Common Oral Pathology in the Dog

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"Dental disease" is commonly referenced in the literature as affecting up to 80% of dogs over three years of age. While periodontal disease is the most common form of tooth-related disease, additional findings of fractured teeth, discolored teeth and other pathology are frequently encountered.

Periodontal disease is a broad term used to describe disease conditions of the tooth-supporting structures. These structures include the gingiva, cementum, periodontal ligament and alveolar bone. Periodontal disease is further defined in 5 stages (4 stages if you consider stage 0 as normal). Characteristics of the stages of periodontal disease are listed below.

Periodontal disease

Gingivitis

There are various ways in which gingivitis is measured in human dentistry. The association between periodontal probing and bleeding is common. As a general rule, gingivitis should be assessed before dental scaling and polishing since the inherent disruption that scaling can cause can artificially make the gingivitis appear worse.

- Gingivitis Stage 1: red and inflamed, no bleeding on probing
- Gingivitis Stage 2: red and inflamed, bleeding upon gentle probing
- Gingivitis Stage 3: red and inflamed, spontaneous bleeding

Attachment loss

This refers to more severe disruption of the tooth supporting structures. While tooth attachment loss becomes more of a quantitative measurement of cementum-periodontal ligament-alveolar bone involvement, these stages all typically involve some degree of gingivitis. Because of the difference in size of teeth relative to the size of the overall patient, a periodontal probe and dental radiographs are required to accurately assess the magnitude of periodontal attachment loss. Ordinarily, long junctional epithelium extends down the sulcus and attaches to the tooth at the level of the cementoenamel junction. The porous nature of cementum facilitates epithelial attachment at the base of the sulcus as well as cementum provides an excellent surface to facilitate the attachment from the periodontal ligament to the alveolar bone. When probing the sulcus depth, the normal depth in dogs is $\leq$3mm. In instances where the periodontal pocket becomes too deep, there is a shift from gram-positive aerobic cocci to gram-negative anaerobic rods. The primary exotoxin of these bacteria as well as the body's efforts to combat infection result in deposition of collagenase and matrix metalloproteases which contribute to further disruption of the periodontal ligament attachement and subsequent deepening of the periodontal pocket. Instances of periodontal disease result in friable, inflamed tissue that can more easily be penetrated by the periodontal probe. Care should be taken not to exert excessive force when probing teeth with periodontal pocketing since it can be very easy to overestimate the pocket depth.

- Periodontal Disease Stage 1: gingivitis only, no attachment loss
- Periodontal Disease Stage 2: <25% attachment loss
- Periodontal Disease Stage 3: 25-50% attachment loss
- Periodontal Disease Stage 4: >50% attachment loss

There is a significant exception to attachment loss defining the severity of periodontal disease. In any tooth where the furcation (space between a single tooth's roots) is exposed, the extent of periodontal disease is considered to be severe. If a periodontal explorer can be passed from the buccal surface, between tooth roots to the palatal/lingual surface, the furcation exposure is considered severe and the tooth is considered to be affected with stage 4 periodontal disease. Prognosis for maintaining these teeth is very poor.

Gingival enlargement

Gingival enlargement is a descriptive term referring to excess accumulation of gingival soft tissues in either focal or generalized locations. Whenever gingival enlargement is encountered, histologic tissue evaluation should be performed to rule out other common differentials such as generalized condidtions of benign or malignant neoplasia. Intraoral radiographs of the affected area should be performed to ensure that if excess soft tissue is associated with underlying bony pathology, that some of that tissue be sampled for evaluation. Gingival hyperplasia is a generic diagnosis denoting excess gingival accumulation. When gingival hyperplasia creates a periodontal pocket depth greater than the acceptable 1-3mm, the pathologic depth will see a shift to gram negative anaerobic rods which will promote further development of periodontitis. Causes for gingival hyperplasia are usually categorized as due to genetics, drug induced causes or related to chronic inflammation.

An underlying genetic predisposition for gingival hyperplasia is typically limited to the brachycephalic breed (Bulldogs, Pugs, etc). Since genetics can't be removed from these patients, efforts should be focused on preventing the development of periodontal disease (which can incite further contribute to gingival hyperplasia) and yearly dental cleanings under general anesthesia to manage any periodontal disease as well as excisional resection of gingival hyperplasia.

Certain drugs have been predictably shown to induce gingival hyperplasia. Cyclosporine is associated with gingival hyperplasia in people, dogs and cats. In cases where cyclosporine is necessary, the secondary effects of gingival hyperplasia may decrease if the dose of cyclosporine is modified with other medications such as concurrent administration of ketoconazole. Some specialists have anectodally reported that putting cyclosporine patients on azithromycin will resolve the gingival hyperplasia. Those courses may need to be as long as 16 weeks and the risk/benefit of antibiotic use for that long should be thoroughly thought out.

Calcium channel blockers are also recognized as associated with the development of gingival hyperplasia. Calcium regulation is an important component of cellular apoptosis. Calcium channel blocking drugs disrupt the programmed apoptosis of gingiva, which subsequently leads to continued normal rates of gingival growth and subsequent gingival accumulation without the typical rate of cell death and sloughing.

Chronic inflammation or periodontal disease is the third category of cause for the development of gingival hyperplasia. Pro-inflammatory mediators and secondary efforts by the body to fight infection results in excess development of gingiva. The superfluous gingiva then creates an increase depth to the periodontal pocket, which precipitates further compromise to periodontal health. A thorough dental cleaning, removal of excess gingiva and periodontal homecare can prevent further recurrence of gingival hyperplasia in these patients.

Intrinsically and extrinsically stained teeth

Extrinsic staining refers to a superficial discoloration that is commonly appreciated on the occlusal surfaces of the first maxillary molar teeth. Extrinsic stain arises from the uptake of stain from food, toys or bacterial byproducts into the surface enamel or exposed, more porous dentin. Surface discoloration is unable to be removed with the ultrasonic scaler and may be reduced or removed with polishing with dental polish. Extrinsic stain, although unsightly and may be mistaken for calculus, it is not associated with any pulpal or periodontal pathology.

Intrinsic staining refers to tooth discoloration in which the stain arises from within the tooth rather than its surface. Instances where pulpal inflammation takes place (pulpitis) lysis of red blood cells results in porphyrin and hemoglobin being small enough to flow into the dentinal tubule and able to seep to the cementoenamel junction. Once within the dentinal tubule, the hemoglobin usually becomes trapped and the surface of the tooth displays the array of color shifts typically seen with soft tissue bruising (red to pink to purple to beige). All intrinsically stained teeth should be radiographed and evaluated for evidence of nonvitality: periapical lucency or pulp chamber widening.

Dental abrasion/attrition/fracture

Most dogs exhibit a natural desire to chew. Some dogs chew more aggressively than others. Tooth structure, enamel in particular, is the hardest substance in the body. Regardless of the innate durability and resistance of enamel to wear, continue use and abuse will cause changes to the tooth surface.

Abrasion

Is loss of tooth structure due to tooth contact with external objects. Abrasion results in the tooth surface being rough. Many veterinary dentists argue that this type of structural tooth loss results in acutely exposed dentinal tubules, which can be reliably associated with tooth sensitivity. Recommendations include radiographing these teeth and consideration for application of a dentinal sealant to eliminate sensitivity and reduce the likelihood of bacterial migration and resultant pulpitis.

Attrition

Is recognized as structural tooth loss associated with repeated abnormal contact or occlusion. This wear typically occurs very slowly and leaves the modified tooth surface with a smooth surface. Typical causes for attrition includes misaligned teeth resulting in a malocclusion. Dogs suffering from allergies and repetitively chew on their toes develop resultant attrition associated with the abrasive nature of dog fur. It is reasonable to radiographically evaluate these teeth for any evidence of bacterial penetration into exposed dentinal tubules, but the slower nature of this loss of tooth structure is more likely to be met with tertiary dentin formation to protect the pulp.

Acute tooth fracture occurs from a traumatic event that can be associated with aggressive chewing or other sources of trauma. Acute dentin exposure leaves these teeth sensitive and vulnerable to bacterial invasion and subsequent pulpitis. Instances of known acute fracture should be treated with radiographic evaluation for underlying pathology and application of a dentinal sealant to eliminate sensitivity and reduce the likelihood of pulpal infection. If a diagnosis is made but treatment cannot be immediately performed, pain medication +/- antibiotic therapy should be prescribed by a veterinarian until treatment.

Chronic ulcerative paradental stomatitis (cups)

Soft tissue ulcerations frequently occur on tissues intimately contacting the buccal surface of the maxillary canine teeth or mucosa overlying the maxillary fourth premolars. In early stages of the disease, pigmented mucosa becomes depigmented and proceeds to become erythematous and ulcerated. Biopsy and histologic evaluation to rule out conditions including neoplasia and autoimmune disease is indicated. At the time of biopsy, a thorough dental cleaning should be performed and extensive efforts should be made to

maintain as little a plaque accumulation as possible. Daily tooth brushing, barrier sealants, dental diets, oral rinses and antibiotic therapy may all be necessary in conjunction with dental cleanings 2-4 times yearly. During initial treatment of the condition, pain medication and anti-inflammatory drugs are indicated since these patients may have central sensitization related to the chronicity of the condition. In extreme or unmanageable patients, extraction may be indicated.

Oral masses

Similar to other areas of the body, masses found in the oral cavity are categorized as malignant or benign. Historically, the benign oral tumors were known as "epulides" or an "epulis." Technically speaking, any tumor associated with the gingiva is classified as an epulis until a biopsy is performed and the mass is more accurately diagnosed.

The family of benign oral tumors in the dog include the fibromatous epulis, ossifying epulis and acanthomatous ameloblastoma. Fibromatous epulis is being replaced by "peripheral odontogenic fibroma" and ossifying epulis is being replaced by "peripheral odontogenic fibroma- ossifying type." Expect to gradually see these changes occur in the literature and in the histologic diagnosis provided on biopsy samples. These tumors are of periodontal ligament cell or periodontal connective tissue origin. Dental radiographs are indicated prior to biopsy to ensure that a representative sample is taken.

Malignant tumors in the canine mouth make up less then 10% of the tumors diagnosed in the dog. The frequency of these types of tumors are 1) malignant melanoma (MM) 2) squamous cell carcinoma (SCC) and 3) fibrosarcoma. Patients diagnosed with any of these most frequent types of oral tumors should be staged with lymph node aspirates and chest radiographs in accordance with the recommendations of the World Health Organization.

Retained deciduous teeth

The general rule that "no two teeth can fit in the same place at the same time" is a rule to live by. When a permanent and deciduous tooth occupies the same sulcus, they are not separated normal periodontal tissues. This predisposes periodontal disease development from food, fiber and bacterial accumulation. A dental radiograph is indicated so that your veterinarian can evaluate the extent of the remaining deciduous tooth and plan properly for extraction. If the deciduous and permanent teeth are left to "fall out," the patient risks developing such severe periodontal disease that both teeth compromise their blood supply and both teeth will ultimately need to be extracted.

Base narrow mandibular canine teeth

Some dogs are found to have lower canine teeth that may erupt too narrow and cause subsequent contact with the roof of the mouth. This is a painful condition that can result in the lower jaw being prevented from growing at the correct growth rate. This is a genetic condition and the client should be counseled to not breed or show the animal. Treatment options for these patients include extraction, crown reduction and vital pulp therapy or orthodontic tooth movement.

Normal oral anatomy mistaken for pathology

Several structures can easily be mistaken for abnormal anatomy. All structures in the mouth should be paired bilaterally. The incisive papilla, located immediately behind the central incisors is sometimes mistaken for an oral mass. The incisive papilla can appear more pronounced if the maxillary incisors have been removed.

Cheek chewers and tongue chewers granulomas are quite common and result from the dog chewing on redundant soft tissues in the back of the mouth or under the tongue. The body's natural response is to create a granuloma as protection from the repeated trauma. These are frequently bilateral and appear as rough, cobblestone tissue in the back of the mouth. Similar lesions can be seen extending on the mucosa underneath the caudal aspect under the tongue. These lesions are usually biopsied if ulcerated. Aggressive biopsy and removal of redundant tissue being traumatized may prevent recurrence.

Conclusion

Oral pathology will be frequently encountered in everyday practice. Early identification and accurate treatment recommendations enable us to impact our patient's quality of life by being able to offer treatment options that address the pathology before the condition becomes inoperable and the patient suffers unnecessary pain and discomfort.

References

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