NEW CONCEPTS IN PERIODONTICS

General dentists and hygienists are the first line of defense in the fight against periodontal disease. Studies suggest over half of the population suffer from periodontal disease. Over 70 percent of adults ages 35-45 suffer from periodontitis and over 90 percent of adults ages 55-65. Most patients do not go directly to the periodontist to seek help. Initially patients go to their general dentist-most of them unaware they have periodontal disease. The primary responsibility of discovering, diagnosis, education, and administering therapy falls to the general dentist and his or her hygiene department.

These statistics concerning periodontal disease have not changed appreciably over the past 50 years. What has dramatically changed is our understanding of the disease process, adjunctive periodontal therapies and the link between periodontitis and overall health. The following is an overview of new concepts in the the pathogenesis, therapeutic strategies, as well as the research concerning periodontitis to systemic diseases.

You Could Lose More Than Your Teeth

Eighty percent of tooth loss is a result of gum disease and if that is not bad enough, research continues to suggest periodontitis is linked to serious systemic disorders. Many of you are familiar with the study stating individuals with perio disease were reported to be 1.7 times more likely to develop coronary heart disease and 2.6 times more likely to die of cardiovascular disease than those with perio. The American Academy of Neurology in 2000 reported that "people who have gum disease may be at a greater risk for stroke due to an increased tendency to have blockages in the carotid arteries." A study done on carotid arteries removed from stroke patients exhibiting athromatous plaque (hardening of the artery) found 50 percent of the cases contained bacteria normally found in diseased periodontal pockets. These are just a few of the studies linking periodontal disease to cardiovascular disease. Diabetes for years have been a systemic disease associated with an increased risk for periodontitis. Now research indicates gum disease may be more important than obesity or age as a factor in the onset of diabetes in adults. Another study revealed that patients with periodontitis and Type II diabetes upon completion of periodontal therapy had similar results to patients treated with insulin. another startling link between periodontal disease and other serious health concerns is in the area of pre-term, low birth weight babies. Studies revealed female subjects with periodontal disease were 6.71. times more likely to have a low birth weight infant. Research at the University of North Carolina in 2002 concludes, "Mothers with periodontal disease have a two-fold increased risk of impaired fetal growth, it can be as high as 6 to 10 times higher if the periodontal disease progresses during pregnancy and if it was severe at the start." This is just a brief overview of the growing evidence that supports the surgeon generals report "Oral Health in America," which concluded that oral health is essential to general health. Never before in the history of the dental profession has the importance of diagnosing and treating periodontal disease been more evident.

Pathogenesis

Our understanding of the etiology of periodontitis has been evolving over the last 50 years (Table 1). We have grown from believing calculus was the primary cause of disease in the early 1960's to a more commonly held belief that specific bacteria alone are the primary cause of the disease. Today recent research indicates bacteria are not the sole cause of the disease, but instead essential in the process that surprisingly depends upon our own body's immune system as the primary causative factor in destructive periodontitis. This process is known as host-modulated response or auto-inflammatory mediated disease.

In short, pathogenic bacteria release a variety of substances including endotoxins derived from their gram-negative cell walls. This in turn can trigger the host immune system to initiate an inflammatory response. The endotoxins released by the bacteria do little damage to the surrounding periodontal tissues. Instead it is the host-derived enzymes including collengenase that destroy both soft and hard connective tissue (bone). The mouth is in a constant flux between tissue breakdown and repair. It is only when our immune system is not operating properly that we tip the balance toward disease (Table 2 A-H). This is why some patients present with poor oral hygiene but because

of a strong immune system show no clinical attachment or bone loss. Yet other patients do not respond favorably in spite of good home care and professional care because their immune system reacts poorly. This is a simplified explanation of a complex process.

Dental Plaque Is Not Created Equal

We now know bacteria is essential but not solely responsible for destructive periodontitis. If we can reduce the bacteria burden acceptable to the host immune system, we can stop the progression of the disease. Bacteria exist in one of two ways: as a biofilm (a complex organized community of bacteria, viruses, yeasts, etc.) or as planktonic (free-floating). There are basically two types of dental plaque: supragingival and subgingival. Supra gingival plaque is organized in both an attached biofilm and loosely adherent or planktonic bacteria. Subgingival plaque has a biofilm component, but the endotoxins and more pathogenic bacteria are adherent or planktonic. This is important because a biofilm is not only difficult to remove, but it also protects the bacteria from medicaments given either systemically or placed in the sulcus. Planktonic bacteria is easily removed with ultronic irrigation, and is very susceptible to locally delivered medicaments.

Changing Concepts in Periodontal Therapy

Scaling and root planning is the most widely accepted starting point in periodontal therapy. It is also one of the most effective procedures we perform in controlling periodontal disease. Today we have adapted instrumentation to reflect new knowledge concerning pathogenesis. (Table 3.). Instead of root planning and scaling designed to removed infected cementum and dentin resulting in glassy smooth roots, we strive for roof debridement and disinfection, removal of clearly discernable calculus and preservation of cementum. This therapy is best performed first by powered instrumentation augmented by hand instrumentation.

Hand Instruments and Ultrasonic Instruments

There is generally no difference between hand instrumentation and Ultrasonic instrumentation in calculus removal. The advantages of ultrasonic instrumentation are many. First, remember the Endotoxin and planktonic bacterial (2-60 times more pathogenic) are loosely attached to the host and can be washed off with ultrasonic irrigation. Reduce the pathogen bacteria to a level in balance with host-immune response, and you will stop the progress of disease. Second, it is much easier to preserve cementum and dentin when using ultrasonic instrumentation. It only takes two strokes with a sharp curette to remove cementum. Third, ultrasonic instrumentation is less physically demanding than hand instrumentation. Fourth, you can ultrasonically irrigate the area with medicaments during root debridement. In subgingival plaque the most pathogenic bacteria is loosely adherent or planktonic and readily susceptible to medicaments.

Even though ultrasonic root debridement is recommended, there are some very important points to remember. Various areas of root morphology are only effectively reached with hand instruments. Most ultrasonic tips terminate in a straight end making it impossible to engage root concavities, furcations, and pronounced contours. For initial root debridement focusing on calculus and biofilm removal, ultrasonics must be used at a higher power. Low power use, while very capable in removing planktonic bacteria and toxins, will only burnish, not remove calculus. This makes debridement difficult at best and ineffective at worse. Lastly the type of ultrasonic therapy being discussed is not a cursory deplaquing (drive by ultrasonic cleaning), but rather a focused methodical overlapping stroke technique performed in a moderate to slow pace.

Adjunctive Therapy

Mechanical root debridement is the most effective treatment for the control of periodontitis. Even with surgical reflection, complete removal of calculus and biofilm is extremely unlikely. That is why the use of adjunctive therapy can significantly improve therapeutic results. Let us review a few new and not so new therapies. Topical antimicrobial rinses and irrigation have proven clinically significant. These medicaments may be applied professionally or incorporated in a home-care

regimen (Table 4). Daily irrigation with or without an antimicrobial agent (WaterPik, Hydrofloss, etc.) has been proven useful in reducing the symptoms of inflammation and bleeding on probing associated with the disease process. Locally delivered antimicrobials (Table 5) are indicated in moderate (greater than or equal to 5 mm) site-specific pockets that continue to show signs of disease activity. These agents can remain in the pocket approximately seven days allowing the gingival crevicular fluid to reach levels that suppress or kill bacteria without creating bacterial resistance.

In patients with several active sites following initial treatment, systemic antibiotic therapy is considered. One of the most exciting new concepts in antibiotic therapy is changing the traditional focus from the bacterial component to the host-immune response. Periostat is an orally administered capsule containing 20 mg. of doxycycline hyclate. Some studies have shown that subantimicrobial doses of doxycycline can inhibit collengenase in gingival tissues and can slow and even halt the progression of periodontitis.

In Summary

General dentists and hygienists are the primary care givers overseeing the discovery, diagnosis, and treatment of periodontal disease. This serious disease affects not only oral health, but can also endanger the overall health of over half of our adult population. Revolutionary discoveries in the pathogenesis of periodontitis has led to advancements in therapies including more effective mechanical debridement, locally delivered antimicrobials, and pharmacological modulation of the host-immune response. I hope this overview has been helpful for you to understand the rapidly changing field of periodontics.