

A Special Focus on Feline Dentistry

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PetED Veterinary Education and Training Resources

One of the biggest revelations for me in my training as a veterinary technician was that cats are not small dogs. That statement is especially true in relation to the subject of veterinary dentistry.

As with most other subjects in medicine, we must start with anatomy and the differences unique to our feline population as a species.

UNIQUE ANATOMY

Tongue: The tongue is covered with papillae. These barbs point backwards, and this enables the cat to rasp meat off of bones and to groom more effectively. These barbs catch debris and dirt while grooming. Unfortunately, because the barbs on a cat's tongue point backwards, anything that gets attached to these barbs eventually gets swallowed. That includes things like hair and string. Hairballs are a common issue for cats as are string foreign bodies. Once tangled in the papillae, the material cannot be spit out.

Teeth: Cats have a unique dental formula. Theirs is I3, C1, P3, M1

I3, C1, P2, M1

Their canine counterparts are supposed to have 4 premolars and more than one molar. So, it is important to know that when charting the feline patient, their teeth on the maxilla start at the second premolar (there is no first) and on the mandible, the first tooth distal to the canine is the third premolar (there are no first and second mandibular premolars).

Gingival probing depths: In our feline patients, normal gingival probing depths are less than 1 mm.

Canine teeth: The canines have vertical grooves that extend the length of the tooth. These sometimes become stained. It is important to note that the enamel is thinnest in this area and care must be taken not to spend too much time trying to remove the staining for fear of damaging the protective enamel.

Also, the pulp canal extends ALL THE WAY to the tip of the crown of the feline canine tooth. Any degree of chipping of these teeth requires investigation. A "wait and see" approach is not appropriate. These injuries must be radiographed. Nearly all fractured canine teeth are painful and will become infected.

Intraoral Radiology

Radiology is a critical tool needed to assess the dental tissues; crown, root, periodontal ligament and bone quality, in the feline patient.

A complete radiographic survey series of a feline patient with full dentition will require up to 8 views. They will include:

1. Oblique Right Maxillary Canine
2. Maxillary Incisor Arcade
3. Oblique Left Maxillary Canine
4. Right Mandibular Premolar and Molars
5. Left Mandibular Premolar and Molars
6. Lower Incisor and Lower Canines
7. Oblique Right Lower Canine and Third Premolar
8. Oblique Left Lower Canine and Third Premolar

We should note that one cannot evaluate the upper canines on the upper incisor image. Both upper third premolars will be superimposed onto the image of both upper canines. That necessitates the two oblique views.

It is also commonly necessary to get obliques of the lower canines to discern bone quality below the canines and to get a diagnostic image of the third premolars.

The Middle Mental Foramen is located distal to the root of the lower canine in the cat. Care must be taken not to confuse this normal structure for a periapical lucency. If there is any question, the head of the X-ray generator can be oblique and this change in angle will show that the lucency is not associated with the root of the tooth.

Good quality intraoral radiographs are important for the veterinarian to diagnose disease in the feline patient. The degree of bone loss is determined radiographically. In early periodontal disease, up to 25% bone loss is observed. In stage 3 periodontal disease, 25-50% bone loss will be evident. This bone loss may be horizontal or vertical (extending down the root). Stage 4 periodontal disease is classified by greater than 50% bone loss. In other words, the tooth has lost greater than 50% of the supporting bone.

Periodontal disease can also cause Alveolar Bone Expansion (Osteitis). This is often seen in cats with chronic periodontal disease affecting the canine teeth. Radiographically, it appears that there is horizontal bone growth accompanied by poor quality expansive alveolar bone.

Common Feline Pathology

Juvenile Onset Gingivitis: This occurs before cats are 9 months old. There is a severe gingivitis and notable halitosis. Often these cats little to no tartar accumulation. The exact cause is unknown, but treatment involves early detection and frequent (q 4-6 months) professional plaque removal with elegant home care. Usually, true juvenile onset periodontitis will resolve by the age of 2 years. It is often noted that juvenile onset gingivitis occurs frequently in specialty cats such as Abyssinians and Persians, but this can be seen in any feline breed.

Treatment involves cleaning the teeth every 3-6 months and training these young cats to tolerate tooth brushing. If there is any hyperplastic gingiva, or gingival tissue covering any portion of the crown of the teeth, then a gingivectomy is performed.

Juvenile Onset Periodontitis: Young cats can exhibit halitosis at an early age. Incisor mobility is often noted and often premolars with furcation exposure at an early age. Frequent professional care and elegant home care are needed in these cases.

Canine tooth extrusion (supereruption): Sometimes when a canine tooth is affected by chronic periodontal disease, there appears to be a greater crown height. Although the etiology is unknown, current studies reveal a statistical correlation between supereruption and tooth resorptive process.

It is important to note; when the veterinarian is making the recommendation for the extraction of a maxillary canine tooth when the lower canine tooth on the same side remains, it is critical that the client be prepared that there is a chance for maxillary lip impingement. This happens because when the upper canine is in place, it protects the upper lip from being impaled by the lower lip.

In most cases, there is no lip trapping. But in a small percentage of cats, the architecture of the face is altered just enough to allow the lower canine tooth to meet the cat's upper lip. In some cases, a small, hairless callus will form, and the patient never notices it. But, in some cases, the trapping of the lip by the lower canine can bother the cats a great deal.

It is always better to inform the client of this possibility before the extraction so that they are prepared with a plan if it does occur. It also informs them that this is a possible side effect of this procedure, rather than poor surgical prowess.

Treatment for lip impingement is either crown reduction with a vital pulpotomy (reducing the height of the lower canine with endodontic treatment) or the surgical extraction of the lower canine.

Alveolar Bone Expansion (Osteitis): Caused by chronic periodontal inflammation the alveolar bone around the upper canine teeth. When noted it is critical to evaluate the periodontal structures of these teeth radiographically to stage the periodontal disease in order to know the appropriate therapy. By Stage 4 periodontal disease and 50% bone loss, tooth extraction should be considered.

Tooth Resorption: Tooth resorption is a common ailment in our feline population. Studies have reported anywhere from 20% to 75% of the feline populations will experience this disease process. These lesions are usually noted buccally but can occur on any surface. Statistically the most commonly affected teeth are the mandibular third premolar. On the cheek teeth, the lesions are commonly noted at the cemento-enamel junction and with hyperplastic gingival tissue covering the affected portion of the tooth.

In the canine teeth, it is common to see tooth resorption more apically and may not be clinically apparent.

At one time these lesions were called neck lesions, FORLs (Feline Odontoclastic Resorptive Lesions) and cervical line erosions. The current terminology is tooth resorptions. They are classified:

Stage 1: Mild hard tissue loss

Stage 2: Moderate hard tissue loss but that does not extend endodontically

Stage 3: Moderate hard tissue loss but that does extend endodontically but most of the tooth integrity is maintained.

Stage 4: Extensive Hard tissue loss that extends endodontically

Stage 5: Crown has fractured off due to hard tissue weakness and the gingiva has extended over top of the remaining root tissue.

The etiology of this disease process is unknown and being researched extensively. Recent studies have grouped these lesions into two groups:

Type 1: Resorption associated with periodontal disease where the tooth retains radiographic evidence of a periodontal ligament and a pulp canal. These teeth need to be treated with complete extraction.

Type 2: Lesions associated with bone replacement. These teeth can be treated with crown amputation with intentional root retention.

If there is radiographic evidence of tooth resorption isolated to the root structure. Since these lesions are not exposed to air and cold water, these teeth are not painful. If the client is willing to follow the progression every 6 months, monitoring these teeth is appropriate as well.

Determination of treatment options can only be made radiographically.

Oralpharyngeal Inflammation: In the past this has been called Lymphocytic Plasmacytic Gingivostomatitis, plasma cell gingivitis or Stomatitis. This is one of the most painful conditions for cats and definitely one of the most frustrating syndromes to deal with for the owner AND the practitioner.

The etiology is unknown specifically but appears to be associated to an immune mediated reaction to either dental plaque. Usually there are many factors involved; genetics, environmental stress, diet and viral infections. Although, for a while it was suggested that feline Bartonella virus was responsible for stomatitis cases. However, although many cats may be infected with Bartonella, it is more probably an opportunistic pathogen and not the primary cause.

These cats present painful. They often drool, have a history of weight loss and poor appetite and their coats are unkempt due to their inability to groom themselves comfortably. Some cats only

have inflammation around the caudal cheek teeth, while others exhibit a generalized inflammation.

This disease is very frustrating. Medical therapies such as corticosteroids, antimicrobials, Gold Salts, Interferon all have mixed long-term results.

When feline patients present with inflammation associated only with the teeth caudal to the canines, surgical extraction of the teeth and all root fragments caudal to the canines is the treatment of choice. It is recommended that if one is to treat a stomatitis case, they must have intraoral radiology capability. It is critical that all root tissue be removed as well. The accidental retention of root tissue will lead to continued gingival inflammation. Since in the best-case scenario, extraction can provide a 50% chance of resolution, post-op radiographs are vital to insure that the case has been properly treated.

Patients also should be supported via feeding tube if anorexia is an issue until they are able to eat on their own.

Post-operatively most veterinarians will put these patients on appropriate antibiotics for 2 weeks post-op with appropriate pain management.

In summary, feline patients have some unique issues that the trained veterinary technician should be aware of to support the veterinarian and the owners.

Occlusions

Persistent deciduous teeth: Anytime two of the same tooth occupy the same space, one must be extracted to avoid overcrowding and the movement of the permanent teeth.

Supernumerary Teeth: extra teeth can be a source of crowding and subsequent periodontal disease.

Missing Teeth: Whenever a tooth is missing and there is no clear notation that it has been previously extracted, intraoral radiographs need to ensure that the tooth is not impacted.

Mesioversion or linguoversion of canine teeth: This is when the teeth are positioned either mesially (spear teeth) or inward toward the tongue. Orthodontics can be applied. Other treatment options include extraction or crown reduction with vital pulp therapy.

Maxillary Fourth Premolar/Mandibular First Molar Interference: Occasionally, the cusp of the crown of the upper fourth premolar will contact the gingiva by the mesial root of the lower first molar. This can cause vertical bone loss and jeopardize the health of the lower molar.

Treatment options include odontoplasty (gentle shaving of the cusp of the maxillary fourth premolar), crown reduction and vital pulpotomy or extraction. Sometimes the health of the lower molar is so poor that extraction of the lower molar is required as well.

Oral Trauma

TMJ Dislocation: Treatment involves the use of general anesthesia and the insertion of a pencil across the upper fourth premolars and the mandibular first molars. The mouth is then gently closed with this object in the mouth. Gently pulling the dislocated mandible forward while closing the mouth around the pencil positions the joint enough that it can slide into position.

Mandibular Symphysis Separation: The symphysis is not a boney union, so it is not a truly fractured mandible. Stabilization can be accomplished either by using a self-cured material like 3M Pro-Temp 3 Garant™ or by stabilizing with 22-gauge cerclage wire.

Tumors

Squamous Cell Carcinoma is the most common feline oral cancer accounting for nearly 75% of all malignant tumors.

Fibrosarcoma is the second most common feline oral tumor.

Home Care

In many practices that I visit, there is an overall attitude that home care is virtually impossible in our feline patients. The truth is that when the client understands the steps to train these skills, and the importance in relation to their pet's health, comfort and cost of care, home care becomes very possible.

It is critical that we know how to recognize dental disease in cats, but, prevention is the key to oral wellness. Of course, this training should be taught at kittenhood. Link small steps toward toothbrushing to positive experiences.

A recent literature search on oral care for people reveals that the recommendation for tooth brushing has minor variability, yet more consistency. There is certainly some variability in how many times a day one should brush, the method for brushing and for how long one should brush. But, across the board, the gold standard for oral home care for people is, brushing should be done at least twice a day, flossing daily, eating a healthy diet and limiting snacks, replacing toothbrushes every three to four months and regular dental checkups.

If we truly want to embrace wellness care for our cat population, we need to figure out a way to teach our clients how to train their pets to participate (note I did not say "tolerate") in tooth brushing. Dental services are expensive, and our clients deserve to be taught how to minimize their dental bills by providing care at home.

First, let's discuss a psychology concept, **The Law of Effect**. Edward Thorndike placed cats in a puzzle box. When the cat stumbled by trial and error, upon how to escape the box, it was promptly rewarded with a food it enjoyed. This law of learning stated that any behavior that is followed by pleasant consequences is likely to be repeated, and any behavior followed by unpleasant consequences is likely to be stopped. Skinner's theory of operant conditioning was all based on the work of Thorndike and the Law of Effect.

The same is experienced in humans. Everything we do, we do because we get a hit from it one way or another. We even do things that we don't intellectually want to do because we are getting something out of it.

If I were to move my Mother-in-law (if I had one) into my home, and I didn't like her...I would be doing so to enhance the relationship of me and my partner. If I write a check to the IRS...I don't want to part with that money...but, I understand that I will avoid problems by promptly paying the tax. You probably don't enjoy going to the dentist, but you go because you perceive a positive impact on our health.

Humans are cognitively complicated beings. According to several behavioral measures, researchers say that dogs and cat's intelligence is on par with a 2 to 2.5-year-old human. When training the cat or dog to participate in tooth brushing, we must break up the skill into small bite sized pieces. These are the steps I teach clients to train this skill, these are the steps I recommend:

1. Test to see if the pet likes poultry toothpaste. That flavor is the most preferred by dogs and cats.
2. Pick one place in the house where you will consistently do this every day. It's no fair changing the venue. Your dog and/or cat know where it can expect to be fed because the food always appears in that place.
3. Pick a time of the day when you will be apt to do this every day. Again, it is important to be consistent.
4. Now, just call the pet to that place at the chosen time and reward the pet with a little toothpaste on your finger or something else they value, just for coming when called. For cat owners you may need an audible cue (I used the shake of a Pounce™ treat canister as the audible cue but treated with poultry toothpaste). When the pet appears, reward them for that behavior.
 - a. When working with a cat, just reward with the toothpaste or chosen treat. Some cats do not value a lot of handling.
 - b. Repeat this step once daily until the pet starts showing up asking for the treat.
 - i. Cats often take weeks
5. Once the pet is showing up on its own, then, and only then, can we up the ante. Now put the toothpaste on the toothbrush. When the pet arrives, offer the toothbrush with the toothpaste. Just let them lick it off the toothbrush and then reward from the tube. Continue this step until there is no concern about the toothbrush. May takes weeks.

6. Once the pet is comfortable licking the toothpaste from the toothbrush, you must gain access to the mouth. *Note: animals are very protective of their heads. This is an important step for shy or challenging pets.
 - a. Hold your non-dominant hand over the head so closely that you can just feel the pet's hair touch the palm of your hand. Offer the toothpaste on the toothbrush and allow them to lick it clean and reward that behavior. Never break their trust.
 - b. The next day, hold your hand a little closer to the head, feeling more hair. Reward their cleaning the toothbrush and allowing this.
 - c. Eventually, you will have desensitized the pet's fear of your hand near their head. At this point, use the thumb of your non-dominant hand and gently pull back the cheek of the pet. When you see any teeth, dab the toothpaste loaded toothbrush on the visualized teeth. Then reward.
 - d. The next day, you can dab one side, then the other. Reward.
 - e. Then the next day, you can make one brush stroke on one side. Reward.
 - f. The next day one brush stroke on each and reward.
7. Eventually, you will have a pet that is asking for his/her teeth to be brushed. By using this slow training method, you have shifted the power. The pet believes they are making the reward happen.

This is a low stress method to train almost any pet to participate in toothbrushing. It may take up to 3 months to accomplish the complete training for a cat. But, it is possible to train a cat easily with this method.

I would recommend that when sharing this training protocol with clients you not recommend cats known to be "caution" pets for fear of the owner being injured and thus a possible practice liability. But, on those patients, it is important to have their mouths examined and cleaned on an annual basis under general anesthesia.

Also, this should be done daily. Daily training deeply reinforces the behavior. It is no longer OK to tell our clients that if they can brush the teeth 3 times a week it will be fine. Plaque lays down 8 hours after a meal.

Some other important facts:

No home care dental product for pets is as effective as tooth brushing. If a client won't or can't brush the teeth, then we can consider alternatives; Chlorhexidine Rinses, approved dental diets, chews impregnated with anti-tartar enzymes.

The Veterinary Oral Health Council (VOHC) exists to recognize products that meet pre-set standards of plaque and calculus (tartar) retardation in dogs and cats. Products are awarded the VOHC Seal of Acceptance following review of data from trials conducted according to VOHC protocols. The VOHC does not test products itself.

Also, the AVDC makes the following statement on their website; “Dogs are carnivores – they chew on bones in the wild. However, the AVDC does not recommend cow hooves, dried natural bones or hard plastic products because they are too hard and do not mimic the effect of a dog tearing meat off a carcass. These hard products are associated with broken teeth or damaged gums.”