

10 Targets for Dental Disease: Diagnosis and Treatment Options

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1. Broken Teeth: Broken or fractured teeth are a common finding in veterinary practices. The reason this occurs is because dogs and cats can generate significant biting force and all too often chew on hard objects. Objects that are notorious for breaking teeth include cow hooves, real bones, rocks, ice, and hard plastic bones. The result is often a tooth fracture that may or may not extend into the pulp canal within the tooth. If the fracture does not enter the pulp canal, simply sealing the tooth with a bonding agent will suffice in most cases. If the fracture opens the pulp canal, which houses the blood and nerve supply to the tooth, then the tooth will be acutely painful. Most pets, however, do not show obvious signs of pain. They typically will chew on the other side of the mouth or avoid using the broken tooth until the nerve dies in 4-10 weeks. Until the nerve dies, the exposed pulp is sensitive and most pets will react if it is touched. Once the nerve dies, the open pulp canal is an area that food, saliva, debris, and bacteria can enter the tooth resulting in an infection of the pulp tissue. The pulp tissue enters the tooth at the tip of the root or roots, and as the infection overtakes the pulp, it extends through the root tip to the bone in this area. Again, most pets do not show much sign of an infected tooth. They typically will not swell or drain pus at this site as one might expect, but the infection is managed by the immune system and smolders. The pain associated with the broken tooth changes from an acute pain to a chronic ache. The immune system will constantly fight the infection to keep it under control. In less than half of the patients, the swelling will appear and pus will drain through the skin or gum tissue in the region of the root tips. Antibiotics will help control the infection temporarily, but the problem recurs after discontinuing the medication. The infection will persist until the source of the infection, the infected pulp, is removed either by extracting the tooth or by root canal therapy. The age of the patient, extent of infection, duration of pulp exposure and importance of the tooth will help decide which treatment is best.

2. Discolored Teeth: Until a recent study published by Dr. Fraser Hale, Dipl. AVDC, in the Journal of Veterinary Dentistry, discolored teeth had been a diagnostic dilemma in veterinary dentistry. Since pulp testers made for humans usually required the recognition and communication of some stimuli to a questionable tooth, they were not very reliable for our patients. Previously, we used dental radiographs and transillumination to help us decide if teeth were vital. By looking at radiographs, we would compare pulp canal width with the corresponding tooth on the opposite side of the arch. If the pulp canal was wider on the affected tooth, then we could conclude this tooth was no longer maturing and was considered non-vital. In some instances, periapical changes might indicate infection/abscess as well. Transillumination is the process of passing a bright light source behind a tooth, like candelling an egg, to check for vitality. A vital tooth will be translucent and a non-vital tooth will have a "shadow" within the tooth. While this test is subjective, it can be used as an aid in questionable teeth. My approach to these cases changed after publication of Dr. Hale's findings. He noted that more than 90% of teeth with discolored crowns actually had non-vital pulps. Non-vital pulps eventually necrose, setting the stage for infection and abscessation. My current recommendation for significantly discolored teeth is either endodontic or exodontic therapy. For those cases where only a small part of the crown is discolored, I still recommend regular

periodic radiographs and evaluation to hopefully diagnose a non-vital tooth before it causes the patient any problems.

3. Unapparent oro-nasal fistulas: Chronic upper respiratory disease can have a number of etiologies: viral, bacterial, neoplastic, fungal, and foreign bodies. One easily overlooked cause is the unapparent oro-nasal fistula (ONF) most commonly seen in the Dachshund, but also common in the Schnauzer, Yorkshire terrier, toy Poodle, and can be seen in any breed. The underlying cause is usually periodontal disease that has developed on the palatal surface of the maxillary canine teeth. As the periodontal disease progresses along the palatal side of the root, the infection destroys the thin alveolar bone separating the root surface with the nasal cavity. The result is an opening from the oral cavity to the nasal cavity that allows food, saliva, and bacteria to enter the nasal cavity. Once established, this chronic infection is exhibited by chronic nasal discharge, sneezing, and halitosis. Surprisingly, the gingiva surrounding these teeth appears normal in many cases. Diagnosis is made by periodontally probing this area. Deep palatal pockets suggest ONF. To confirm the diagnosis, watch for the presence of blood or saline exiting the nares when flushing the pocket with sterile saline. At this time, treatment is limited to extraction of the canine tooth and closure of the oro-nasal defect with wide single layer buccal based mucoperiosteal gingival flap or a double flap ONF repair, depending on the size and chronicity of the defect. If there is simply a deep palatal pocket on the canine tooth, this defect can be repaired using advanced periodontal surgery and Guided Tissue Regeneration to repair/replace the lost bone in the defect. This will help slow, stop or reverse the loss of this tissue and retain the maxillary canine teeth for a longer period.

4. Periodontal Disease: The number one disease in dogs and cats. Basically it is the inflammation or active destruction of the tissues surrounding and supporting the teeth. The degree of periodontal disease can range from mild gingivitis to advanced alveolar bone loss, abscessation, and tooth loss. The diagnosis of periodontal disease depends on clinical signs and objective measurements of periodontal tissue attachment loss by either periodontal probing, dental radiographs or both. Most general practicing veterinarians want to know when a tooth is indicated for extraction, and what to do if the tooth is not yet ready for extraction. As a very general rule of thumb, a tooth should be considered for extraction when the root(s) have lost greater than 50% of alveolar bone attachment to the roots, and/or other means of periodontal therapy are deemed to not likely be successful or the client is not committed to saving the tooth. This is best accomplished with dental x-rays. Dental x-rays give you visible evidence and objective data that will help you determine which teeth should be extracted or if they can be preserved. If there is not sufficient alveolar bone loss to warrant extraction, but periodontal pockets are noted greater than 3mm around the tooth, then periodontal tissue rejuvenation attempts such as closed root planing, subgingival curettage, and placement of perioceutic (i.e. Doxirobe gel) can be very beneficial to regain lost soft tissue attachment, reduce periodontal pocket depth, and create a healthier periodontium.

5. Sub-orbital swellings: This is a common condition seen in small animal practice. In some cases, the swelling is rostral to the orbit, just below the orbit, or in the retro-orbital space. In any of these instances, I think of three common "rule-outs". In my experience the majority of these swellings have been either an abscess, neoplasia, or cyst. Other less commonly seen problems include zygomatic salivary gland adenitis, buccal molar lymphadenopathy, or foreign body infection.

- A. Abscesses: These are usually associated with a tooth root abscess and are typically endodontic in origin, but they can be the result of advanced periodontal disease. There is no age, breed, or sex predilection. Apical abscesses usually respond favorably to antibiotics while on the medication, but then recur once therapy is discontinued. The recurrence of the swelling may be immediate or take months to return. On physical examination, if a broken tooth with pulp exposure or discolored tooth is noted in the region of the swelling, then this is the likely suspect. Definitive diagnosis can usually be obtained with dental x-rays. Once the affected tooth/teeth is/are identified, then treatment options can be discussed with the owner. If the abscess is due to endodontic disease, then the owner has the option of either extraction or root canal therapy. Interestingly, only a small percentage of those broken teeth with pulp exposure actually progress to develop into suborbital swelling with obvious abscessation. The majority of broken teeth with infected pulp seem to smolder as a chronic periapical infection which may go on for years. If the tooth abscess is due to periodontal disease, the tooth has no alternative except extraction. Once the source of the infection is removed, the swelling should slowly resolve.
- B. Neoplasia: Some suborbital swellings are due to the involvement of the caudal maxilla with tumor invasion. Usually these are seen in older animals and tend not to respond to antibiotic therapy. Again, dental x-rays can be very helpful in determining the cause of the swelling and can help show lysis caused by invasive tumors. The dental x-rays will help determine if surgical margins are possible. CT scans are also very helpful in determining the viability of surgery. The final diagnosis usually will require histopathologic examination of the involved tissue, and definitive treatment will depend on tumor type, evidence of metastasis, and the desires and expectations of the owner.
- C. Cysts: While not all that common, cysts can be a cause of swelling in the sub-orbital area. The most common cyst that we see in the oral cavity of dogs and cats is the dentigerous cyst. This is a fluid filled sac that develops around an unerupted tooth. These can occur at any age, but are typically younger animals, between 1-3 years of age. Missing teeth in the area of a swelling might be an indication clinically that a cyst could be the etiology. Dentigerous cysts are more common in the brachycephalic breeds such as the Boxer, Boston Terrier, and Bulldog. The mandibular first premolar is the most commonly involved tooth, but this has been seen in the caudal maxilla and can result in a sub-orbital swelling. Again, dental x-rays will be very helpful in diagnosis, and treatment is aimed at removal of the unerupted tooth and removal of the cyst lining.

6. Oral Tumors: Oral neoplasia accounts for 6% of all tumors in dogs and 10% of all tumors in cats. Of these, 50% are malignant in dogs and 90% are malignant in cats. Many oral masses look alike, whether benign or malignant. The key to successful treatment planning is early detection and histopathologic evaluation of all oral masses. Small lesions may seem insignificant due to their size, but if the mass turns out to be malignant, obtaining adequate surgical margins without major structural loss is much easier with lesions less than 1 cm than those larger. In most cases, complete surgical removal of oral tumors early in the course of disease is the preferred treatment. Dental radiographs can be a valuable diagnostic tool when evaluating oral masses. In general, benign tumors do not typically invade bone, as such, these lesions tend to deflect teeth and alter their position. On the other hand, malignant masses can be invasive into bone, and usually remove bone around tooth roots without displacing teeth. Notation of lymph node size and consistency along with

chest x-rays, abdominal ultrasound, and other diagnostic modalities such as MRI can also be helpful especially when staging oral tumors. Most benign lesions can be removed with surgical margins extending into clinically healthy tissue only. The exception to this rule is the acanthomatous epulis (aka acanthomatous ameloblastoma, central odontogenic fibroma, adamantinoma). These tumors are technically benign because they have never been shown to have metastatic potential, but they can invade into the local alveolar bone. These lesions involve the periodontal ligament of an affected tooth and successful treatment depends on removal of 0.5cm margins around the tooth/root involved, which usually results in the removal of the teeth on either side of the affected tooth. Malignant tumors require typically 1-2cm surgical margins into clinically and radiographically healthy tissue. Regional lymph node aspirate prior to surgery or lymph node excision is also advocated. Consultation with an oncologist with any malignancy is also recommended to consider all treatment options. Note: If an extraction site is slow to heal or not healing as expected, biopsy is certainly warranted as many of these end up being neoplastic in my experience.

7. Resorptive lesions in cats: Although these can be seen in the dog, they are much more prevalent in the cat population. Most studies agree that on average, about 50% of domestic cats have at least one resorptive lesion. Several theories have been proposed for the cause of these lesions, but to date, none has been proven. We do believe the incidence has increased over the past 100 years. Unless caught early, most of the teeth affected by resorptive lesions are best extracted. Very early lesions may benefit from glass ionomer restoration, but in most cases, the restorations are lost and the lesion progresses within 18 months. Dental radiographs are essential for proper treatment planning. In general, when extracting teeth with resorptive lesions, it is always best to remove the entire tooth root, but in cases where the roots are resorbing, no evidence of periapical or periodontal disease exists, stomatitis is not present, and in the event a root fractures, this root should continue the resorption process if left as is and the gingiva sutured over the extraction site.

8. Feline Stomatitis: One of the most frustrating and challenging diseases veterinarians see in felines is Lymphocytic Plasmacytic Stomatitis (LPS). Clinical signs may include gingivitis, faucitis, pharyngitis, or palatitis. These lesions are usually chronic and non-responsive to standard medical therapy. The exact etiology is still unknown, but the result appears to be an over-reaction to the plaque and the tooth structure itself. Diagnosis is primarily made by history and clinical signs. Biopsy samples of the gingiva support the diagnosis, but typically, any chronic gingivitis will have lymphocytes and plasmacytes present. It is important to test these patients for FELV and FIV since that may alter the way it is treated and therefore alter the prognosis. There have been numerous medical therapies aimed at the immune system attempted in the past including gold salts, cyclosporin topical, and lactoferrin, with mixed reviews. The mainstay of medical therapy has been corticosteroids and antibiotic therapy to reduce the plaque bacteria and decrease the inflammatory reaction. This approach usually helps initially, but the effectiveness tends to fade over time. In a study published in the Journal of Veterinary Dentistry, Dr. Phillippe Hennes found 60% of cats with stomatitis significantly improved with either caudal or full mouth extraction and an additional 20% improved some. It is important to remove the tooth and all root remnants when performing these extractions. Dental radiographs are nearly essential to evaluate and document complete extractions. Recent studies have focused on the possible role of Bartonella and its association with LPS. There is a test available for Bartonella available through AnTech or National Veterinary Labs. If positive, the current treatment recommendation for Bartonella is Azithromycin, 10mg/Kg daily for 21 days.

9. Stomatitis in Dogs: (Chronic Ulcerative Parodontal Stomatitis) Similar to cats, dogs too can have stomatitis. In dogs, the underlying etiology seems to be related to a severe reaction to plaque on the teeth surfaces. The hallmark clinical sign in these cases is “kissing” ulcers of the buccal mucosa over the teeth covered with a soft creamy plaque. There is usually severe halitosis, ulcerations on the lateral margins of the tongue, and extreme sensitivity within the oral cavity. Some dogs will stop eating, but most continue reluctantly. Histopathology of the oral ulcerations usually results in chronic active inflammation with mucosal ulceration. Early in the course of disease, cleaning the teeth can be beneficial if the owners can brush the teeth. This is usually difficult because the pets are sensitive around their mouths and as plaque accumulates, the ulcers tend to return within 4-6 weeks. Adjunctive modalities include adding antiseptics to the drinking water (Oxyfresh-www.oxyfresh.com or Breathalyzer), pulse antibiotic therapy, oral chlorhexidine rinses, Maxigard gel, or barrier sealants such as OraVet-Meriel, can help slow/reduce plaque accumulation. Over time, the effectiveness of these efforts tend to diminish and more aggressive therapy is needed. In advancing cases, removal of the source of plaque accumulation, i.e. the teeth, usually results in resolution of the oral ulcerations. Although there are no studies to show response to extraction therapy, my experience has been that these are more responsive than cats and significant relief can be obtained from partial or full mouth dental extractions.

10. Missing/unerupted teeth: During embryonic development, the developing tooth is surrounded by a structure called the dental sac. If the tooth does not erupt, these teeth have the potential to become cystic. The most common cyst that we see in the oral cavity of dogs and cats is the dentigerous cyst. This is a fluid filled sac that develops around an unerupted tooth. These can occur at any age, but are typically younger animals, between 1-3 years of age. Missing teeth in the area of a swelling might be an indication clinically that a cyst could be the etiology. Dentigerous cysts are more common in the brachycephalic breeds such as the Boxer, Boston Terrier, and Bulldog. The mandibular first premolar is the most commonly involved tooth, but this has been seen in the caudal maxilla and can result in a sub-orbital swelling. Again, dental x-rays will be very helpful in diagnosis, and treatment is aimed at removal of the unerupted tooth and removal of the cyst lining.