CATS ARE NOT DOGS **DENTISTRY**
WHEN IT COMES TO DENTISTRY
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Normally there are 26 deciduous and 30 permanent teeth in the cat's oral cavity.

Dental formulas (upper number indicates the maxillary teeth, lower number the mandibular teeth):

- The deciduous dental formula for kittens is 2 x (I3/I3, C1/C1, P3/P2) = 26 teeth.
- The permanent dental formula for adult cats is 2 x (I3/I3, C1/C1, P3/P2, M1/M1) = 30 teeth.

All the incisors and canine teeth have one root; the maxillary second premolar, if present, normally has one root. However, studies have shown that nearly 40% of the maxillary second premolars have two (sometimes fused) roots. The maxillary third premolar has two roots in most cases (10% of the maxillary third premolars have a small third root), and the maxillary fourth premolars have three roots. The maxillary first molars, if present, usually have two roots. The mandibular cheek teeth in a cat (third and fourth premolars and first molars) have two roots.

Teeth are categorized by location and form. There are four types of teeth in the cat. Incisors are small teeth located between the canines. They are used for prehension. Incisors are referred to as right/left, maxillary/mandibular, first, second, and third incisors. In the modified Triadan system, right maxillary incisors are numbered 101, 102, 103 starting from the first incisor, and left maxillary incisors are numbered 201, 202, and 203. The left mandibular incisors are numbered 301, 302, 303, and the right mandibular incisors 401, 402, 403.

Canines are single-rooted teeth located rostrally in the mouth caudolateral to the incisors. They are used for piercing and biting. Canines are referred to as right/left, maxillary/mandibular canines. The crowns of the maxillary and mandibular canine teeth have vertical grooves**.** In the modified Triadan system, the right and left maxillary canines are numbered 104 and 204, respectively. The root and crown of the maxillary canines help to hold the upper lip outward, so that when the mouth is closed, the coronal tip of the mandibular canine slides into the vestibule without traumatizing the upper lip. The left and right mandibular canines are numbered 304 and 404, respectively (in the modified Triadan system, all the canines end in "4" and first molars in "9").

Premolars are located caudal to the canines. There are normally three maxillary and two mandibular premolars in the cat. Proper nomenclature of feline premolars is based on the archetypal carnivore model, which has a full dentition of forty-four teeth (six incisors, four canines, sixteen premolars, and twelve molars). The premolar behind the maxillary canine is termed the right or left maxillary second premolar**.** In the modified Triadan system, the second premolars are referred to as tooth 106 (right) or 206 (left). The second premolar has one or two fused roots. The third premolars (107, 207) have two roots. The fourth premolars (108, 208) have three roots (mesiobuccal, mesiopalatal, and distal). The premolar behind the mandibular canine is termed the left or right mandibular third premolar (307, 407), followed by the fourth premolar (308, 408), with two roots.

Molars are located caudal to the premolars. There is one set in the maxilla termed right or left maxillary first molar (109, 209), and one set in the mandible termed left or right mandibular first molar (309, 409). The mandibular first molar has one large mesial root and a smaller distal root, which angles caudally**.**

Oral Pathology
Understanding feline dentistry can be overwhelming at times with tooth resorption, oropharyngeal inflammation, fractured teeth, periodontal diseases, and oral masses to grasp. Fortunately, embracing dental concepts in bite-sized pieces makes feline dentistry understandable and fun.

In most feline practices the veterinarian examines the patient in the exam room, appropriate preoperative tests are performed and reviewed, and the cat is anesthetized, and then the technician gathers gross dental information (probing depths, missing and/or fractured teeth, clinical tooth resorption), cleans the teeth, and presents findings to the veterinarian. It is up to the veterinarian to make diagnoses based on the exam findings and to create a treatment plan. The treatment plan is dictated by recognition of disease and an understanding of anatomy and dental principles. Fortunately, the general practitioner or a close referral can manage most dental cases.

In cases where there is a “functional” abnormality (even though the dentition is not “normal,” the animal does not derive adverse effects), no immediate care is needed, and future follow-up is recommended. Examples of functional abnormalities include an enamel chip that does not penetrate the dentin sufficiently to affect the pulp, where radiographs do not show pathology; functional malocclusions; and cases where the root of a tooth shows minimal external resorption that does not extend into the oral cavity.

Periodontal Diseases
In cases of stage 1 gingivitis (inflamed gingiva without evidence of support loss), treatment should include thorough teeth cleaning, polishing, and application of barrier sealant. With stage 2 periodontal disease (less than 25% of support loss occurs), nonsurgical care is indicated, such as teeth cleaning, irrigation, polishing, application of barrier sealant, and possible application of local antimicrobial (Clindoral) where periodontal pockets are present. In stage 3 periodontal disease, where between 25% and 50% support loss occurs and pocketing exists, local antimicrobial application can be considered if the owner is committed to twice daily home care and the tooth is readily accessible. Teeth affected by stage 4 disease, where greater than 50% support loss occurs, should be extracted.

Fractured Teeth
Fractured teeth with pulp exposure should be extracted or saved via root canal therapy. Although any appropriate tooth can be considered for root canal therapy, in cats, due to the small root anatomy of non-canine teeth, canine teeth are only treated. Vital pulp therapy can be used in cases of near pulp exposures that have entered the enamel and dentin and have come close to the pulp. Treatment depends primarily on the age of the animal—a young animal (less than 9 months) will have a large pulp chamber close to the dentin. Vital pulp therapy should be performed in these cases with frequent radiographic reexamination. The older animal with increased amount of dentin between the fracture and pulp can either have root canal therapy performed or serial radiographs for signs of endodontic involvement before root canal or extraction.

Conventional root canal therapy is a treatment option to care for end-stage pulp disease without tooth resorption in canine teeth. If the fracture is acute (up to 2 days in the young cat and 2 weeks in the cat older than 18 weeks), vital pulp therapy can be attempted with a guarded prognosis, and extraction or conventional root canal therapy can be performed with a more predictable outcome. If the fracture is older, extraction or conventional root canal therapy are options. Doing nothing should not be an option.

Oropharyngeal Inflammation
Not all cases of oropharyngeal inflammation are stomatitis. In 2009, the American Veterinary Dental College adopted oral inflammation terminology based on anatomical presentation.

Gingivitis: inflammation of gums
Periodontitis: inflammation of non-gum periodontal tissues
Alveolar mucositis: inflammation of tooth sockets
Sublingual mucositis: inflammation of mucous membranes on the floor of the mouth
Labial/buccal mucositis: inflammation of lip/cheek mucous membranes
Caudal mucositis: inflammation of mucous membranes at the back of the mouth
Stomatitis: inflammation of the mucous membrane lining of any of the structures in the mouth
Palatitis: inflammation of mucous membranes covering the hard and/or soft palate
Glossitis: inflammation of mucous membranes of the top or bottom of the tongue surface
Cheilitis: inflammation of the lip
Osteomyelitis: inflammation of the bone and bone marrow
Tonsillitis: inflammation of the tonsil
Pharyngitis: inflammation of the throat

Treatment of Inflammation
Plaque, a film that covers the teeth and contains bacteria, seen above and below the gum, appears to be the key initiating source of inflammation in a cat’s mouth and throat. Removing teeth decreases the plaque burden. In a majority of affected cats, tooth extraction is the only treatment thus far shown to have long-term positive results (80%) without the need for further medication. The decision whether all teeth are extracted or only the premolars and molars is based on examination findings. If marked inflammation, periodontal pockets, or tooth resorption are noted around the canines and/or incisors, the affected teeth are also extracted.

In cases where inflammation persists for months despite extractions of some teeth, all remaining teeth and root fragments should be extracted. If lesions persist for months to years despite extraction of all teeth, periodic use of a laser to treat inflamed areas, oral prednisolone every other day, cyclosporine, and interferon (daily oromucosal treatment with 0.1 MU of rFeIFN-ω) may be helpful.

Tooth Resorption

A common feline oral malady is tooth resorption (TR). Greater than half of all cats more than three years old will have at least one tooth affected by resorption. Tooth resorption less frequently affects dogs. These tooth defects have been called cavities, neck lesions, and external or internal root resorptions. Tooth resorptions are usually found on the outside of the tooth where the gum meets the dental surface. The lower jaw premolars are mostly affected; however, tooth resorption can be found on any tooth.

The cause is unknown, but theories supporting an autoimmune response, calicivirus, and metabolic imbalances relating to calcium regulation have been proposed. Commonly the resorption starts at the gum line and progresses, eroding sensitive dentin. Some affected cats show pain and jaw spasms whenever the lesion is touched. Others show increased salivation, oral bleeding, or difficulty eating. Most times it is up to the veterinarian or astute owner to diagnose tooth resorption.

There are five recognized stages of tooth resorption. In *stage 1*, only an enamel defect is present and rarely noted. The lesion is not sensitive because it has not entered the dentin. In *stage 2*, the lesion penetrates enamel and dentin and is commonly sensitive upon compression with a Q-tip. When resorption progresses into the pulp chamber (nerve), *stage 3* has occurred. In *stage 4*, large amounts of the tooth hard structure have been destroyed. By the time *stage 5* has occurred, most of the tooth has been resorbed, leaving only a bump covered buy gum tissue.

Intraoral X rays are essential to evaluate all the teeth to determine the best course of therapy. Depending on intraoral X-ray results, treatment for tooth resorption involves either extraction of the entire tooth and roots or partial tooth extraction. In cats affected by stage 5 without inflammation, treatment is not necessary.

Therapy Options

1. Do nothing with the observed pathology other than follow its progress in the future in cases:

- Where there is a “functional” abnormality (even though the dentition is not “normal,” the animal does not derive adverse effects)
  - Enamel chip that does not enter or penetrate the dentin sufficiently to affect the pulp and the radiographs do not show pathology
  - Functional malocclusion
- Where an external resorption lesion is located subgingivally and does not appear to affect the integrity of the tooth

2. Teeth cleaning, irrigation, polishing, application of barrier sealant

- Stage 1 gingivitis (inflamed gingiva without evidence of support loss): treatment involves a thorough teeth cleaning, polishing, and application of barrier sealant
- Stage 2 periodontal disease (less than 25% of support loss occurs): treatment involves above plus possible application of local antimicrobial

3. Local antimicrobial administration (LAA) (Clindoral[Trilogic Pharma]

- Stage 2 periodontal disease (less than 25% support loss) and stage 3 periodontal disease (25% to 50% support loss): where the caregivers can provide home care, treat as above plus local application of antibiotics

4. Crown reduction with gingival closure

- Type 2 TRs with evidence of decreased root opacity compared to normal root(s).

5. Oral Mass incision, excision

- Benign
- Malignant

6. Extract

- In stage 4 periodontal disease where the tooth has more than 50% support loss based on probing depths or where gingival recession has progressed past the mucogingival line. Extraction is the treatment of choice in most cases. Flap exposure, apical position flap, bone implants, mucogingival surgery can be attempted in the right case with the right owners with a guarded prognosis.
- Where the tooth has between 25% and 50% support loss and the patient will not allow or the owner will not perform appropriate home care.
- Where the tooth is stage 3 mobile.
- Where the tooth is affected by endodontic disease and stage 3 or 4 periodontal disease.
- In type 1/3 TRs without decreased root opacity on intraoral films.
- Where root canal therapy is not a viable option due to the owner's wishes or the practice's capability (and lack of referral option).
- Where there is poorly responsive oropharyngeal inflammation that does not respond to home care. All teeth distal to the canines are extracted, resulting in a 80% success rate.
- Where there are supernumerary teeth causing crowding. In the normal dog there should be 42 teeth. Between the maxillary and mandibular canines there should be 6 teeth. Between the maxillary canine and fourth premolars there should be 3 teeth; and between the mandibular canine and first molar 4 teeth. Any more or less needs radiographic evaluation for extraction.
- Where there are persistent primary (deciduous) teeth. These should be removed at the time of diagnosis to potentially prevent abnormal location of the adult teeth.
- Where there are internal resorption lesions not amenable to root canal therapy.