Periodontal Disease:
The Silent Killer. Identifying Disease, Successful Treatments

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The success associated with the treatment of pathologic periodontal pockets rests on first identifying the underlying cause for the condition. Recognizing the increased depth of the sulcus (periodontal pocket) and acknowledging that the host’s defense mechanisms against the bacteria in those pockets are designed to flush out the pocket and keep it clean, and then modifications to that local environment must occur. These modifications include A) making the pocket less hospitable for gram negative, anaerobic bacteria, as well as B) creating an environment conducive to reversing the periodontal attachment loss. The greatest prognostic determinant influencing the success of your periodontal treatment is the client’s willingness and ability to institute homecare. Homecare products and techniques will be discussed elsewhere during a separate presentation.

Root Planing and Subgingival Curettage

Root planing is the process of cleaning a pathologic periodontal pocket on both the soft tissue (gingival side) and hard tissue (cementum) surfaces. With targeted removal of the subgingival calculus, necrotic cementum, long junctional epithelium and leaving a healthy root surface, residual periodontal ligament cells and nonkeratinized epithelium have a chance to reattach.

Instruments designed for subgingival curettage include universal subgingival curettes, Gracey subgingival curettes (these instruments have an extra angle in the working end of the instrument to facilitate debridement) and dental hoes. Subgingival curettes are the most commonly used instruments used for this purpose when treating periodontal disease. Familiarity with the instruments is important for successfully executing treatment procedures. Curettes have a rounded toe (tip) and, when closely looking at the working surface, the cutting surface is either angled perpendicular or 70° to the shank. Instruments with a cutting surface angled perpendicular to the flat surface are known as Universal curettes. When the cutting surface is angled 70° to the shank, the instrument is termed a Gracey curette. Knowing the orientation of the cutting surface of your instruments is important to successfully position the instrument to accurately prepare the tooth and soft tissue surfaces.

Closed root planning is the act of non-surgically treating the tooth root by removing subgingival calculus, accumulated organic debris and necrotic cementum. This is reserved for treating periodontal pockets that are no deeper then 5-6mm in total depth in the canine and <2mm in the cat. The curette should be delivered into the base of the sulcus with the cutting edge parallel to the root surface until it is positioned at the bottom of the sulcus. The handle of the curette is then orientated parallel with the long axis of the tooth crown-this will engage the cutting surface onto the root surface. The active motion of the universal curette is during the pull stroke where the cutting edge engages the root surface and
debrides pathologic tissues. The instrument is placed into the periodontal pocket and repeatedly drawn against the tooth structure until there is no longer any areas of resistance suggestive of subgingival calculus or diseased cementum. This should be performed on all surfaces of the root surface associated with pathologic periodontal pocket.

**Subgingival curettage** is the act of removing the epithelial lining of the periodontal pocket in attempt to regain healthy periodontal attachment. Once the root surfaced has been prepared, the working end of the curette should be used where the cutting edge is placed away from the root to clean the soft tissue surface of the periodontal pocket. Successful removal of long junctional epithelium is necessary for new epithelial attachment and subsequent periodontal ligament rehabilitation. Similar atraumatic placement of the curette into the periodontal pocket is performed with an identical reorientation of the instrument handle with the tooth crown and a pull action out of the sulcus. While this does incite bleeding from the sulcus, adequate debridement is necessary to facilitate pocket healing.

**Open root planing** involves surgically creating a mucogingival flap that allows definitive access to the root surface needing to be cleaned. Creating this flap follows the same principles of performing surgical extractions (divergent releasing incisions, wide based flaps, etc). Flaps greater then 6mm should be surgically accessed to provide more reliable root preparation (through visualization) and soft tissue surface debridement. Vertical releasing incisions should be created along the line angles of the tooth root (as if a surgical extraction was going to be performed) to facilitate flap repositioning. A wide based flap with incisions extending from line angles provide the best opportunity for the normal forces of mastication to not undermine efforts associated with healing. When possible, vertical releasing incisions should be made over bone, in an area of healthy periodontal attachment and, ideally, on either side of an area of vertical pocketing. A sharp #15 or 10 blade should be used and the flap elevated with a sharp periosteal elevator. Periosteal elevators such as the Freer, EX9, EX7 or a straight Miller’s surgical curette can all be helpful. The root surface can be debrided with a curette, hand scaler, ultrasonic scaler or diamond bur on a water-cooled, high-speed hand piece (the pedal should need to be depressed less then 50%).

Care should be taken to only remove subgingival calculus, necrotic cementum or other visualized necrotic debris. Over-preparation of the root surface risks removing unnecessary amounts of cementum, which risks stimulating external root resorption and ankylosis. Once root and flap debridement has taken place, the flap should be repositioned into the original location and sutured with 4-0 or 5-0 monofilament delayed absorbable sutures. Sutures should be placed split-thickness if releasing incisions are made over areas of periodontal attachment loss. Suture material present in the healthy sulcus or pathologic periodontal pocket will be treated as a periodontal foreign body and will cause the redevelopment of a pathologic pocket.

**Periodontal pocket medicaments** labeled for veterinary use are limited. Doxycycline is the most commonly used antibiotic with a carrier designed for periodontal pocket treatment. The goal of antibiotic placement into the pathologic pocket is to maintain a environment conducive (reduced load of pathologic periodontal pathogens) for periodontal ligament cell reattachment and epithelial attachment at a normal depth. The tetracycline family of drugs is frequently chosen for treatment in periodontal pockets.
While there may be anecdotal success reported for the use of emptying the contents of an oral capsule into a periodontal pocket, the periodontal-specific formulations of these medications typically involve a delayed release carrier that provides days to weeks of slow release antibiotic activity. Doxirobe (doxycycline in a gel labeled for veterinary use) and Arestin (minocycline in a powder form labeled for use in humans) are the most common formulations used by veterinary dentists. Doxirobe is a gel (two-part carrier/doxycycline mixture) that is delivered into the periodontal pocket with an administration cannula. The mixture begins setting up once in contact with fluid (water or crevicular fluid).

Frustrations working with Doxirobe usually arise from efforts to deliver and place the gel into the periodontal pocket. Once the unset material flows out of the sulcus, efforts to knead the Doxirobe gel into the sulcus usually results in the gel sticking to placement instruments. To combat these difficulties, Doxirobe administration may require two sets of hands (help from an assistant). While one person administers the Doxirobe into the pathologic pocket, the same person can use a metal or plastic composite instrument to knead the gel back into the pocket that flows out from the free gingival margin. The second person’s role is to drip water with the air-water syringe onto the tooth crown (over the Doxirobe application site, specifically). As gel flows out of the sulcus, the water and instrument cause the gel to solidify which makes it easier to reseat back into the pocket. Repeatedly kneading the gel results in securely seating the antibiotic in a predictable manner. It is important to remember that the gel should only occupy the “pathologic” portion of the pocket. Filling the gel to the surface may result in the body treating the gel as a foreign body and reestablishment of the periodontal pocket.

Examples can be supported in the literature stating that periodontal reattachment can occur even with the presence of residual subgingival calculus present. Diligent efforts to subgingivally condition the root surface and opposing soft tissues, coupled with compliant efforts by the client to institute home care, provide a periodontal environment that retains a potential for healing. While substantial periodontal attachment gains can occur as the result of a single treatment, it is more predictable to prepare clients for a 50% reduction in the pathologic depth of the periodontal pocket at each treatment. The deeper the periodontal pocket, the more likely that a repeated treatment may be necessary to rehabilitate the tooth’s periodontal attachment. Periodontal reevaluation (ideally) should be performed in 3-4 months under general anesthesia and should involve periodontal probing and repeat radiographic reevaluation.

**Guided Tissue Regeneration**

Teeth are designed to be supported by the periodontal ligament (provides flexibility and reduces fracture) and alveolar bone (the anchorage point for the periodontal ligament to span to from cementum). Instances of attachment loss below the gum line, and in the presence of alveolar bone, are ideal to regain attachment resulting in that normal cementum-periodontal ligament-alveolar bone relationship with root planing and subgingival curettage. When alveolar bone has resorbed secondary to the presence of inflammation, periodontal rehabilitation of a deep pocket will likely result in establishment of long junctional epithelium attaching to the root surface. Upon recheck evaluation these teeth probe normally however the long-term prognosis of healthy attachment is less than excellent due to the tooth’s inability to be adequately supported- *it wants to be supported*
by bone! In these situations, performing an advanced procedure where bone is encouraged to form in addition to regenerating periodontal ligament is called guided tissue regeneration (GTR). GTR is typically only successful when treating vertical bone defects. Think of it this way- osteoblasts only like to lay down new bone by migrating out of existing bone in a horizontal direction. Reversing horizontal bone loss in the mandible or maxilla is the most hotly researched topic in human dentistry because it just doesn’t work. The greater the number of bony walls that a periodontal pocket has, the more surface area for osteoblasts to move in and regenerate bone. The hallmarks of guided tissue regeneration are to clean the pocket of infection and inflammatory byproducts (against the bone, in the pocket and on the root surface) and to place an osteoconductive or osteoinductive material into the pocket and cover it appropriately.

First step- Clean out the pocket! This is usually done with open root planing due to the extent of the pocketing. All debris should be removed from within the pocket and root surface, the bone should be inspected for health (it should bleed when debrided) and the epithelial lining of the soft tissue pocket wall removed via curettage.

Second step- Fill the pocket! The bony defect should be filled with something conducive to new bone formation. In rare instances with small defects a clot may be sufficient however these types of pockets are likely unappreciable on intraoral radiographs and spontaneously regenerate bone without us even knowing it. Options for filling the pocket, include autogenous bone graft, an allograft or a synthetic material (alloplast). Of the synthetics available on the market, bioactive glass which is a mixture of silicate and quartz, and has the capacity to be coated by hydroxyapatite. Whether it is some form of bone graft or an alloplast, the particulate serve as a scaffold for deposition of woven bone. While bioactive glass serves as a scaffold it takes a very long time to be completely resorbed by the body and replaced by autogenous bone. Tricalcium phosphate is an alternative for packing in boney pockets which not only serves as a scaffold but resorbs and is broken down into calcium and phosphate (both ingredients necessary for bone formation) over a span as long as 4 months. A key when filling the pocket with graft material is to only fill to the normal height of where bone should be (approximately at the cementoenamal junction).

Third step- Place a membrane! If left to heal on its own, the periodontal pocket will re-epithelialize well before new bone forms. Placement of a membrane over the bone graft particulate, abutting against the tooth, is necessary to prevent the down growth of epithelium. A variety of different membranes can be used: custom trimming a sheet of cortical bone membrane, sterile medical grade gortex, and perioceutic among others can be used to inhibit down growth. The major advantages of the cortical bone membrane or perioceutic is that removal isn’t necessary since the material is ultimately bioresorbable. Following careful placement of the membrane, gingiva is sutured over it.

As stated earlier, maintaining a healthy oral cavity is pivotal to success of this procedure. A client’s diligent efforts with periodontal homecare is key to creating an environment where bone regrows and periodontal ligament reestablishes. Recheck of this procedure should take place at 4 months post-treatment. Normal periodontal probing depths and
radiographic reestablishment of normal alveolar bone with a visible periodontal ligament space are signs of success.

**Conclusion**

Early identification of periodontal disease and appropriate client selection can make for a rewarding experience when treating pathologic pockets associated with periodontal disease. Tooth preservation offers the benefit of quicker recovery than surgery, maintenance of tooth function, and improved general health from the perspective of fewer bacteria associated with intermittent bacteremia and inflammatory mediators in circulation.

**Recommended reading:**


