

Advances in Feline Dentistry

Thomas J. Klein, DVM

Adjunct Professor
Department of Veterinary Clinical Sciences
College of Veterinary Medicine
The Ohio State University
Columbus, Ohio 43210

KEY WORDS

- periodontal disease
- feline odontoclastic resorptive lesions (FORLs)
- lymphocytic-plasmacytic gingivitis/stomatitis (LPGS) syndrome
- selective extractions
- buccal flap technique
- intraoral radiography
- pain management

The greatest challenge in feline dentistry is in diagnosing which of the three most common oral maladies is being presented in the clinical setting. Periodontal disease, feline odontoclastic resorptive lesions (FORLs), and lymphocytic-plasmacytic gingivitis/stomatitis (LPGS) syndrome are manifested by many similar gross signs and can have overlapping pathologies. The latter two conditions are extremely painful, and proper therapy can greatly improve an affected cat's well-being.

PERIODONTAL DISEASE

Periodontal disease is the most common disease of adult cats.¹ Periodontal disease typically refers to gingivitis, which is defined as inflammation of the gingival tissues, and to periodontitis, which is gingivitis plus destruction of the supporting periodontal tissues (cementum, periodontal ligament, alveolar bone). Gingivitis is the reversible stage of periodontal disease; it can be appropriately treated and largely prevented by thorough plaque removal and continued supragingival plaque control. Periodontitis is more severe and primarily irreversible. It may require advanced therapy and thorough plaque control to prevent disease progression. Microbial plaque is the primary etiologic agent responsible for periodontal disease. Plaque is primarily bacteria admixed with salivary glycoproteins and extracellular polysaccharides that form a soft, sticky mass on tooth surfaces. The bacteria and their byproducts cause direct gingival inflammation as well as indirect activation of the host immune response. The gingiva will remain inflamed and the disease may progressively worsen until the offending bacteria are removed. Undisturbed

plaque mineralizes into a hard shell of calculus, which contributes to the disease process by providing a roughened surface for enhanced attachment and retention of plaque bacteria. Calculus also acts as a mechanical irritant exacerbating gingival inflammation. Other factors contributing to the prevalence and severity of periodontal disease include breed, genetics, age, diet, chewing behavior, and systemic health. Although the specific pathophysiology remains undefined, gingivitis, left untreated, may progress to periodontitis, with resulting oral pain, dysfunction, and tooth loss (Figure 1).

The role of periodontal disease in the etiology of other oral diseases such as FORLs and LPGS remains unclear. Maintenance of periodontal health depends on appropriate professional therapy combined with continued dental home care. Thorough removal of supragingival and subgingival plaque, calculus, and debris, polishing to smooth tooth surfaces, sulcus irrigation to remove debris or to aid in microbial control, and fluoride application, if indicated, are all part of routine periodontal therapy. Depending on the degree of disease present, ancillary steps such as periodontal surgery, root planing or curettage, and exodontic and endodontic procedures, as well as pain management, may be used. For the proper therapeutic steps to be taken in the cat, it is critical to appropriately determine the grade of periodontal disease present (Table 1).

FELINE ODONTOCLASTIC RESORPTIVE LESIONS

First described in 1976, feline odontoclastic resorptive lesions (FORLs) now affect 50% or more of cats over the age of 4 years. The maxillary or mandibular premolars are most commonly involved (Figure 2), followed by molars, canines, and incisors. The lesions initially appear to be reddened or "raised" gingival areas at the margin of the teeth, and many elicit a "chatter" pain response on touch. The lesion is located at the cementsoenamel junction, starting out as a shallow defect, then progressing to deeper stages (Figure 3). Some FORLs appear nonreactive and are nonpainful, which may indicate a stage of remodeling. These teeth must be examined grossly and radiographically to determine the extent of disease and resorption involved. The cause of these lesions is still unclear. Some type of stimulus elicits a physiologic change in the dental pulp, leading to vasodilation, release of inflammatory mediators, and stimulation of odontoclastic activity. Histologically, evidence of odontoclastic and other tis-



Figure 1. Grade IV periodontal disease in feline left upper third and fourth premolars.

sue reactions separates this process into a resorptive phase and a reparative phase, with both phases frequently occurring in close proximity (Figure 4). Previous studies have attempted to link FORLs to dietary acidification, feline calicivirus infection, dietary calcium imbalances, periodontal disease, and many other potential culprits, all as yet without proof. Retrospective examination of skulls from museum collections revealed a very low incidence of FORLs prior to 1960.² This fact may raise questions about whether altered feeding programs, vaccination protocols, or other feline management techniques that have evolved since 1960 may have contributed to the increase in FORLs.

THERAPY FOR FELINE ODONTOCLASTIC RESORPTIVE LESIONS

Once a full oral assessment is performed and the degree of FORL involvement is noted, it is critical to perform full-mouth oral radiographs (Figure 5). The radiographs will reveal grossly undetectable lesions and subgingival pathology. These x-rays serve to formulate the treatment plan and determine which teeth

Table 1
Grades of Periodontal Disease

Grade	Appearance
Grade I	Gingival inflammation and redness at free gingival margin; possible halitosis
Grade II	Free gingival inflammation, edema, and bleeding upon probing; no bone loss or tooth mobility; calculus present above and below gum line
Grade III	Moderate loss of attachment (<50%); possible slight tooth mobility and possible pustular discharge upon probing
Grade IV	Marked (>50%) bone loss, tooth mobility, and gingival recession; greater than 50% loss of attachment

From Bellows J: *The Practice of Veterinary Dentistry*. Ames, IA, Iowa State University Press, 1999.

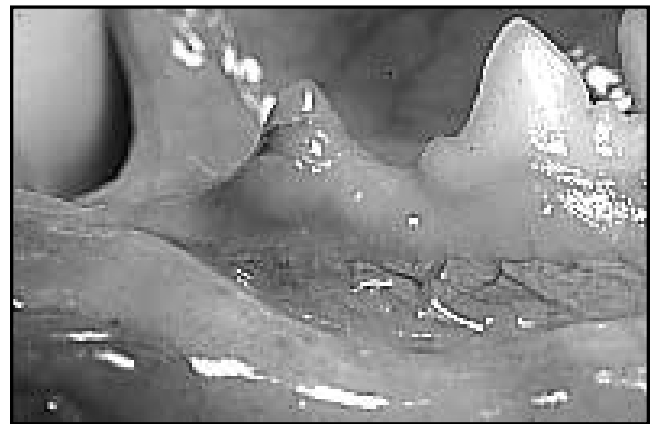


Figure 2. The most common site of FORL in the cat: the mandibular premolar.



Figure 3. A stage IV FORL in a mandibular premolar.

are to be extracted. As the causes of FORLs are unknown and the course is progressive, it is important to advise the owners of affected cats that dentition appearing normal today may succumb to the disease in the future. It is also helpful to note the four stages of FORLs (Table 2). Stage I lesions may be repaired with a light cure glass ionomer, which releases fluoride, possibly providing relief and forestalling pro-



Figure 4. Photomicrograph of FORL. Note the osteoclasts rimming the edges of the lesion.

Table 2
Stages of Feline Odontoclastic Resorptive Lesions

Stage	Description
Stage I	Abrasions, shallow cementum, or enamel defects that do not enter the dentin
Stage II	Erosions that progress into the dentin through enamel or cementum
Stage III	Erosions that extend into the root canal
Stage IV	Chronic resorptive lesions resulting in loss of tooth structure, complete root destruction, and ankylosis of roots

gression for some time, as will general periodontal care and topical fluoride agents. Although a host of therapies have been suggested for stage II through IV lesions, these teeth are best extracted, as disease progression is inevitable in these stages.

Proper extraction technique is critical for resolution of tooth lesions, as root remnants left in the alveolar socket continue to have a painful pulpal nerve that could cause the inflammatory reaction to persist. Standard buccal flap extraction techniques, using high-speed burs and gingival suturing, will quickly resolve the painful tooth lesions (Figure 6). The use of a small periosteotome and small elevators, as well as proper illumination and magnification, greatly aids in the feline tooth extraction process (Table 3). Post-extraction radiographs are invaluable in determining completeness of the extraction, and healing quickly follows. Postoperative pain management is valuable in all cats but specifically in those affected with multiple FORLs (Table 4). Proper oral hygiene and the use of topical stannous fluoride 0.4% are considered helpful in preventing FORL occurrence in other teeth.

LYMPHOCYTIC-PLASMACYTIC GINGIVITIS/STOMATITIS SYNDROME

This disease must be separated from the typical in-



Figure 5. Intraoral radiograph of mandibular premolars showing stage IV FORLs.

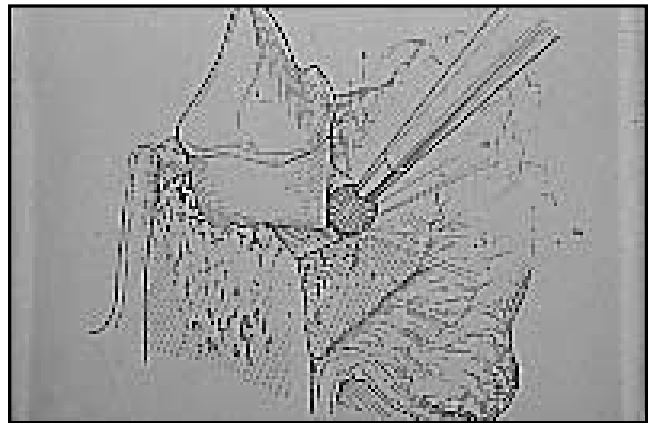


Figure 6. Extraction technique using high-speed burs and buccal flap. (Courtesy of Nutramax Laboratories, Inc.)

flammatory lesions noted with periodontal disease and the focal lesions of FORLs. The inflammatory presentation is usually much more widespread than the two previous diseases and often involves many of the buccal and lingual surfaces, the pharynx, the fauces (soft tissue junction of the maxilla and the mandible in the back of the mouth), and, infrequently,

Table 3
Equipment for Feline Extractions

- High-speed delivery system (multiple manufacturers)
- #2, #1, #1/2 round burs and #701 and #702 crosscut fissure bars (Henry Schein Inc., 135 Duryea Road, Melville, NY 11747; Phone: 800-872-4346)
- Periosteotome (order #228, Dr. Shipps Dental Laboratory, 351 N. Foothill Road, Beverly Hills, CA 90210; Phone: 310-550-0107)
- Feline dental elevators (Cislak Manufacturing, Inc., 1866 Johns Drive, Glenview, IL 60025; Phone: 800-239-2904)
- #15 scalpel blade
- Magnification and good lighting
- 4-0 or 5-0 absorbable suture with taper-cut needle (Monocryl with an RB1 needle; Vicryl; Ethicon, Inc., Somerville, NJ 08876; Phone: 800-255-2500)
- Consil™ synthetic bone crystals—optional (Nutramax Laboratories, Inc., 5024 Campbell Boulevard, Baltimore, MD; Phone: 800-925-5187)

the tongue. Often, overlying periodontitis and FORLs are seen, further complicating diagnosis and therapy. Cats being presented with this disease have severe oral pain, ptyalism, anorexia, dysphagia, and depression. The affected areas are often extremely hyperemic, swollen, proliferative, and friable. The etiology of LPGS is still not well understood, although immune-modulating diseases such as feline immunodeficiency virus (FIV) or feline leukemia virus (FeLV) infection can predispose a cat to this condition.

THERAPY FOR LYMPHOCYTIC-PLASMACYTIC GINGIVITIS/STOMATITIS

In a recent study of LPGS cats,³ 80% were clinically cured or significantly improved by extracting teeth that had the following features:

- Severe periodontitis (grades III and IV)
- FORLs (except stage I, shallow lesions confined to the enamel)
- Teeth surrounded by severe buccostomatitis (spontaneous or induced bleeding on palpation)

Table 4
Analgesics for Feline Chronic Oral Pain

Immediate postoperative/intraoperative care analgesia

- Butorphanol 0.2–0.8 mg/kg q 1–4 h SC, IM, or IV^a
- Buprenorphine 0.005–0.1 mg/kg IM/IV q 4–6 h^b
- Fentanyl patch

Home care analgesia

- Butorphanol 0.3–1.0 mg q 6–8 h
- Injectable butorphanol (10 mg/ml) can be mixed 1 ml in 30 ml of a palatable liquid feline vitamin supplement and dosed orally at 1 ml–3 ml q 6–8 h (author's dosage)

^aIM = intramuscularly; IV = intravenously; SC = subcutaneously.

^bFrom Muir WW, Hubbell JAE: *Handbook of Veterinary Anesthesia*, ed 2. St. Louis, Mosby, 1995.

- Mandibular molar teeth, maxillary fourth premolar teeth, and first molar teeth in cats with faucitis

Most veterinary dentists use a combination of specific periodontal therapy, extractions as needed, and corticosteroids used judiciously for control of LPGS. Recently, the use of a CO₂ laser has been advocated in LPGS therapy. Although this therapy is still in its infancy, proponents suggest that resolution of bacterial “tracts” is responsible for its success and may preclude full-mouth or selective extractions.

This is an exciting time to be involved in feline dental disease and, although many new therapies have been implemented to control the most common dental abnormalities in cats, many questions remain as to the underlying pathologic mechanisms involved. Until the cause is ascertained, pain management, periodontal therapy, selective extractions, and antiinflammatory medications are the therapies of choice.

REFERENCES

1. Logan EI: Feline dentistry. Denver, Proceedings of the Veterinary Dental Forum, 1997.
2. Harvey CE, Alston WE: Dental disease in cat skulls acquired before 1960. Proceedings of the Veterinary Dental Forum, 1990, pp 41–44.
3. Hennes P: Chronic gingivo-stomatitis in cats: Long-term follow-up of 30 cases treated by dental extraction. *Journal of Veterinary Dentistry* 14(1):15–21, 1997.

