

PERIODONTAL DISEASE

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Dental disease is one of the most common problems in dogs and cats, 80% of dogs and 70% of cats have some level of periodontal disease by 3 years of age*. It is a chronic, progressive disease, which becomes worse with time.

What is periodontal disease?

Periodontal disease is disease of a tooth's support structures. There are four periodontal tissues: the gingiva (gums), cementum, periodontal ligament, and alveolar bone. Periodontal disease is broken up into two entities, gingivitis and periodontitis. Gingivitis is the initial, *reversible* stage in which the inflammation is confined to the gingiva. This inflammation may be reversed by a dental cleaning and homecare (brushing, etc.). Gingivitis, if left untreated, progresses to periodontitis. Periodontitis is the active stage of inflammation, and is the *irreversible* (without surgery) loss of the supporting structures (bone and soft tissue) of the tooth. While it is irreversible, it is possible to arrest its progression with proper professional therapy and home care.

Periodontal disease is extremely variable from one pet to another. Some young pets develop severe periodontal disease early in life, while other pets do not develop periodontal disease until they are geriatric, or do not develop it at all. Things that can influence whether or not a pet will develop periodontal disease, and the rate that the periodontal disease will progress include:

- How the pet's teeth fit together: When there is crowding of the teeth, it is easier for food material to accumulate between the teeth and cause inflammation to develop.
- The pet's diet: Some foods are naturally more abrasive and have some natural cleaning effects. Some diets are made with components that are beneficial for oral health.
- What the pet chews on: Chewing on treats and toys, including soft toys and rope toys, provides some additional natural cleaning and strengthening of the teeth. Extremely hard chew toys, like bones, hard plastic toys, antlers, and horns should be avoided, because these and other hard items put teeth at risk of being broken.
- If the pet is receiving home dental care: Home dental care is critical to help slow down the progression and reduce the severity of periodontal disease. Home dental care may include, tooth brushing, dental chews, water or food additives, and others.
- If the pet is having dental cleaning procedures performed: Anesthetized professional dental cleaning and evaluation procedures are important, because they allow for assessment and treatment of disease below the gumline. Most pets benefit from having this done annually, but some pets must have it performed more often.
- Heredity: The strongest influence over whether a pet will develop periodontal disease is genetic predisposition/heredity. This is similar to periodontal disease in humans. Small breed dogs are at higher risk of developing periodontal disease, and certain specific breeds are also at higher risk.



Figure 1. Gum recession

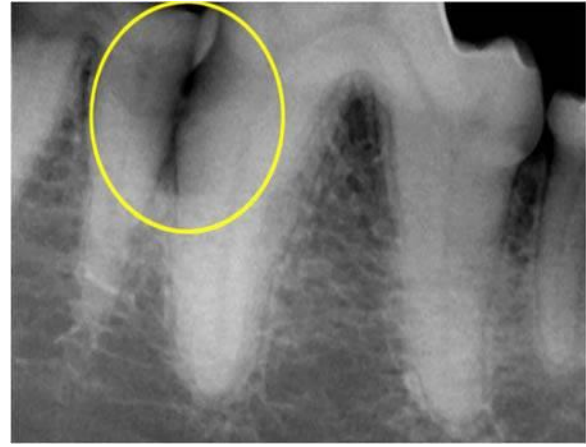


Figure 2. Bone loss at tooth in Fig. 1



Figure 3. Periodontal disease



Figure 4. Severe bone loss

Systemic effects of periodontal disease:

If left untreated, periodontitis may cause loose, painful teeth as well as contribute to disease and inflammation in the body. The inflammation around the roots of the teeth makes it easier for bacteria to enter the bloodstream. This is called "bacterial showering." In rare cases, this can result in infections in other organs. One very uncommon, but potentially fatal, condition is bacterial endocarditis, which is bacterial infection of one of the valves of the heart. In most patients the bacteria do not cause infection, but there is a component of the bacteria, called endotoxin, that causes small amounts of damage to multiple organ systems, including the heart, brain, liver, and kidneys. The amount of damage is small, but accumulates over time to result in more serious damage to the organs. The bacteria in the system also stimulates inflammation in the body and can worsen other inflammatory conditions. One example of this happens with pets (and humans) that have periodontal disease and diabetes. Diabetes is more difficult to control when periodontal disease is also present.

Pathologic fracture:

When the teeth in the lower jaw develop deep periodontal disease, the chronic inflammation/infection can weaken the bone of the jaw, resulting in a **pathologic fracture**. A pathologic fracture of the jaw is when the jawbone breaks under normal stresses such as chewing, or minor trauma like jumping off of a couch or biting a toy. The fracture happens because the bone is weakened by disease (usually either infection/periodontal disease or tumor). Since the tissue is unhealthy to begin with, these fractures are difficult to repair, and typically require a heavy bone plate and bone grafting material. In many patients with this type of fracture, the bone has degenerated as well. These often do not heal well, even when treated appropriately. The most aggressive treatment for these fractures is removal of the diseased teeth in the area, followed by referral to a veterinary college, such as U.C. Davis in California, for repair and bone regenerative treatment. For many patients, the most practical treatment is to remove the diseased teeth and allow the fracture to develop scar tissue. This is called a fibrous nonunion fracture. The bones will not grow back together, and the jaw will always be more mobile than an intact jaw, but will not be

painful. In some pets with this type of fracture, there is more than one part of the bone that is broken. When this happens, the bone that is in between the 2 fractures is freely moveable, and is painful. In these pets, the best procedure may be to completely remove the loose piece of bone. This results in a jaw that moves from side to side more than normal, but is non painful and is functional. Periodontal disease develops and progresses relatively slowly, so most pets that develop pathologic fractures are small breed dogs that have not had professional anesthetized dental cleaning for many years, or have never had professional anesthetized dental cleaning.

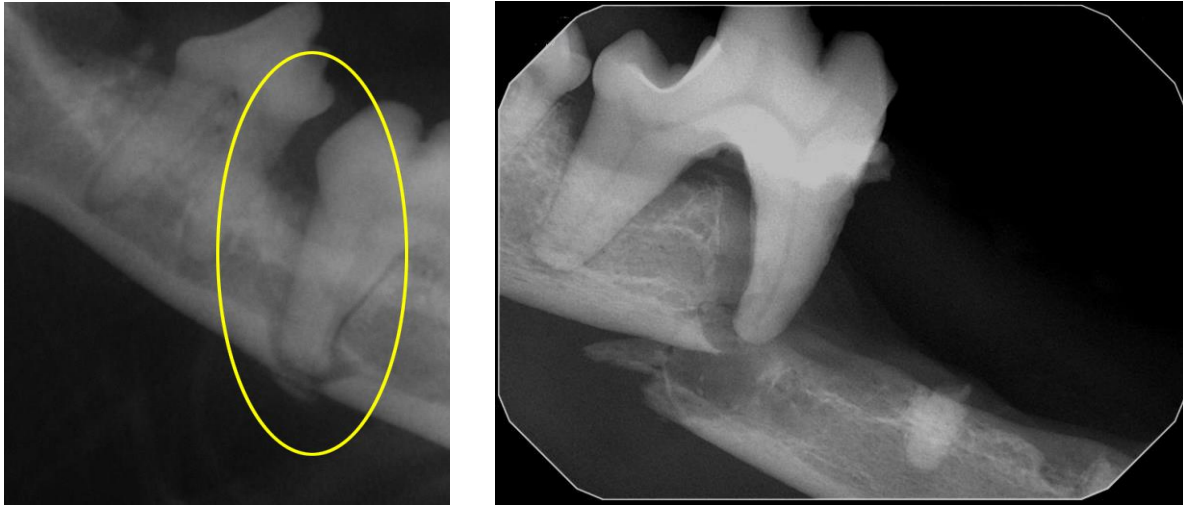


Figure 5. Pathologic fractures

Oronasal fistula:

A common potential result of periodontal disease is an **ornasal fistula (ONF)**. This results from periodontal disease progressing up the inside surface of the upper canines, incisors, or cheek teeth. The roots of these teeth are adjacent to the nasal cavity, and are separated from it by a thin piece of bone. Periodontal disease can destroy this bone, resulting in a communication between the oral and nasal cavities. The bacteria, food particles, and other oral debris will enter this area and cause inflammation or infection in the nasal cavity. Signs may be chronic nasal discharge, sneezing, or rubbing at the face, but many pets do not show any symptoms at all when this is present. Interestingly, this condition can occur even when the remainder of the teeth appear relatively healthy. There are certain breeds of dogs, like Dachshunds, that are very predisposed to developing this problem. Unfortunately, there is little recourse for this problem other than extraction of the affected tooth. When the tooth associated with an ONF is extracted, the surgery site does not always heal well. There are multiple factors that can cause this. The larger the ONF, the more difficult the healing is. In some patients with this condition, special surgical procedures are needed to repair the opening.



Figure 6. Oronasal fistula

What causes periodontal disease?

Periodontal disease starts with the formation of plaque, which is a combination of bacteria and salivary glycoproteins. Bacteria colonize the tooth surface within hours of the teeth being cleaned. If not removed, plaque will extend under the gum line into the area known as the gingival sulcus (the groove between the

tooth and gum). The bacteria in this subgingival plaque will secrete toxins and metabolic products. The bacterial toxins elicit an inflammatory response from the pet. White blood cells migrate into the area to destroy the bacterial invaders; however, they also damage the periodontal tissues. These inflammatory events result in loss of attachment of the tooth. This causes deep pockets to develop around the tooth, and eventually bone loss around the root(s). This may result in either gingival recession where roots are exposed, or the gingiva can remain the same height while the area of attachment moves down, thus creating a periodontal pocket and bone loss that cannot be detected until a pet is under anesthesia.

The plaque above the gum line becomes mineralized and forms calculus (tartar). This can start developing in as little as a few days after a dental cleaning. By-products of these bacteria cause the body's immune system to mount a progressively stronger immune response, which causes further damage to the tooth's support structures, causing progressive tissue loss and inflammation, and eventually, without treatment, causing the tooth to be lost.

The inflammation that is associated with the body's defense mechanisms attacking the invaders also allows those invaders to gain access to the body. Animal studies suggest that these bacteria can negatively affect the kidney, liver, and other organ systems. Bacteremia (bacteria in the bloodstream) has also been linked to heart attacks and strokes in people. These bacteria may become attached to heart valves and cause endocarditis which results in an intermittent infection and strokes. While these studies are not definitive, this is a process which can lead to a state of chronic disease.



Figure 7. Periodontal disease with gum recession

What are the signs?

Clinical signs of periodontal disease include swelling, a gingival color change from pink to red, bleeding gums, calculus accumulation, and bad breath. Clinical signs of more advanced periodontitis can include the above plus gum recession, difficulty chewing, drooling with or without blood, and increased tooth mobility.

Halitosis or bad breath (often described as "doggie breath") is the primary sign of periodontal disease that is noticed by pet owners. Dogs' and cats' breath should not have a disagreeable odor. If your pet has "doggie breath" then it is likely due to some level of chronic periodontal disease.

How is periodontal disease diagnosed?



Figure 8. Radiographic bone loss in periodontal disease

Bone loss from periodontal disease occurs beneath the gumline. In order to evaluate the stage of disease as well as the best treatment, your pet must be examined under general anesthesia. In addition to a visual examination, dental imaging and an instrument, called a periodontal probe, are used to measure attachment loss. Dental imaging minimally must include radiographs (x-rays). Dental x-rays reveal problems that cannot be detected by an anesthetized exam and periodontal probe. Dental x-rays also have their limitations. X-rays show the silhouettes of the teeth, only, and overlapping structures in the oral cavity can make x-rays difficult to interpret. In our office, dental imaging is performed using both dental x-rays and advanced 3D imaging of the dental structures using Cone-Beam CT (CBCT). CBCT gives highly detailed imaging of the tooth and bone, and will reveal problems that cannot be seen on dental x-rays. Every dental procedure in our office is imaged both with dental x-rays and with CBCT.

Periodontal disease is also staged:

- Stage 1 gingivitis
- Stage 2 early periodontitis-less than 25% attachment loss
- Stage 3 established periodontitis- between 25-50% attachment loss
- Stage 4 advanced periodontitis- greater than 50% attachment loss

How is periodontal disease treated?

Treatment depends on the severity of disease and how aggressive a pet owner is willing to treat their pet's periodontal disease. It is important for owners to understand that periodontal disease develops because of how the body reacts to the normal bacteria in the mouth. We cannot eliminate bacteria from the mouth, so periodontal disease is not a "curable" disease. Periodontal disease requires maintenance through professional dental treatment, ideally combined with home dental care.

Stage 1 gingivitis (reversible stage) is treated by teeth cleaning and polishing, followed by various types of home dental care.

Note: Stages greater than stage 1 represent irreversible changes. However, therapy at any point in the disease process may stop or slow this progression.

Stage 2 disease will require deep scaling, with or without the application of a local antimicrobial (Doxirobe) product, followed by home dental care.

Stage 3 disease is treated similarly to Stage 2. However, in some cases (pockets around a tooth more than 5mm deep) a surgical procedure such as open root planing or guided tissue regeneration is needed. These surgical procedures can be effective if the owner is able to provide, and the pet is willing to accept, aggressive (daily) home dental care. If the owner is not able to do adequate home dental care, the prognosis for these teeth is poorer, and extraction of the affected tooth should be considered.

Once **Stage 4** disease occurs, the prognosis for the affected teeth is poor. If the teeth are to be saved, aggressive periodontal surgery is necessary. If surgery is performed, the owner must be dedicated to daily tooth brushing and other forms of home dental care in order for the procedure to be successful. In most cases of stage 4 (and often stage 3) periodontal disease, extraction is the best option for the affected teeth.

This part is critical, and bears repeating: If surgery to save teeth with Stage 3 or 4 periodontal disease is going to be successful, the pet owner needs to be committed to save the animal's teeth. This commitment includes daily brushing at home to remove plaque, which begins to colonize within hours after a procedure. Frequent veterinary dental progress re-examinations should also be anticipated. Depending upon the stage of periodontal disease that is present, anesthetized dental cleaning and assessment procedures should be performed every 3-12 months. Advanced periodontal disease can also be very expensive to treat effectively, and this must be taken into consideration. The patient must be a willing partner. If the dog or cat will not allow home care, the best dental surgeon and most caring owner will not make a difference. Unless there is strong owner commitment and patient compliance, it is much wiser to extract the tooth affected by advanced periodontal disease rather than letting the pet suffer needlessly.

Non-Anesthetic "cleanings"

Periodontal disease can be prevented or slowed with routine professional (anesthetized) dental cleanings and home care. The bacteria that initiate this disease are located beneath the gumline. Non-anesthetic "cleanings" **DO NOT** address the below the gumline and are of little to no value. In fact, they can be harmful by giving the owner a false sense of security that their pet's mouth is healthy, just because they no longer see the tartar above the gumline. Without general anesthesia:

- 1) It is dangerous and painful to use sharp instruments to clean below the gumline.
- 2) Periodontal probing cannot be performed to determine the depth of the pockets without causing unnecessary pain.
- 3) Dental imaging cannot be performed to see the 60% of the tooth hidden from visibility.
- 4) Extraction of diseased teeth cannot be performed.
- 5) Damaged teeth cannot be treated.
- 6) The back "cheek" teeth, which accounts for almost 1/3 of the teeth cannot be adequately cleaned.
- 7) The inside surface of the teeth cannot be cleaned well.

All of the seven tasks mentioned above can be performed effectively in a single dental procedure under general anesthesia. General anesthesia is much safer today than ever before. With appropriate anesthetic precautions, the risk is generally very low. In addition, it is a certainty that undiscovered or untreated dental disease (during an anesthesia-free procedure) will become worse.

How can periodontal disease be prevented?

Daily plaque control through tooth brushing is the key to help prevent periodontal disease. Dental-friendly foods, drinking water and food additives, and dental chews are available to help control calculus. A list of effective products are approved by the [Veterinary Oral Health Council](http://www.vohc.org) and are listed on their web site (www.vohc.org).

What is the prognosis for periodontal disease?

Gingivitis is treatable with professional dental cleaning and routine dental home care. Periodontal disease is not curable once bone loss occurs, but can be controllable when properly treated and followed up with strict dental home care and periodic anesthetized professional dental cleaning procedures.

*References available on request

Additional information and handouts can be found online at the web sites of:

The American Veterinary Dental College - [Animal Owner Resources – AVDC.org](http://www.avdc.org)

Veterinary Partner web site - <http://www.veterinarypartner.com>

Veterinary Oral Health Council - <http://www.vohc.org>

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