Benign Oral Tumors in Dogs: Diagnosis and Treatment

R. Michael Peak, DVM, Dipl. AVDC

The Pet Dentist at Tampa Bay

www.thepetdentist.com
Email: thepetdentist@gmail.com

Objectives I'd Like You to Get

Clinical clues to benign vs. malignant oral tumors
Decisions on how to get biopsies
Review of management of some benign oral tumors

Name that Tumor!!
Peripheral odontogenic fibroma vs. Acanthomatous ameloblastoma
Malignant melanoma vs. Squamous cell carcinoma vs. Fibrosarcoma vs. Osteosarcoma
I have no flipping idea!!!

Benign or Malignant?

Benign

Characteristics of Tumors

Benign:
Pedunculated
Well defined
Displace teeth
Typically don't invade bone (exceptions: acanthomatous ameloblastoma, plasmacytoma) Slow steady growth
Well differentiated histologically

Malignant:
Expanding within tissues, irregular, some ulcerated, invade bone around teeth, mobile teeth, +/- osteolysis, variable growth rate, most are poorly differentiated (Exception is the Hi/Low fibrosarcoma)

How Do We Figure It Out?

Diagnostics
Radiographs: Dental radiographs preferred +/- CT or Cone Beam CT
BIOPSY!
Incisional: Probably best if it appears malignant
Excisional: May be appropriate if it appears to have more benign characteristics Additionally: FNA of regional lymph nodes, chest radiographs if it appears malignant

Biopsy

Location — centrally located

Amount — 5-10mm cube or wedge

If incisional, consider future surgical margins

Amount — 5-10mm cube or wedge If incisional, consider future surgical margins Don't introduce tumor cells into normal tissue planes Method: scalpel blade, cautery, punch Depth: soft tissue only vs. deeper into bone Closure Excisional vs. Incisional **Biopsy: Excisional vs. Incisional** Characteristics: Benign or Malignant? Owner preferences: One and done? If excisional, consider anatomy and tissue surrounding mass (surgical margins) Amount of attached gingiva that will remain around remaining teeth If less than 2mm attached gingiva surrounding, then consider extraction If unsure, incisional biopsy is never wrong... **Once you get your results** Benign Clean margins, likely no further tx needed Unclean margins, +/- further sx. or monitor
Malignant

Depending on type, local extent and any evidence of metastisis: +/- surgery +/-radiation +/- chemotherapy

Malignant
Depending on type, local extent and any evidence of metastisis: +/- surgery +/-radiation +/- chemotherapy

Surgical recommendations

Benign
2-3mm margins (couple of exceptions) Less aggressive tissue removal
Radiographs +/− CT/MRI

Malignant
Minimum 1-2.5cm tumor free margins in all dimensions (depending on type) Radiographs/CBCT/CT/MRI +/- contrast
Lymph node FNA/biopsy/removal

Common Benign Canine Oral Tumors
Focal Fibrous Hyperplasia Peripheral odontogenic fibroma Acanthomatous ameloblastoma Sublingual granuloma Odontoma Plasmacytoma

Focal Fibrous Hyperplasia
aka “gingival Hyperplasia”
Benign overgrowth of the gingiva
Common in certain breeds: Boxer, Bulldog, etc.
Can be caused by certain medications: Cyclosporin, Amlodipine, Phenytoin, hormones (pregnancy induced gingival overgrowth)
Can be caused by gingival irritation
Excision is usually curative, may recur

Gingival Hyperplasia (GH)
A benign overgrowth of the gingival tissue
May be associated with periodontal disease,chronic irritation, medications, or genetic predisposition (Boxers)

Gingivectomy/Gingivoplasty (GV/GP)
Surgical removal of the excess gingival tissue to a normal level and contouring the gingiva BIOPSY!!!

Peripheral odontogenic fibroma
Previously called “Fibromatous epulis”
Some ossify internally: “Ossifying epulis”
Treatment involves excision with minimal margins
Removal of involved tooth may be necessary
Recent eveidence suggests removal to or including osseous crystal bone may be curative May recur

Acanthomatous ameloblastoma
Canine Acanthomatous Ameloblastoma (CAA)
Also called: acanthomatous epulis, adamantinoma, central/peripheral ameloblastoma Technically benign: has not been shown to metastasize, BUT locally invasive Originates from periodontal ligament tissue
Breed: Gold. Ret., Akita, Cocker Spaniel, Shetland sheepdog

Acanthomatous ameloblastoma
Most common location= rostral mandible Most common tooth involved = canine Second most common location = mand M1 Treatment options:
Surgery: 0.5-1.0cm margins of clinically and radiographically normal tissue

Radiation

Chemotherapy: Intralesional Bleomycin

Radiation

Chemotherapy: Intralesional Bleomycin

Marginal Mandibulectomy for CAA

aka "Rim Excision"
Walker, KS, Reiter, AM, Lewis, JR, "Marginal Mandibulectomy in the Dog", J Vet Dent, Vol. 26, No. 3, Fall 2009, pp. 194-198.
Murray, RL, Aitken ML, and Gottfried, SD, "The use of rim excision as a treatment for canine acanthomatous ameloblastoma", J Am Anim Hosp Assoc., Mar-Apr2010 Mar-Apr;46(2):91-6.

Sublingual granuloma

aka "Gum chewer's lesion"
Excessive sublingual mucosa
Typically bilateral, +/- ulceration
Usually small breed dogs
Excision is usually curative, but may recur with time Avoid sublingual salivary ducts if possible

Odontoma

Benign oral tumor of dental (actual tooth) origin Two types:

Compound: multiple tooth-like particles contained within a capsule
Complex: amorphous thick material contained within a capsule

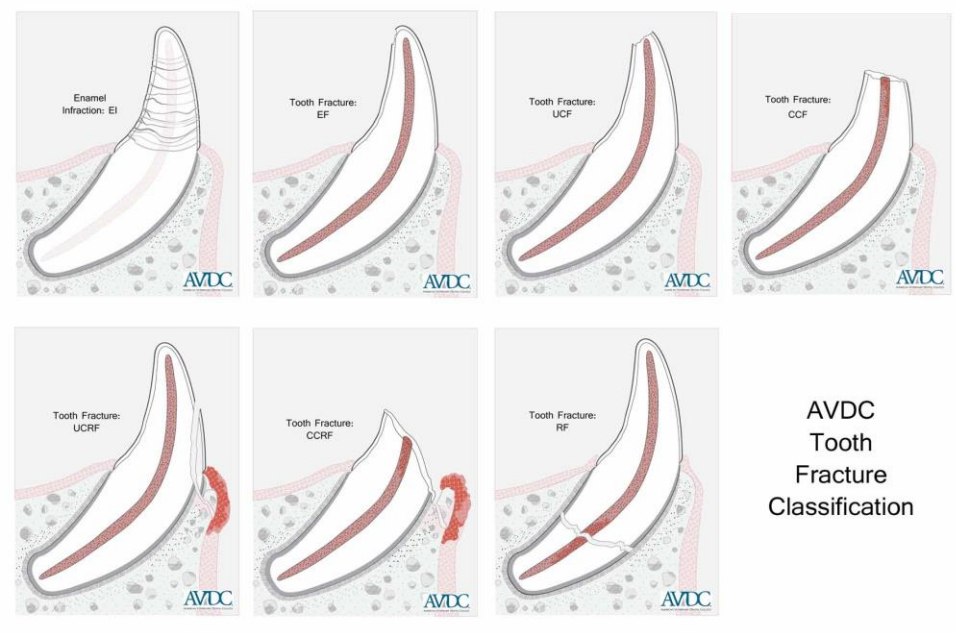
Plasmacytoma: 1cm margins

Dealing With the Damaged Tooth: From Chips to Avulsions

Michael Peak, DVM, DAVDC
The Pet Dentist at Tampa Bay, Wesley Chapel and Clearwater, FL **813-406-4800**
www.thepetdentist.com

Teeth take a brunt of force in normal activities such as playing, working, and even in normal mastication. Due to their relative inelasticity, in many cases, the tooth ends up fractured or otherwise traumatized. The extent of the fracture can vary in every instance ,and from a clinical standpoint, may be as minor as not needing any treatment to needing endodontic therapy or extraction. The American Veterinary Dental College Nomenclature Committee has created examples of each type of fracture and listed examples on their website for all to use. These examples can be found at: www.avdc.org

Tooth Fracture Classifications:



AVDC Tooth Fracture Classification

Teeth are usually strong, but in cases of trauma or developmental defects, lesions can occur. Important clinical considerations include the source of trauma/wear, amount of remaining crown/tooth structure, overall health of the tooth, importance of tooth for function or esthetics, and likelihood of trauma to continue. We will investigate a clinically based review of dental lesions including:

- Worn Teeth
- Uncomplicated Crown Fractures
- Uncomplicated Crown/Root Fractures
- Complicated Crown Fractures
- Root Fractures
- Carious Lesions
- Enamel Hypoplasia
- Discolored Crowns

• Sub-luxated, Luxated or Avulsed Teeth

1. Worn Teeth: Due to aggressive chewing or abrasive materials, wear of the teeth may occur. Technically speaking, attrition is the normal wearing of the cusps or occlusal surfaces of teeth during mastication. Abrasion is the abnormal wear of teeth when chewing on objects not intended for ingestion. Either condition may result in loss of tooth structure and are treated similarly. Clinically what is important is whether the pulp canal has been exposed or is near enough to exposure to allow bacterial contamination into the endodontic canal. Dental radiographs with comparison of the same contralateral tooth may be helpful along with transillumination and careful exploration of the fracture surface for pulp exposure can assist in trying to determine if the pulp is indeed still vital. Worn teeth without pulp exposure where there is no radiographic evidence there is pulp necrosis and that transilluminate normally may be vital, but these teeth need to be re-evaluated radiographically periodically.
The tooth itself is comprised of three major components: pulp, dentin, and enamel. The pulp is the innermost layer of the tooth and is made up of vessels and nerves that provide nutrition and sensation to the tooth. The major cell type found is the fibroblast, but the cell of notoriety is the odontoblast. The odontoblast's function is to make dentin and continues to do so throughout the life of the tooth. As such, the pulp cavity starts out very wide in an immature tooth and as the tooth, and patient, mature, the pulp canal becomes more narrow and the dentin around the pulp thickens. The part of the pulp cavity within the crown of the tooth is called the pulp chamber and the part of the pulp cavity within the root is called the root canal. It is important to note that the nerve fibers within the pulp only detect one sensation...pain. There are two types of pain receptors in the pulp, one for sharp acute pain and one for dull throbbing pain. Clinically this becomes very important in a tooth that has had a pulp exposure! The dentin is the middle layer of the tooth and may be thin or thick, depending on the age of the tooth/patient. Dentin is mostly inorganic in matrix, and has small tubules normally that contain fluid and at the interface with the pulp allow odontoblastic processes to reach into these tubules. Anything that causes an abnormal movement of fluid contained within the tubules either in or out will result in sensitivity in a vital tooth. Near pulp exposures can be sensitive and theoretically could allow for bacterial penetration through the dentin to the pulp. Clinically this is important especially in younger patients where the pulp is closer to the outer edges of the tooth. These tubules can be sealed with a dentin bonding agent to help prevent/reduce sensitivity. The dentin extends to the root surface and is covered by a cellular layer called cementum. The outermost extent of dentin within the crown of the tooth meets the enamel which is the outermost covering of the tooth normally exposed through the gingiva. Enamel is 97% inorganic and is the hardest substance in the body. As such, it is also fairly brittle, like porcelain and does not have the capacity to regenerate itself. In contrast, if the enamel/dentin or root surface are damaged, resulting in sensitivity or irritation to the underlying pulp, the odontoblasts have the capacity to lay down more dentin in response to the irritation if such irritation does not result in the overall death of the pulp. This dentin laid down in response to irritation is also known as reparative dentin. This type of dentin can be seen in teeth that have had slow progressive wear. The result is a dark stained center with no observable pulp exposure. Clinically, if these teeth have no pulp exposure, and are radiographically normal, then dentin bonding may help reduce the irritation to the pulp, and if the source of wear can be removed, then these teeth may continue to remain vital. Follow-up radiographs and visual evaluation are recommended in 6-12 months following treatment.

The pulp has a defense system to help prevent or alleviate irritation. As wear encroaches on the pulp, the odontoblasts are stimulated to produce tertiary dentin, an irregularly placed dentin to help increase dentin wall thickness at the site of irritation. In cases where the wear is at the cusp tip, the pulp actually recedes away from the wear leaving tertiary dentin. This type of

dentin accumulates stain and may appear brown. Worn teeth in some cases clinically have a smooth surface with a dark stain. Careful exploration should reveal if the pulp canal has been entered. If so, then either extraction or root canal therapy is indicated. If not, then dental radiography/evaluation and either root canal therapy/extraction if the tooth appears non-vital or dentin bonding or crown placement for protection if is appears vital.

2. Uncomplicated crown fractures: For crown fractures that do not involve the pulp or root structure, there may be several options based on the extent of the tooth damage. For enamel infractions, generally these are of no clinical significance and no treatment is needed, however, dental radiographs and transillumination with comparison of the same tooth in the opposite side of the arcade can be helpful to determine if the tooth is vital. For enamel fractures, without invasion into the dentin, smoothing with an arkansas white stone, etching, placement of a bonding agent and composite veneer restoration will help return the surface smoothness of the enamel and help prevent plaque and calculus deposition. For uncomplicated crown fractures, these are likely to be sensitive due to the exposure of the dentin. Treatment involves, cleaning and smoothing any rough enamel edges, evaluating radiographically and clinically to be certain the pulp is not exposed, non-fluoride pumice polishing, acid etching, and at least application of a dentin bonding agent. This should seal any exposed dentinal tubules and prevent/reduce sensitivity. To further improve on the clinical scenario, a composite veneer restoration again will help return the surface smoothness of the tooth to help reduce plaque and calculus deposition. If the fracture involves a cusp, the composite veneer restoration need not go over the cusp as it can be easily refractured. If this type lesion extends very near to the pulp, as evidenced by a pink hue or “blush” seen clinically within the dentin, a protective layer of cement, such as calcium hydroxide cement (DyCal-Dentsply, Inc.) just over the area of near exposure to provide protection to the underlying pulp and then the restoration is placed over this material. Deeper lesions into the pulp require endodontic therapy or extraction.

The materials used for restorations include: non-fluoride pumice, 37% phosphoric acid etch, a bonding agent, and possibly glass ionomer, composite, amalgam, metal crowns, or other restorative material. The non-fluoride pumice is used to help clean the surface of the tooth without adding waxes or fluoride which may inhibit the overall bonding of materials to the tooth. The 37% phosphoric acid is used in most cases to etch the enamel prisms of the enamel and open the dentinal tubules to allow micromechanical attachment of the bonding agent to a hybrid layer of collagen and water within the dentinal tubules. This bonding of the hybrid collagen layer greatly enhances the bonding. Over the years, bonding agents have improved on their bond strengths, ease of use, or time required to place and set and each new upgrade is called a new generation. Within the last ten years, bonding agents have improved from the 4th generation bonding agents which required a dentin conditioner layer and two separate liquids mixed together and then applied to an acid etched surface of the tooth, to 5th generation bonding agents which did not require the dentin conditioner and many were premixed in one bottle which was applied to an acid etched tooth surface, and now 6th generation bonding agents which have the acid etch within one package that is applied with the bonding agent and allowed to dry. Some bonding agents are light cured, or harden in response to a specific wavelength of light and some are chemically cured by mixing two materials together. Dual cure bonding agents have the ability of both, the chemical cure or light cure which allows for faster setting when a light is used plus a complete cure if there are areas not reached by the light. The bonding agent is sometimes referred to as an “unfilled resin”. In contrast, “filled resins” also known as composites are basically the bonding agent that has been filled with particles of glass, plastic, or fibers that impart some special characteristic such as color, added resistance to wear, or resistance to fracture. Composites also are categorized based on their viscosity with some being relatively liquid called flowable composites and others that are fairly firm called

compactible composites. Some have large filler particles called “macro filled” composites which make them more wear resistant and others have small particles called “microfilled” composites which are easier to polish. A combination of small filler particles with large particles made to give wear resistance while giving a smooth polishable surface are called “hybrid” composites. All of these can be colored with different shades in order to match as close as possible the tooth being restored. Glass ionomers are cements made of glass particles that actually create a weak ionic bond to the dentin surface. These are good for sealing the tooth for instance between the vital pulp and final composite restorations in vital pulpotomy procedures and underneath final fillings of complete pulpectomy and standard root canal procedures. These were once used extensively for fillings in resorptive lesions in cats, because they also have the added advantage of releasing small amounts of fluoride, but as was later discovered, many of these fillings failed due to continued resorption of the tooth by odontoclasts. Amalgam was once the mainstay of all cavity fillings. A mixture of silver mercury, and tin, this material had the advantages of being moldable into cavity defects and was very hard once set in place, especially good for the occlusal surface of teeth. The disadvantages include it’s relative technique sensitive nature, it’s inability to directly bond to the tooth (although there are now amalgam bonding agents available), the fact that it releases tiny amounts of mercury, and if placed in the presence of moisture expansion during the setting which could result in further damage such as splitting of the crown.

There are many clinical instances where dentin bonding agents and composite restoration may be indicated. Worn teeth with near pulp exposures, enamel chip fractures, enamel developmental defects, carious lesions, early resorptive lesions, cosmetic restorations, and endodontic access locations all are indications where restorations may be needed. As such, a basic understanding of the importance exposed dentin and the benefits of sealing a damaged tooth along with the knowledge of what restorations can to to help these damaged teeth, will help the practitioner, patient, and client make better decisions regarding the overall dental health.

STEPS TO RESTORATION OF A TOOTH:

1. Evaluate the fractured surface and radiograph
2. Smooth any rough edges of enamel and any dentinal irregularities with an Arkansas White Stone in a highspeed handpiece or other polishing discs
3. Rinse well with water and air dry
4. Apply 37% phosphoric acid etch to enamel edges for 30 seconds and dentin for 10 seconds
5. Rinse well and air dry lightly
6. Mix/apply the bonding agent of choice according to manufacturers recommendations to the prepared tooth surface
7. Lightly air dry
8. Light cure if necessary for the recommended time by the manufacturer of the bonding agent (typically 10-30 seconds)
9. Repeat the bonding for 2 more layers (do not etch, only reapply the bonding agent, dry and cure)
10. If desired, apply composite in 2mm increments and light cure for recommended times
11. Polish with coarse, medium, fine, and superfine grit polishing discs to get a smooth restoration surface and recontour to replace the missing desired tooth anatomy
12. Place a final layer of bonding agent over the composite restoration, lightly air dry, and light cure for the recommended amount of time to seal any micro cracks that could have developed at the time of composite curing.

*These steps are intended as recommendations and are not hard and fast roles for every scenario and every type of dental restorative material. Please refer to your material's recommended instructions for more specific information.

3. Uncomplicated (or Complicated) crown-root fractures: Some fractures of the crown, while they don't involve the pulp, may extend subgingivally along the root. It is hard to find references with hard and fast rules to relegate treatment decisions, basically, the practitioner needs to use his/her clinical judgement to decide if the overall periodontal health of the tooth has been jeopardized. If the fracture extends below the gingival margin, the extent must be explored. In some cases, gingival flap surgery will be indicated to fully evaluate the extent of the fracture. If the fracture extends further apical than the mucogingival line beneath the gingiva, then either the attached gingiva may need to be repositioned more apically, recontouring the alveolar bone to allow for normal biologic attachment of the gingiva in it's new location, or if in an area that this cannot be performed and there will remain periodontal pocketing alongside the treated tooth, then the owner should be made aware that this tooth may develop periodontal disease and could be a source of chronic infection in the future and may be indicated for extraction due to this problem later. Some clients are willing to take that risk in an effort to save the tooth, while others may opt for extraction.

4. Complicated Crown Fracture: If the pulp canal is involved, or if there are signs of pulp necrosis, then endodontic or exodontic therapy is indicated. If the tooth has been fractured less than 48 hours, a partial coronal pulpectomy and vital pulp therapy (vital pulpotomy) is an option. Based on human studies, the success rate of this procedure is approximately 85%, which means the tooth stays vital. Most veterinary dentists are performing this treatment less and less, especially if the tooth is a mature tooth since total pulpectomy and standard root canal therapy seems to have a higher success rate. If the tooth has an open apex or a very wide pulp canal, then vital pulp therapy may allow the tooth to mature more to a level where standard root canal therapy is easier and would carry a higher success rate. If the tooth is an immature tooth with an open apex and is older than 48 hours, then consideration should be given for apexification (removing the pulp contents and replacing with either calcium hydroxide paste or mineral trioxide aggregate-MTA) to give the body a chance to fill in around the apex of the tooth wit firm osteoid creating a root terminus for eventual standard root canal therapy with MTA at the apex. Most "complicated" crown fractures involve mature teeth and most are greater than 48 hours old, leaving the two basic options of either standard root canal therapy if the tooth is periodontally sound and if the roots are not undergoing inflammatory root resorption or extraction.

5. Root fractures: It is possible for the root to fracture without traumatizing the crown. As a very simplistic rule, the closer the root fracture is to the apex and the more stable the coronal segment is, then the better the prognosis. If the tooth is vital and the coronal segment is stable, then no treatment may be needed. If the crown is not stable and the tooth is or was recently vital, regardless of where the root fracture is, then stabilizing the tooth with an interdental splint is indicated. In some cases, osteoid can fill in the fracture site, stabilizing the tooth and maintaining the tooth as a vital tooth. If the tooth is or becomes non-vital there are a number of possible procedures to maintain the tooth, but the prognosis decreases. Options for non-vital teeth with root fractures include:
Standard root canal procedure on both the coronal and apical segment
Root canal therapy for the coronal segment and no treatment for the apical segment
Coronal segment apexification followed by standard root canal therapy of the coronal segment with no treatment of the apical segment

Intraradicular splint with root canal therapy and a post placed into both the coronal and apical segment
endodontic implant in which the apical part of the implant replaces the surgically removed apical segment of root
removal of the coronal segment and root extrusion followed by root canal therapy of the remaining root segment and post/core build-up for restoration
From: Principles and Practice of Endodontics by Walton & Torebinejad, Saunders, 2002

6. Carious lesions: True carious lesions (sometimes called "cavities") are not as common in dogs and cats as they are in humans. It is theorized this is due to difference in shape of the crown, material ingested, natural oral flora bacteria and pH of the saliva among other things. True carious lesions are caused by certain bacteria (Steptococcus mutans is the primary culprit in humans) that digest carbohydrates (CHOs) and produce an acid that demineralizes the enamel such that the destruction can continue into the dentin and possibly the pulp. For this reason, small enamel carious lesions may be larger than expected once the diseased enamel is removed and the full extent of dentin destruction is realized. The occlusal surfaces of the molar teeth are the most common location, but these can occur in the developmental grooves of premolar teeth, interproximal areas between teeth, and along the root surfaces. Treatment involves removal of the diseased or demineralized tooth structure and replacing it with a restorative material. See the information listed above for placement of a composite restoration.

7. Enamel hypoplasia: Disruption of ameloblasts during the development of the tooth can result in a loss of enamel or a defect in the mineralization of the enamel (hypomineralization). Enamel hypoplasia is a focal or generalized complete loss of enamel structure revealing the underlying dentin. Enamel hypomineralization is a focal or generalized lack of hard enamel structure clinically seen as a soft, rough irregular surface of enamel that can be scaled away easily with an ultrasonic scaler. The end result of either process is a loss of the protective non-porous layer of smooth enamel over the tooth's crown. The exposure of dentin can allow for dentin sensitivity. See the discussion in item #1 above for "Worn Teeth". Another important clinical consideration is that when the enamel is formed by the ameloblasts, the roots are also being formed by another epithelial tissue, Hertwig's epithelial root sheath which acts as a template for root formation. Some epitheliotrophic viruses not only disrupt the enamel formation, but also the root formation. The clinical result is shortened, blunted roots. Full mouth dental radiographs are indicated in these cases to help detect root hypoplasia. Even if root hypoplasia is found, there is no known treatment to stimulate the root to form, as this is only informational such that the owner should be warned a small amount of periodontal disease or less than normal crown stresses may dislodge normal appearing teeth pre-maturely. Treatment of these teeth is aimed at preventing dentin sensitivity and creating a plaque retardant surface to re-create the lost enamel. Treatment involves anesthesia, full mouth dental x-rays, thorough cleaning of the teeth, non-fluoride pumice polishing, acid etching, dentin bonding and composite restoration of all teeth or select teeth depending on the wishes of the client.

8. Discolored Teeth: Until a relatively 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.

9. Sub-luxated, Luxated, or Avulsed Teeth: These are teeth that have been dislodged from their alveolar socket to varying degrees. A sub-luxated tooth is one that has had trauma to create tooth mobility but has not been displaced out of the alveolar socket. This tooth should be stabilized if necessary with an interdental splint and monitored periodically (every 6 months) for vitality or any signs the tooth is not vital, then further treatment is indicated. A luxated tooth is one that has been within but not completely out of the alveolar socket. These teeth should either be extracted or treated by replantation and endodontic therapy. Replantation involves sterile saline gentle flushing of any clot or debris out of the alveolus, and replacement of the tooth into the alveolus. Any torn soft tissue should be securely sutured and the tooth stabilized with a semi-rigid interdental splint. Since the apical neurovascular bundle was likely disrupted at the time of the trauma this tooth should have standard or retrograde endodontic therapy. An avulsed tooth is one that has been completely displaced out of it's alveolar socket. The neurovascular bundle is definitely damaged and this tooth, if it is to be saved, should be replanted as soon as reasonably and safely possible for the patient. In any case, if the tooth is completely avulsed out of the mouth, it should be immediately placed in either Hank's balanced salt solution (HBSS) or in whole milk in a plastic bag until replantation. HBSS can be found at many pharmacies. The tooth should be gently rinsed with sterile saline and the protocol is followed as above for luxated teeth. An alternative to this is to perform standard root canal therapy on the avulsed tooth prior to replantation, but this should be done with gentle care, holding the root with saline soaked gauze. The goal is to not disrupt any viable periodontal ligament/cementum left on the root surface. Eventual external replacement root resorption is a possible consequence of tooth replantation. Some studies have recommended the use of calcium hydroxide as either an intermediate obturation or use of a calcium hydroxide endodontic sealer cement in the obturation process (CRCS-Hygenic/Coltene Whaledent)

Interesting Cases We've Seen Lately

R. Michael Peak, DVM, DAVDC
The Pet Dentist at Tampa Bay
813-406-4800

1. Congenital Hypothyroidism In Young Cats

Clinical Signs: Smaller than normal
Brachycephalic head conformation
VERY soft hair coat
Constipation
Short legs
Delayed permanent teeth eruption with persistent deciduous teeth
Gingival overgrowth
Some have mental dullness, may have seizures
Some develop renal insufficiency

DIAGNOSIS: Send in T4, free T4, and TSH. Expect low T4/fT4 and elevated TSH

Treatment: Levothyroxin 0.05-0.1mg daily, recheck T4 in 4 weeks

***May need uncovering of unerupted permanent teeth to allow for full eruption
Head conformation and skeletal abnormalities usually correct

Ref: Bates, J., "Medical Management of Dental Abnormalities Related to Congenital Hypothyroidism in a Cat." J Vet Dent. 2023 Sep;40(3):250-257.

Jacobson T, Rochette J., "Congenital Feline Hypothyroidism With Partially Erupted Adult Dentition in a 10-Month-Old Male Neutered Domestic Shorthair Cat: A Case Report." J Vet Dent. 2018 Sep;35(3):178-186.

2. Dentino-Skeletal Retinal Dysplasia (DSRA) In Cane Corso

Clinical Signs: Abnormal permanent teeth: Generalized enamel hypoplasia
opalescent appearance of teeth
crown fractures
Dental radiographs: delayed dentin deposition
Endodontic disease
Dental Histopathology consistent with Dentinogenesis Imperfecta
Skeletal malformations: curved long bones
Consistent with osteogenesis imperfect
Retinal malformations: Progressive retinal degeneration with vision loss

CAUSE: Defect in the Melanoma Inhibitory Activity (MIA3)_ gene that codes for production of the TANGO1 protein.

DIAGNOSIS: Commercially available tests are available

TREATMENT: Extract any teeth with evidence of Endodontics infection +/- dentin bonding areas with missing enamel.

Genetic counseling with owners: Recommend neutering affected individuals and those that test positive for the genetic defect/

Ref: Brown AT, Peak RM, Smithson CW, Bell C., "Dental Abnormalities in Two Dental-Skeletal-Retinal Anomaly-Positive Cane Corso Dogs: A Case Series." J Vet Dent. 2023 Dec. Online pub.

3. Closed Mouth Jaw Locking in a Dog

Clinical Signs: Progressive inability to open the mouth
Weight loss
Atrophy of the muscles of mastication
May have history of head trauma

Differential Diagnoses: TMJ Ankylosis (intra-articular ankylosis)
TMJ Pseudo-ankylosis (extra-articular ankylosis)
Masticatory Muscle Myositis
Neoplasia restricting the TMJ
Increased ossification of the external ear canal
Cranio-mandibular Osteopathy (CMO)
differentiate from retrobulbar/tooth root abscess

DIAGNOSIS: Usually see abnormal osseous formation in or around TMJ with radiographs, CT, or CBCT

TREATMENT: Surgery if due to ankylosis

4. Closed Mouth Jaw Locking in a Cat

Same as above

5. Open Mouth Jaw Locking in a Dog

Clinical Signs: Mouth locked wide open and pet is unable to close

Differential Diagnoses: TMJ luxation, periodontal disease with displacement of canine tooth

DIAGNOSIS: Radiography, CT, CBCT

CAUSE: The lateral displacement of the coronoid process such that it becomes trapped beneath and lateral to the zygomatic arch

Treatment: Surgical exposure of the locating side, removal of the dorsal portion of the coronoid process +/- removal of ventral portion of the zygomatic arch

6. Rostral Mandibular Swellings (2 cases)

Clinical Signs: Swelling noted between the roots of then mandibular canine teeth

Differential Diagnoses: Periapical abscess of mandibular incisor(s)
Dental related cyst (radicular cyst)
Neoplasia: benign or malignant

Treatment: Depends on etiology: extraction of any diseased teeth, surgical debridement of cyst, surgery to remove any neoplasia with appropriate margins

7. Mandibular Molar Malformation in a Dog

Clinical Signs: None in many cases
Draining tracts through gingiva/mucosa
Small infolding of enamel right at the furcational area

DIAGNOSIS: Dental radiography or CBCT

Treatment: Surgical extraction of affected tooth

Unusual Feline Dental Cases

R. Michael Peak, DVM, DAVDC
The Pet Dentist at Tampa Bay
813-406-4800

1. Cusp Tip Fractures of Maxillary Canine Teeth:

When cat jumps from high level onto slippery surface
Very easily overlooked, many result in pulp exposure, pulp necrosis, abscess
If pulp is exposed then treatment = extraction or root canal therapy
Maxillary canine tooth provides support to the upper lip
Surgical extraction of the maxillary canine may result in upper lip entrapment
Root canal procedure (if possible and/or practical) may be preferred

2. Upper lip entrapment

Uncommon sequelae following extraction of maxillary canine tooth
May result in upper lip trauma, mild to severe
May show behavioral changes: hiding, annoyed, increased “mouthy movements”
If this persists, then consider addressing the mandibular canine tooth
Either extraction or crown reduction of mandibular canine tooth

3. Pyogenic Granuloma secondary to Traumatic Occlusion

Inflamed soft tissue lesion adjacent to mandibular1st molar
Secondary to occlusion of medial cusp tip of occluding maxillary 4th premolar
May be confused with SCC clinically
Common after extraction of mandibular 1st molar tooth (but not always)
Usually don’t have overt “pus” associated with them
Clinical signs range from none to overt pain
Treatment= either contouring cusp tip of PM4 (25% recurrence) to extraction
Histopathology is very important to rule out other etiologies

Ref: Riehl, J., Bell, C. M., Constantaras, M. E., Snyder, C. J., Charlier, C. J., & Soukup, J. W. (2014). Clinicopathologic Characterization of Oral Pyogenic Granuloma in 8 Cats. Journal of Veterinary Dentistry, 31(2), 80-86.

4. Patellar Fracture and Dental Anomalie Syndrome

Previously called: “Feline Teeth and Knees Syndrome”
Usually present with mandibular bone swelling
Younger cats typically
Retained deciduous teeth and unerupted permanent teeth is common
May have associated osteomyelitis
Treatment: Only in areas of osteomyelitis, extract decid/perm teeth + debride/close

Ref: Bell, CM.,Edstrom, E., Shope, B., Carmichael, D., Buelow, M., Bailey, SJ., and Langley-Hobbs, SJ., "Characterization of Oral Pathology in Cats Affected by Patellar Fracture and Dental Anomaly Syndrome (PADS)", J of Vet Dent. 2023, Vol. 40(4), pp. 284-287.

5. TMJ luxation vs. Caudal Mandibular Fracture

	CAUDAL MAND FX	TMJ LUXATION
Deviation of the mandible	Toward the lesion	Away from the lesion
Instability	Significant with fracture	Not easily palpated
Radiographic signs	TMJ condyles in fossa	One or both condyles out
Treatment	Reduce fracture, maintain occlusion	Replace luxated condyle

6. Osteoma in Cats

These are usually very firm, slow growing
Non-painful swellings commonly found in the vertical ramus of the mandible
Radiographically these appear as well circumscribed osseous density masses
Excision is usually curative, and minimal margins are usually all that is needed
These can recur if not completely excised.
Depending on size and location, these may interfere with opening of the mouth.

7. Bone Cysts

Uncommon in cats, less than in dogs
Soft fluctuant swelling within the bone
Radiographs show multi lobular appearance with smooth margins
Aspirated fluid is straw colored, brown, or serosanguinous
Treatment is open debridement
Submit sample for histopathology