mobility and tooth loss. Periodontal disease is graded in stages:

- Grade 1: gingivitis
- Grade 2: gingivitis plus early periodontitis (<25% alveolar bone loss)
- Grade 3: gingivitis plus established periodontitis (26-50% alveolar bone loss)
- Grade 4: gingivitis plus advanced periodontitis (>50% alveolar bone loss)

Clinical signs of periodontal disease include gingivitis, plaque and calculus, halitosis, bleeding gingiva, gingival recession, periodontal pockets and loose teeth. A specific type of periodontal disease seen in cats is alveolar osteitis around the canine teeth, where the inflammatory reaction in the alveolar bone causes swelling or protrusion of the bone and sometimes loss of periodontal tissue attachment. In juvenile-onset cases, Grade 2 disease may be reached as early as 6-8 months of age. Most veterinary

dentists recommend that all patients with Grade 1 disease or higher receive a full dental assessment and treatment. Grade 1 and 2 periodontal disease is often reversible; more advanced stages are not.

Cats are prone to several oral problems requiring assessment and treatment, such as:

- FORLs
- Chronic gingivostomatitis
- Tooth fractures
- Retained deciduous teeth
- Malocclusion
- Oral neoplasia (especially squamous cell carcinoma)
- Oral granulomas (e.g., eosinophilic granuloma complex)
- Oral ulcers (calicivirus, uremic, toxic)

The most common of these problems are FORLs and chronic gingivostomatitis.

FORLs are also known as feline neck lesions, dental resorptive lesions, and cervical line lesions. They have been identified in cats living as long ago as 13th and 14th century Europe (Berger, Stich et al. 2004). FORLs are characterized by cavitating lesions in the pulpal tissues or enamel and cementum. The lesions are commonly found at the cemento-enamel junction and are usually on the buccal surface of the tooth. The furcation area is a commonly affected site in molars and premolars. The most commonly affected teeth are the mandibular premolars. Lesions may be obscured by hyperplastic gingiva or overlying calculus. The crowns of teeth affected with dentoalveolar ankylosis often break off, leaving resorbing roots behind. FORLs are considered to be painful and a painful response (jaw “chattering”) on examining affected teeth, even under anesthesia, is common.

FORLs may be classified according to their severity using various schemes, such as:

- Grade I: only cementum or enamel affected
- Grade II: enamel and dentin affected
- Grade III: pulp exposure
- Grade IV: extensive structural damage
- Grade V: crown loss, retained roots

This resorptive process is not dental caries, the bacteriochemical process seen in humans and dogs. The stimulus causing odontoclasts to initiate resorption of healthy tooth structures in cats is unknown, although inflammation associated with periodontal disease has been proposed. The role of diet in periodontal disease in general and FORLs in particular, including the role of excess dietary vitamin D, is unclear. Cats can develop FORLs even if they are fed exclusively dry diets (Harvey 1996). As well, the live prey diet of feral cats does not protect them against periodontal disease (Clarke and Cameron 1998).

Recent studies have found that FORLs are very common, with prevalence rates from 29-67% (van Wessum, Harvey et al. 1992; Lund, Bohacek et al. 1998; Ingham, Gorrel et al. 2001; Pettersson and Mannerfelt 2003). Prevalence increases with age, and previous dental disease (calculus, gingivitis, periodontal disease) is a strong risk factor (Scarlett, Saidla et al. 1999). Although some studies have found an increased prevalence in pedigree breeds, other studies have not supported this conclusion. In one study, cats without oral lesions were more likely to have owners that cleaned the cat’s teeth at least twice weekly (Lund, Bohacek et al. 1998). Even feral cats suffer from FORLs, although at a lower rate than pet cats (Verstraete, van Aarde et al. 1996).

Chronic gingivostomatitis is a condition characterized by persistent inflammation and sometimes ulceration of the oral mucosa. It can be debilitating, frustrating to treat, and may result in euthanasia. It may be referred to by other names, such as plasma cell stomatitis-pharyngitis, chronic faucitis, lymphocytic plasmacytic gingivitis-stomatitis and others. Prevalence data is scarce, but in one study from the U.K. involving 4858 cats seen by primary care practices, the prevalence was 0.7% (Healey, Dawson et al. 2007).

The etiology of chronic gingivostomatitis is unknown. It has been proposed that the disease is an immune reaction to plaque and the tooth structure itself or the periodontal tissues. The disease varies in severity and may include faucitis, pharyngitis, or palatitis. Clinical signs include drooling, bleeding gingiva, oral sensitivity, and partial anorexia and weight loss. On histopathology, abundant lymphocytes, plasmacytes and occasional neutrophils are found. Many organisms, including viruses and anaerobic bacteria, have been found in association with gingivostomatitis. The most commonly suspected infectious etiology is calicivirus, but herpesvirus has been implicated as well (Knowles, Gaskell et al. 1989; Lommer and Verstraete 2003). The evidence linking *Bartonella* spp. to chronic gingivostomatitis is not convincing and no treatment has been shown to eradicate the infection.

Treatment:

A comprehensive treatment plan should be followed for each feline dentistry patient. Dental treatments should always be performed under anesthesia. Cleaning only the coronal surfaces without anesthesia is fraught with risks (gingival damage, pain and anxiety, increased plaque retention due to scratched enamel surfaces, failure to diagnose less obvious problems) and gives owners a false impression that the cat's mouth is now healthy.

The general steps in a treatment plan include:

- Pre-anesthetic blood and urine testing appropriate to the patient, including retrovirus testing
- Placement of an IV catheter for fluid administration
- Analgesia as determined by the patient's needs (options include NSAIDs, opioids, ketamine or fentanyl constant rate infusion; dental blocks; fentanyl transdermal patch placed in advance)
- Administration of peri-operative antibiotics if necessary
- Induction of anesthesia, intubation, anesthetic monitoring
- Thorough oral exam and charting of findings
- Dental radiographs
- Scale and polish the crown of each tooth as well as subgingival areas
- Irrigate subgingival areas with water or chlorhexidine solution to remove debris
- Measure each gingival sulcus; clean and treat any pockets
- Extract diseased teeth (obtain client consent!) or other necessary oral surgery; biopsy any masses
- If extractions were required, take post-operative radiographs
- Recover the patient; continue pain management
- Discharge appointment with owner to cover post-operative care, home dental care, and any necessary medications such as antibiotics or analgesics
- Schedule re-evaluation 1 week later for cats with moderate to severe periodontal disease

Currently, the most effective treatment for teeth affected with FORLs is surgical extraction. Owners are often shocked at the number of extractions required in cats with FORLs or advanced periodontal

disease. The answer to the question “How will my cat eat without those teeth?” is “Much better!” It is important to help owners understand that severely diseased teeth are no longer functional, and are a source of pain and infection. Crown amputation with intentional retention of roots has been recommended for ankylosed teeth (DuPont 1995; Lommer and Verstraete 2000), but the practice is controversial. Restoration is considered only for teeth with very early lesions and does not enjoy a long-term success rate (Zetner and Steurer 1995). A recent report of neodymium:YAG laser treatment for FORLs with a good success rate (79% of 71 teeth with no further lesions) has been described (Anthony 2001). However, potential damage to associated tissues is a serious concern.

Chronic gingivostomatitis is often refractory to treatment. No conservative treatment, including dental cleaning, home care, antibiotics (e.g., metronidazole, clindamycin, azithromycin), or corticosteroids, is likely to provide long-term (>6 months) resolution for moderate to severely affected cats. One small study of 8 cats with stomatitis found 50% responded to treatment with cyclosporine in a 6-month monitoring period (Vercelli, Raviri et al. 2006). Carbon dioxide laser ablation of diseased tissue has been advocated for disease control, pain relief, and preservation of non-diseased teeth, but published data on efficacy is lacking.

The only treatment shown to provide long-term relief in a majority of cats without further intervention is caudal (all teeth behind the canines) or whole mouth dental extractions. In the only published study on the efficacy of dental extractions for chronic gingivostomatitis, 60% of cats had significant improvement, 20% had some improvement, and 20% had little or no improvement (Hennet 1997). A recent case report details the use of recombinant feline interferon omega in a cat with refractory gingivostomatitis after extraction of all molars and premolars (Southerden and Gorrel 2007).

Follow up evaluations are an important part of ensuring continued oral health in feline patients. Cats with a healthy mouth should have an oral exam at least every year. Cats with gingivitis or mild-moderate periodontal disease should be examined every 6 months, and patients with more severe oral disease will benefit from re-evaluation at least every 3 months. Frequent re-evaluations allow for assessment of client compliance, and the opportunity to revise the treatment plan.

Prevention:

Home care is a vital component of oral health, and may consist of tooth brushing, oral rinses or gels, and dental diets and treats. It is important for clients to understand that home care is intended to *prevent* gingivitis and periodontal disease; it does not *treat* oral disease. In fact, trying to implement home care when a cat's mouth is diseased and painful causes more harm than good. Tooth brushing should always be initiated when the cat's mouth is healthy and pain-free.

Kitten wellness visits are an ideal time to explain and initiate oral home care as a means to improved client compliance. It is easier for clients to learn tooth-brushing techniques while a cat is young and has good oral health. In young kittens, oral health care may consist of simple cleaning of the cheek teeth with a soft cloth, mainly to accustom the kitten to having the mouth handled. Once the permanent dentition has erupted, tooth brushing with a dentifrice can be started. Brushing is intended to reduce plaque formation, the stimulus for gingivitis and periodontal disease. Calculus by itself does not cause oral disease, but both plaque and calculus provide an environment for oral pathogens that produce toxins, causing inflammation. To prevent gingivitis and periodontal disease, plaque must be removed before it mineralizes into calculus. Once calculus has appeared, it cannot be removed by home care.

Daily brushing of teeth is the most effective means of plaque control. Cats can be more challenging to implement daily tooth brushing, but even brushing twice weekly will be beneficial. It is important to explain to clients that while home care is very important, it does not replace regular professional oral examinations and treatment. Home care is only effective for the tooth surfaces that the owner can reach. Information for clients on home dental care, including instructions for brushing, can be found at: <http://www.toothvet.ca/dentalcare.html>.

Many devices may be employed for removal of plaque, such as cat toothbrushes (e.g., C.E.T.® Cat Toothbrush), gauze pads, and finger toothbrushes (e.g., C.E.T.® Fingerbrush). Owners should be encouraged to try more than one device to find the one that works best. While it is the mechanical effect of brushing that removes plaque, a veterinary dentifrice, such as C.E.T.® Toothpaste by Virbac, can help improve compliance if the cat likes the flavor. Oral rinses or gels, such as Maxi/Guard™ Oral Cleansing Gel by Addison and C.E.T.® Oral Hygiene Rinse or Gel, may be useful adjunct products as oral antiseptics after dental treatment and as plaque retardants.

There is some evidence that soft food diets are associated with increased frequency and severity of periodontal disease in cats and dogs (Watson 1994; Gawor, Reiter et al. 2006). For cats, this represents a considerable dilemma, since dry diets high in carbohydrates are linked to health problems such as obesity and diabetes mellitus. However, there is no doubt that cats can develop significant dental disease even when fed exclusively dry diets. The small kibble size of most dry diets does not offer much opportunity for chewing, and many cats swallow the pieces whole. Even when they do attempt to chew, the individual kibbles are brittle and shatter into smaller pieces with little effort on the part of the cat.

A number of dry diets are now marketed as “dental diets.” The most common dietary approach for reducing plaque and calculus formation is the use of a high-fiber matrix that removes plaque from teeth by abrasion. Individual kibbles are usually larger in size than non-dental diets, requiring the cat to chew each piece instead of swallowing kibbles whole. Each kibble is less brittle and less prone to simply shatter into small pieces, thereby requiring more chewing time. Recently, pet food companies have developed coatings for dry diets designed to inhibit mineralization of plaque into calculus by binding to salivary calcium, such as Eukanuba® Dental Defense System™. However, calculus does not cause gingivitis or periodontal disease, but it does make it easier for more plaque to adhere to tooth surfaces. Diets such as Medi-Cal® Feline Dental Formula and Royal Canin Veterinary Diet™ Feline Dental DD27™, combine a calcium sequestrant and a high-fiber matrix.

Chew treats, such as C.E.T.® Oral Hygiene Chews for Cats and Feline Greenies®, are intended to improve oral hygiene by their mildly abrasive action. They cannot replace tooth brushing, but are a valuable addition to a home oral care program.

It can be difficult to sort out the various product claims made by manufacturers. In 1997, the Veterinary Oral Health Council (VOHC) was established by the American Veterinary Dental College. VOHC recognizes products that meet standards of plaque and calculus control, and awards its seal after a review of trials conducted according to VOHC protocols. Currently, the following feline products have received the VOHC® Seal of Acceptance:

Feline diets certified for plaque and calculus control:

- Prescription Diet® Feline t/d
- Friskies® Feline Dental Diet

- Science Diet® Oral Care Diet for Cats
- Purina Veterinary Diets® DH Dental Health™ Feline Formula

Feline oral treats certified for calculus control:

- Feline Greenies®

There are a number of ways to improve client compliance with oral health care plans, such as:

- Have a standardized clinic protocol for regular oral exams and dental treatments
- Ensure clinic staff are well informed about oral health
- Incorporate reminders about dental assessments into recall mailings
- Use dental models and other visual aids in the exam room
- Avoid complicated medical jargon when discussing oral health with clients
- Replace slang terms such as “a dental” with more appropriate phrases such as “dental assessment and treatment”
- Use admission and discharge appointments for dentistry patients
- Provide written take-home information on oral health care
- Take before and after photos
- Promote *National Pet Dental Health Month* (Pets Need Dental Care, Too) in the clinic and in client communications

Summary

Veterinarians should educate cat owners about the importance of oral care as part of an overall wellness program. Many cats will need a dental treatment on a yearly basis; some more often. Good oral health brings substantial benefits, such as fresh breath, improved overall health, improved quality of life, and even prolonged longevity.

Definitions

Calculus (tartar): plaque mineralized with salivary mineral salts such as calcium carbonate and calcium phosphate

Gingivitis: inflammation of the gingiva; red, swollen or bleeding gums

Periodontal disease: a group of problems affecting the periodontium. It is typically divided into gingivitis and periodontitis.

Periodontitis: disease of the periodontal ligament, alveolar bone and cementum.

Periodontium: comprised of the gingiva, the sulcus (space between the gingiva and tooth), root surface (cementum), connective tissue attachments, and supporting bone.

Plaque: a soft biofilm composed of bacteria, food particles, sloughed epithelial cells, and salivary mucin.

Resources

American Animal Hospital Assoc. Dental Care Guidelines for Dogs and Cats; J Am Anim Hosp Assoc 2005;4:277-283.

Veterinary Oral Health Council: <http://www.vohc.org/>

American Veterinary Dental Society: <http://www.avds-online.org/>

American Veterinary Dental College: <http://www.avdc.org/>

Veterinary Dental Forum: <http://veterinarydentalforum.com/>

Pets Need Dental Care, Too!: <http://www.petdental.com/>

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