A Short Essay on Orthodontics & Infection Control for the Orthodontic Patient

Understanding Periodontal Diseases, gum Infections, Important Issues and Side Effects of Modern Orthodontic Therapy ©

by

Dr. Neal C. Murphy, DDS, MS
Associate Clinical Professor of Periodontics
Case Western Reserve University
School of Dental Medicine
Cleveland, Ohio USA (216) 368-6757

Lecturer, UCLA School of Dentistry
Sections of Periodontics and Orthodontics
Encino Office: (818) 905-5050
Oxnard-Ventura Office: (805) 983-2055

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© 2010, Dr. Neal C. Murphy
Who is Dr. Neal C. Murphy?

There is an old adage in healthcare professionals that says, “Never treat a stranger.” This means that doctor-patient rapport is a traditionally special relationship in our society. Sadly, it is being eroded by commercial mogrelization, an inevitable social evolutionary step in capitalist cultures. However, in a free society it can be counteracted by elective collaboration between doctors and patients, honestly and boldly presented for your edification, are tendered in the spirit of meaningful outreach. With increasingly depersonalizing trends in healthcare, it is always good to know your healthcare provider thinks and acts on a human level. It’s important. The essence of healthcare is neither art nor science; it is humanism. So, here is the human being.

BIOGRAPHICAL SKETCH

Associate Clinical Professor, Department of Periodontics & Affiliated Skeletal Research Center  
Case Western Reserve University, Cleveland, OH 44106  
Associate Clinical Professor, University of Southern California, 1982-1987  
Lecturer, Division of Associated Clinical Specialties, 1981-2010  
Capt. USAFR (Ret.), married with 2 grown children

Formal Education

Postdoctoral Orthodontics & Dentofacial Orthopedics, UCLA  
Postdoctoral Periodontics, Case Western Reserve University School of Dental Medicine  
MS Biology, Case Western Reserve University Graduate School  
DDS The Ohio State University  
BA Kent State University

Experience & Leadership

Major National Presentations

5. Pacific Coast Society of Orthodontists, Monterey, CA, September 1996  
7. Managed Care – Adapting to the Emergency Paradigm, National Meeting, American Academy of Periodontology, New Orleans, LA, October 1996  
8. Bioactive glass as a regenerative material – 3 years of clinical observations, National Meeting of the American Academy of Periodontology, San Diego, CA, 1997  
11. Dental and Periodontal Complications to Eosinophilia – Myalgia Syndrome, National Meeting of EMS Network, San Diego, CA, 1999  
13. The “Bayesian Smile”-Decision Analysis in Dentistry,42nd Annual Bayesian Research Conference, 2003,) Studio City, CA –Feb., 2003  
14. Dental Decision Science A Bayesian Approach, Dental and Maxillofacial Interest Group, Society for Medical Decision Making, Chicago, IL, October, 2003  
16. Considering the Mouth as a (W)hole, American Association for the Advancement of Science, (AAAS), St. Louis, MO, February, 2005  
17. Tissue Engineering for the Orthodontist: An Exploitation of the Utah Paradigm for Accelerated Tooth Movement and Epigenetic Regional Phenotype Modification The 8th International Conference on Biological Mechanics of Tooth Eruption, Resorption and Movement, Phuket, Thailand, November 7-10, 2005
18. The Frost-Jee Procedures: Therapeutic Surgical Induction of “Therapeutic Regional Ostepenia in Clinical Orthodontics, Testimonial Meeting for Dr. Webster S.S. Jee, Oakland, CA June, 2005
22. PAOO Complications and Sequella, a 5 year Retrospective American Academy of Periodontology, Seattle Washington, Sept 9, 2008
25. Malpractice Prophylaxis – Using tort law as guidelines for a healthy patients, the commonweal and a ethical practice” Las Vegas, NV October, 2010 (in preparation)

**Private Practice Experience**

Private practice in Orthodontics and Periodontics in Encino & Oxnard/Ventura California, 1982-present

**Honors & Awards**

1. 1987—Commendation for Teaching Excellence, awarded by orthodontic residents, UCLA School of Dentistry
3. Certificate of Appreciation, UCLA Orthodontic Alumni Assn.2010 for 25 years of support and 3 terms as President.

**Publications (copies available upon request)**

**Textbook Chapters**

4. Davidovitch Z and Murphy N, Accelerated Tooth Movement through Surgery, Chapter 1 The Biology of Tooth Movement, Davidovitch Z and Krishnan V, Eds.
5. Singh GD and Krumholtz, Epigenetic Orthodontics, Appliance Therapy Group, Chatsworth, CA 2008

**Scientific Journals**

Websites/Blogs/Internet postings
www.UniversityExperts.com
GoogleScholar.com:
1. Murphy NC, Beyond the ligament
2. Murphy NC, In vivo Tissue Engineering for Orthodontists

Professional Collaborative Activities

1. Editor/Reviewer: American Journal of Orthodontics and Dentofacial Orthopedics, 1987-present
2. Guest Editor: Seminars in Orthodontics, December, 2008

Professor Murphy and the technical staff over the years have carried out research and development on a variety of intellectual subjects that relate to orthodontics and underlying periodontal science, applications of this science in both traditional and managed care milieu. He has served as a quality assurance consultant for 5 insurance firms, numerous law firms and engaged in consistent student counseling activities. With on-going research and teaching relationships at 3 major U.S. universities, UCLA, USC and CWRU and collaborates on clinical studies in his native state of Ohio and Florida. Dr. Murphy also interfaces with elected government organizations at the local, state, and national levels, and has 2 U.S. patents pending.

Personal Interests
Fly fishing, professional boxing, English literature and composition, mathematics, statistics, logic & experimental design, military history, cognitive and educational psychology, college football, linguistics (Spanish & German)

Note:
We hope this background information is helpful to you in making dental and oral health decisions. If you would like further data about our office kindly contact:

Lorraine Vigil
Ms. Lorraine Vigil
Professional Relations Officer
Now a little bad news that very few patients know... Braces may be hazardous to your gums and general health. On a practical level, if the infection is not treated during braces, it can spread into the supporting bone requiring surgical correction. This can double the cost of care. Inadequate dental treatment and avoiding the dentist may even be harmful to your general health. This is not because the metal is toxic, but because braces make it more difficult to control oral infections. Gum diseases, gingivitis and periodontitis (pyorrhea) is a symptomless (no pain or obvious bleeding) slowly erosive chronic infection to which you become accustomed and yet is progressive to the point that it can cause all your teeth to fall out. Worse, these poisons, if not swallowed, enter the bloodstream and damage blood vessels that support the heart and other vital organs. Treated in its early stages, gingivitis or mild periodontitis, it is curable. However as signs of infection, bleeding on probing or bone loss and “pocket” formation, become advanced even heroic regenerative surgery will not stop its progress, only slow it down. Gum infection bacteria “eat” protein (your blood and tissue) not sugar. Even patients who are in comas and fed intravenously get periodontitis. For pregnant mothers, the baby’s constant exposure to toxins is especially bad.

Also, don’t feel safe by having numerous “deep cleanings”. That only masks the disease and drives it “underground” deeper into the bone. Most dentists will help us keep your gums healthy by cooperating with our plan. California dentists have especially good reputations worldwide. So please, ask your dentist to follow our recommendations for periodontal care during your orthodontic treatment. We will give you a copy of the recommended treatment. You should ask your dentist three key questions every time you have a teeth cleaning.* (1) “Do I have pockets deeper than 3 mm?” (2) “Are they bleeding upon probing examination?” (3) “Where are they?” This way you can be adequately informed so you are not unpleasantly surprised one day in your 30’s, 40’s or 50’s when you are told, “Sorry, you need dentures”.

Now, the good news...

We’ve treated patients, even with advanced gum disease, who commit to good care late in life, and now show no significant progression of the disease for over 30 years. For chronic diseases that’s a “cure”. Now, let’s empower you with scientific knowledge. Study the diagram below:

ATTENTION: Your braces go... HERE ...that's why they block tooth brushing at the gumline.

Healthy Gum Margin
Neck of Tooth

Normal Healthy Gum tissue... →... with 3mm groove (sulcus) between margin and tooth neck

Infected Gum margin receding from the neck of the tooth and following...

Receding Infected Bone...

...until the tooth falls out.

On the left you see gum health. On the right you see advanced gum disease as measured by a periodontal probe. The activity deep in the pocket may be invisible to you because dental floss and the bristles of a toothbrush cannot reach below the gum line deeper than 3 mm, the first silver bar at the end of the probe. See: Red Arrow above. The first three millimeters below the gum line is the “Anatomical Range of Effective Home Care “, defined by the arrow. Below 3mm infection is untouched!

* Related terms: scaling, prophylaxis, root planing, “deep cleaning”. This only treats bacteria on the tooth, a symptomatic treatment that ignores infection in the tissue and covers-up or “masks” the real cause of the disease.
It is important to know that “cleaning”, like the word “nice” or “love” in the English language is so overused that it means almost nothing in a strict scientific sense. It can mean brushing your teeth lightly with an abrasive, to fundamental debridement of infected soft tissue. The best words in a periodontal context are the scientific terms “scaling” or “root planing”. The former refers to the removal of scales and calcium deposits used by bacteria to invade the supporting dental bone. “Root planing” refers to the removal of surface root tissue that is literally dead tissue, killed by bacterial toxins.

**Complications of Gum Disease**

The ultimate outcome of uncontrolled periodontal disease is tooth loss. As the destructive factors cause the breakdown of bone and connective tissue, there remains no anchor for the teeth. But before that happens a lot of other pathological events occur along the way.

**Bad Breath**

A much less severe but nevertheless distressing problem caused by periodontal disease is bad breath, although coatings on the tongue may contribute more to bad breath than periodontal disease there is not doubt that the flow of pus from the chronic periodontal abscess renders a putrefying odor before it is swallowed. In a way that is good, because at least the infection in draining. When infection is held inside the tooth pulp chamber and the pressure cannot escape, the tooth is raised hydraulically in the socket and the pressure is interpreted as pain. But if there is no pain then one does not notice slowly evolving events. That’s what makes gum infection so insidious.

**Heart Disease and Stroke**

Studies have reported that people who have heart disease have a 1.5 - 4 times increased risk for periodontal disease. This is greater odds that the association with cholesterol! And the risk is highest for patients with extensive gum disease, bleeding from every tooth. Acute coronary syndrome, high blood pressure (hypertension), and high cholesterol have also been associated with periodontal disease in scientific studies for decades.

Periodontal disease has also been linked to stroke and to coronary artery disease (CAD) or the more general cardiovascular disease (CVD). The more severe the periodontitis, the greater the risk for heart problems. Many experts, however, are still not sure whether periodontal disease is a risk factor for stroke or a marker that reflects various risk factors common to both conditions.
A stroke is caused by a loss of blood circulation to areas of the brain. The blockage usually occurs when a clot or piece of atherosclerotic plaque breaks away from another area of the body and lodges within the blood vessels of the brain. Some aggressive bacteria even invade the lining of the blood vessels like termites and get inside the cells of the tissue they contaminate.

Recent evidence suggests that the inflammatory response may be the common element. This is an over-reaction of the immune system that causes injury to tissues in the body. A common link between patients with both heart conditions and periodontal disease may be elevated levels of C-reactive protein (CRP), a marker for the inflammatory response. Some experts believe that immune factors causing this response are released into the bloodstream during periodontal disease and cause injury in the arteries supplying blood to the heart.

Other evidence suggests that the periodontal disease bacteria itself -- particularly \textit{P. gingivalis}, \textit{T. denticola}, \textit{T. forsythia}, and \textit{streptococci species} -- may be the main culprit. In 2005, the NIH sponsored \textit{Oral Infections and Vascular Disease Epidemiology Study} (INVEST). This scientific panel determined an association between cardiovascular disease and the bacteria that cause periodontal disease. In this study, higher levels of oral bacteria were associated with thicker carotid arteries (a predictor of heart attack and stroke), regardless of C-reactive protein levels.

While this study's findings are an important advance in understanding the relationship between periodontal and heart disease, it is still not clear if periodontal disease actually causes heart disease. Researchers hope that future results from INVEST will clarify this issue. Experts suspect that gum disease treatment may reduce the risk of heart disease for nearly everyone. While many studies are equivocal, all scientists agree that infection is bad and needs treatment.
**Effect on Diabetes**

Diabetes is not only a risk factor for periodontal disease; periodontal disease itself can worsen diabetes. Evidence suggests that the bacteria that cause periodontal disease may enter the bloodstream and activate cytokines, (damaging immune system factors), and destroy cells which produced insulin. Research indicates that treating periodontal disease can reduce the need for insulin and improve blood sugar control. A major side effect of diabetes is infection of the toes and legs of untreated diabetics. What kind of doctor would amputate toes, feet and legs without telling the patient about the underlying cause? This is why we take some much time and effort in controlling the infection around braces. We must tell the whole truth as a categorical imperative.

**Effect on Respiratory Disease**

Bacteria that reproduce in the mouth can also be carried into the airways in the throat and lungs, increasing the risks for respiratory diseases and worsening chronic lung conditions such as emphysema, or even serious cases of pneumonia.

**Effect on Pregnancy**

This may be the most important of all you learn because it involves the welfare of a totally innocent dependent, a growing baby.7-10 Many studies strongly indicate that bacterial infections that cause moderate-to-severe periodontal disease in pregnant women increase the risk of premature delivery and low birth weight infants. The more severe the infection, the greater the risk to the baby. Research indicates that the bacteria from gum disease, and from tooth decay, may trigger the same factors in the immune system as genital and urinary tract infections. These biologic substances, called prostaglandins and tumor necrosis factor, produce inflammation in the cervix and uterus that can cause premature dilation and contractions. Research also suggests that periodontal disease increases the risk for preeclampsia, a life-threatening disorder that occurs in mid- to late pregnancy and is characterized by high blood pressure.

Experts recommend that women have a periodontal examination before becoming pregnant or as soon as possible thereafter. Because women with diabetes are at higher risk for periodontal disease, it is especially important that they see a dentist early in pregnancy. Experts are still not sure exactly how treating periodontal disease might improve birth outcomes, but fortunately, a 2006 study in the *New England Journal of Medicine* indicated that periodontal treatment is definitely safe for pregnant women. This is important when severe gum infection may be a risk factor in premature births and low birth weight, an unhealthy sign in newborns.

For pregnant patients the news about gum infection can be a very serious medical problem. In a recent issue of the *Journal of Obstetrics and Gynecology* (February, 2010) Dr. Y. Han, et.al. reported that a Santa Monica mother’s gum infection (*Fusobacterium nucleatum*) had infected the unborn baby and resulted in the death of the child at full-term delivery. The original article is available for download or free from our office staff. Six years previously doctors had been warned by Dr. Y. W. Han, about the threat in the scientific journal, *Infection and Immunity* (2004). Yet due to the slow pace of data distribution and “culture lag” it went unheeded. This news came too late for a Santa Monica mother and her child. What happens in the extreme acute infections like this can also be insidiously destructive in the slower pace of chronic infection. Just because you don’t feel it doesn’t mean it isn’t happening.
Effects in the Orthodontic Patient

Effects of chronic low-grade infection can range from a complication of treatment, to accelerated bone loss, to quite the opposite: a 70% chance of permanent overgrowth of gum tissue (below left) which can obscure 1/3 of the smile with deep pus pockets and infected bone.\textsuperscript{11}

![Uncontrolled growth of abnormal gum tissue after braces have been removed because of poor oral hygiene. It can get this bad… really!](image1)

![Normal, healthy gums and supporting bone in an orthodontic patient who followed our instructions for good oral health.](image2)

Notes:
Common Questions
Patients Ask or Should Ask about Dental Extractions,
Gum Infection, the Treatment and Prognosis

Beware of Injudicious Orthodontic Tooth Extractions!

For nearly 100 years orthodontists have been debating whether or not it is wise to take out perfectly healthy teeth in order to straighten the remaining ones. Over the years some guidelines have been developed to help the orthodontist decide but most of the data was based on outdated biological facts that do not square with 21st Century biology. So the old controversy is coming to the forefront again. It is a very emotional subject for many orthodontists because the stakes are so high. But the resolution to the controversy is easy and it is within your ability to make a choice.

If you are confused, intimidated by the decision then delay extraction of teeth, try a non-extraction approach. In formal logic this is called Pascal’s Wager and in common parlance it is called “hedging you bet” by keeping all options open as long as possible. You can always change your mind if you feel a non-extraction treatment plan is better; if you choose extractions however, re-establishing facial deformity is more time consuming and difficult for everyone.

Now discoveries in medical problems such as sleep apnea and breathing problems have been associated with extractions, the natural loss of teeth and chin profiles that are too far away from the front teeth (giving the illusion that the upper front teeth “stick out too far”) So many younger orthodontists are claiming that extracting teeth for a child can actually cause facial deformities. If you look at the profiles of many celebrities you see what has been called the “orthodontic look”, a common term for lower facial deformity. (Google the images of: Larry Byrd, the Boston Celtics basketball player, Dustin Hoffman and Robin Williams for examples of so-called disfiguring “flat profiles”.)

Now Professor M. Thomas Wilcko of Case Western Reserve University in Cleveland Ohio, has developed an orthodontic treatment that can reverse this with minor outpatient surgery. But the best treatment is to diagnose an orthodontic problem at age 6 or younger and then treat children early so a facial deformity caused by bad habits or poor breathing posture is prevented. The best treatment of any disease or deformity is “prevention”. It is easier, faster and less expensive. That’s just common sense. The best surveys of this “natural growth guidance” and data on “accelerated orthodontics” can be seen on the websites of our esteemed colleagues:

www.orthotropics.com    www.wilckodontics.com

We endorse the philosophy presented there, support a non-extraction treatment whenever it is possible and have been teaching “accelerated orthodontics for a decade. Of all the patients we treat we recommend extraction of healthy teeth in more than 2-3% of our patients. Other orthodontists by their own admission take out healthy teeth in over 50-85% of their patients. They justify it as “traditional” therapy but there is no compelling biological rationale for this excess.

We generally assume you do not want extractions as a default plan. Yet, you must decide for your self or your own children so if you need guidance in your decision ask Dr. Murphy. It is an important decision that will affect your child’s face for a lifetime and affect his or her self image and psychological development. So choose wisely by basing your decision on scientific facts and logic.

On the next page you can see images of the “flat profiles” or “dished-in” profiles which many anti-extractionist orthodontists feel are disfiguring. You can also Google: obstructive sleep apnea, orthodontics to learn more about the controversy.
The images above demonstrate severe disfiguring flattening of the lower facial profile. The comparison of Magic Johnson’s profile with that of Larry Byrd is particularly striking. Can you guess which basketball player had extractions with his braces? An imaginary line from the tip of Larry’s nose to the chin shows how far back the lips have been distorted. The far left shows the deformity against a red reference line. We do not want to risk this profile deformity in any child. The flattening is also very noticeable when one smiles.

Look at the public images below. As you can see, the dished-in face deformity does not get better with age. Note how the lips have sunken in without tooth support in the aging face of Larry Byrd (below left). The lower half of his face has the appearance of an old man far beyond his years. This is not what we want to happen with a child’s face. A 25 year-old girl should not have the lower facial appearance of a 45 or 50 year old woman. Put your hand over the lower lip of the pretty girl on the right below and see how she is much prettier without a flattened profile of the lower lip and chin. This does not happen in all cases but it is very unpredictable. About 40% of orthodontists admit to regretting extractions after seeing profiles like these in their practices. We are anti-extractionists and consider healthy tooth extraction, like amputations, a last resort.

How much better looking would the fellows below be if the orthodontist did not take out teeth when they were young?
What about Orthodontic First Aid or “Emergencies”?

According to Murphy’s Law, emergencies will occur late on Saturday nights. Most things can be “patched” until you can be seen by the doctor. Here are some pointers on how to handle problems. As you will see, wax is our duct tape! The more you know, the better prepared you will be. Don’t let a minor problem ruin your weekend because you do not what know what to do. Below are some practical hints for “Orthodontic First Aid”. When in doubt you can just “cut the wire.

How can I minimize soreness after adjustments?

1) Use a chew wafer or sugarless gum! When you were a baby, your parents probably gave you a teething ring to help with soreness. It is the same thing here.
2) Take headache medicine (e.g. Tylenol®) and take it before you get really sore. Don’t wait for soreness to wear off before taking your next dose. Some soreness will last about 3 days.
3) Don’t eat soft foods. This sounds crazy, but the more you chew, the faster soreness goes away.

What about painful wires that sometimes poke the cheek or gums?

Take a big toothpick or tongue depressor, or even a common spoon and tuck the twisted wire under one of the brackets or the archwires. If that does not work and the big wire is poking you, just use a common household wire cutter to cut the wire and remove it. You will not damage your teeth if you cut only the wire. The teeth will not get crooked again if you come back to our office within a week or two. If this is impossible you can take a wad of sugarless gum and put it over the wire as an insulator. This should bury the sharp edge in the soft chewing gum. Broken brackets: These should not cause any major problems that can’t wait until the doctor can fix them. Wax can help keep the bracket from sliding around.

What foods can’t I eat?

We’re actually pretty liberal about this. If you brush and floss daily we do not ask you to eat a Spartan diet. We have very few rules but they are the most important ones. If you think some food might break your braces, you are probably right. Use common sense. Braces are delicate! Hard, sticky candies are the worst. You know when you bite into caramel or a Jolly Rancher and your teeth stick together? With braces, your brackets will stick to the candy and come off of your teeth when you open. If a bracket is off of a tooth, the tooth is not moving = longer treatment time. This adds up really quickly.

What’s the best way to get used to braces?

At first it will feel very different having braces. Your lips are not used to them and especially your teeth are not used to them. Your lips may become sore from rubbing on the braces. It is like rubbing a blister on your hand after working in the yard. At first you get sore but your lips and cheeks will “toughen up” like a callus on your hand. Your teeth will probably become sore by dinner. This is normal.

If in doubt, don’t hesitate to call one of my pagers, (818) 816-1066 & (818) 226-8081, or an assistant during regular business hours. For an unmanageable emergency you may also call me at home, (818) 889-6704 in Agoura, California.
Are cavities and gum swellings actually infections?

Yes! Now let’s address the most important issue of all: controlling the infections. Yes, cavities are dental infections. You usually think of infection as acute soreness. Well, that’s an acute infection. Most dental problems are chronic infections, the stage before they become acute. So let’s learn a little about chronic infection that is easier and cheaper to treat. And let’s have you treat it instead of a dental professional. Yes, you can do it yourself if you choose to. I’ll teach you; just call me “Coach”.

What exactly does “good oral hygiene” mean?

It is very important to keep bacteria off of your teeth while your braces are on. If left on teeth, they will form small white spots. These are cavities and will not go away, ever! Braces do not cause white cavities (see image below); poor brushing does. Trust me, you do not want a great smile at the end of treatment and have white spots on the gum line. I or one of my assistants will always be willing to coach you into a “Gold Medal” dental patient. All you have to do is ask.

This patient had braces taken off before the end of treatment because she allowed the bacteria to eat away at the enamel causing “white spot” cavities. Remember: the stuff you brush off you teeth is not food. It is a whole bacterial colony* The image (above, right) is what it looks like under the microscope. Yes! It’s alive! …and you are its lunch!

For the patient above dental health came too late. This patient needs $6,000 gum surgery, a $1,000 root canal treatment and a $1,500 crown. All this because she did not listen to us or use one of our free toothbrushes and floss!

* For a review and movie links see: http://www.usc.edu/uscnews/stories/10661.html
Don’t the periodic “deep cleanings” every 6 months control the diseases?

Well, yes and no. If you just have gingivitis (pockets no deeper than 3mm) and you use floss and brush every day effectively then a “cleaning” and “check up” radiographs for cavities (caries) may be sufficient. That’s why most insurance companies pay for ““cleanings”. They presume you are doing what you should and it is effective. That way if you don’t follow through on your part they have justification for canceling your policy or denying a claim. The same policy is enforced if you don’t lock you car.

If something is stolen, your auto or homeowners insurance can legitimately deny the claim. But a six month interval may not be enough for some people. As a matter of scientific fact it takes 24-48 hours to inflame the soft gum tissue and about 2-3 months to cause irreversible bone loss where your brush and floss have missed the mark. That is why 3 month intervals between scaling and root planing are recommended by scientists, not just our office.

Regarding “deep cleaning” you must know that the term is not scientific so it can mean anything, like the words “love” and “nice”. They are not precise. If the term “deep cleaning” means scraping the tooth surface below the gum line then it is not effective care and can actually be dangerous. Scaling the root suppresses symptoms and signs of deeper disease. Therefore if not all the infection is taken out the “deep cleaning” only drives more severe infection deeper into the tissue while indications that you have something wrong are muffled. The serious infection is not on the root. It is in the soft tissue and the bone. See diagram below:

The “Range of Effective Home Care”, defined by White Arrows is within the first 3 mm below the gum line… Infection deeper than 3mm infection is untouched!

The toothbrush is physically incapable of going deeper.

Deep Cleaning scraps infection off the roots (orange arrow)

But your infection is often in the soft tissue diagramed at the green asterisks (*). These infections are what a periodontist treats.
**How can I prevent gum infections each day?**

1) Brush after every meal. If this is not possible then brush morning and night, but do it well.

2) Leave your travel toothbrush in your locker or desk at school or work and clean your mouth after lunch or snacks.

3) Brush your gums, not just your teeth. If your gums bleed when you brush, then brush that spot harder. I promise you will not bleed to death. Bleeding gums mean there is and infection there and the bleeding helps wash it away.

4) Be sure to floss between your teeth. It is very time consuming so use it as an excuse when you need an excuse for staying up late or being alone.

5) Use the medicines that we give you and listen to your “assistant coach”.

6) Most importantly, see your dentist at least every 3-6 months for:

**Why do my gums hurt and bleed?**

Your gums hurt and bleed because they have microscopic ulcers, small tears in the skin just like a skinned knee. Even if you touch a skinned knee with a feather it bleeds and hurts. That doesn’t mean the feather is sharp. It means the knee is “ulcerated” with a superficial abrasion. For bacteria, that raw tissue we’ve all seen as kids is a direct 8-lane highway to your internal organs. The same is true for oral ulcers (see red arrow) inside the gums.

The red arrows in the illustration to the right show exactly how oral germs on the teeth get into tissue to cause bleeding.

After the bleeding stage when the infection gets deeper into the tissue -- beyond where the brush and floss can reach – germs destroy supporting bone and spread thorough the body to infect foreign organs and blood vessels of the heart and vascular system...

...silently, with no pain!

**Can my general dentist supervise this problem?**

Yes, he or she can provide excellent supportive care. In fact when both the orthodontist and referring dentist join forces to “double team” the orthodontic patient and follow a simple disease prevention program, cavities and gum infections normally associated with orthodontic therapy can be reduced as much as 85%! The best idea is “teamwork”.

Check out exactly what’s happening in the germ colonies under the gum line. Go to your computer and watch a movie of the living organism under the microscope. You can see it at: http://www.erc.montana.edu/Res-Lib99-SW/Movies/default.html. If you have any questions about terms or concepts see this excellent website for patient education:

www.bracesinfo.com/glossary.html ~ Carpe Diem!
Appendix

Range of Disease Severity (by Damage)

Look at your periodontal charting and determine the degree of disease yourself. Ask Dr. Murphy if you are right.

**PROGNOSIS* DETERMINATION BY POCKET DEPTH ALONE**

1-3 mm suggests excellent prognosis without Professional Treatment beyond scaling (cleaning) and good daily home care.

4-6 mm suggests good prognosis with surgery or non-surgical soft tissue and bone treatment.

7-9 suggests fair prognosis/ this means there is a good chance of disease remission with regeneration and constant close scrutiny of disease.

9+ mm suggests stopping the disease process may be problematic even with aggressive professional care; the objective is to slow down the rate.

* Prognosis (def.) – chances of full recovery from disease for 10-20 years.
**Range of Infection Control**

Look at your periodontal charting and determine the degree of disease yourself. Ask Dr. Murphy if you are right.

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* The deeper the pocket the less control you have of the infection and the more virulent the bacterial population. This is because deeper pocket have less oxygen and the most destructive bacteria don’t need oxygen; they are “an-aerobic”.

* Prognosis (def.) – chances of full recovery from disease and arrest of progressive bone loss. We have a high standard for the definition of “cure”, viz. 10-20 years with not recurrence. Cure is possible.
X-Ray Analysis

Now let’s teach you how to read dental radiographs (X-Rays*).

If you took 8th Grade Health in school, you should remember that the tooth is divided into three anatomical parts: the crown (corona), the neck (cervix) and the root. Well, it so happens that the supporting dental bone, in Latin, “spongiosa” (white arrows), that forms the mass of the jawbone IN HEALTH should lie about 1mm beyond the neck of the tooth. This “crest of the bone” is located at the red dotted line. This line is 1mm beyond the green line when the gone and gum tissues are healthy.

We indicate that healthy level by the green line marks the neck of the teeth, where the crown meets the root, and below. As you can see it hold up pretty well because the lower teeth in this 40 year old composite patient only has gingivitis. The infection has not yet spread into the supporting bone.

Now let’s look below at the patient’s upper front teeth that are infected with moderate bone loss from periodontitis. The green line ( _____ ) indicating a healthy bone level and the red dotted line ( ****** ) are far apart where bone has been lost. The blue asterisk (*) shows the end of the roots. Analysis of Radiographs is not so difficult after all! Now ask Dr. Murphy to demonstrate your dental radiographs. Can you analyze them?

* “X-Rays” is really a misnomer. X-Rays are actually the specific waves of the electromagnetic radiation on the non-visible spectrum that produce the image we more accurately call Radiographs._
Is Orthodontic Therapy Expensive? What is the cost of facial beauty for a lifetime?

If one uses the theories of cost, value and worth, it turns out that orthodontic treatment is extremely valuable and worthwhile. The problem is that the measurements are intangible and the benefits are spread out over 5--70 years. But using what is taught by economics professors at universities (exponential utility analysis) and basic “cost accounting”, the cost that looks high in the short run turns out to be negligible in the long run.* So, excellent treatment is expensive but affordable. Look at the amortization table below and pick your favorite daily cost., then work backwards! That is your most economical treatment plan. You can even ask your accountant to look at this cost schedule.* Here is what “expensive” (50% more than our fees) periodontal therapy, costs:

A. Cost to create a beautiful smile (high fee) and eliminate infection


<table>
<thead>
<tr>
<th></th>
<th>Per Month</th>
<th>Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>$15,400.00</td>
<td>$1,283</td>
<td>$42</td>
</tr>
<tr>
<td>After the first year</td>
<td>641</td>
<td>21</td>
</tr>
<tr>
<td>After 5 years</td>
<td>256</td>
<td>8</td>
</tr>
<tr>
<td>After 10 years</td>
<td>128</td>
<td>4</td>
</tr>
</tbody>
</table>

We rarely treat more often than every 20-30 years. We have patients treated 35 years ago with no dental cost other than our quarterly scaling fees. They have low annual dental costs, beautiful faces and no infections.

B. Cost to Eliminate Infection (moderate fee)


<table>
<thead>
<tr>
<th></th>
<th>Per Month</th>
<th>Per Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>$9,200</td>
<td>$766</td>
<td>$25</td>
</tr>
<tr>
<td>After the first year</td>
<td>383</td>
<td>13</td>
</tr>
<tr>
<td>After 5 years</td>
<td>153</td>
<td>5</td>
</tr>
<tr>
<td>After 10 years</td>
<td>77</td>
<td>3</td>
</tr>
</tbody>
</table>

Dividing the Treatment over 2 years or 2 payers the cost for each is:

$4,600/year $383 12

After the first year

(For 5 and 10 year value divide by 5/10)$39/19 $1.40/ $0.70

C. Cost to maintain health

$175/visit x 4 visits/year = 58 2

Subtracting the cost of dental care that you will not need: Total cost = $0.00

D. Cost of No Treatment, i.e. cost to restore missing teeth

Finally take the monthly cost and subtract what your insurance will cost. This is the “Real Cost” of your treatment. The same arithmetic can be applied to one bridge or one restored implant.

Now compare it to the cost of a tooth replacement = $1,000/crown x 3 = $3,000

Amortized: $3,000 /year = $250/month or $8.00 / day …if you replace one tooth/year.

*Accounting verified as accurate by Howard Fox, C.P.A., Agoura Hills, CA (818) 897-0600
References
(Available at www.google.com)


**ADDENDUM**

Now let’s see how well the common toothbrush can reach the disease.

On the left side the tooth and gums are healthy. The tooth brush goes under the gumline 3mm but since the sulcus (biologic groove) is only 3 mm deep the brush and floss can reach all the infected areas of the tooth.

Contrast this with the right side. The toothbrush and floss can still get under the gum line 3 mm but since the periodontal infected pocket is 6-7mm deep, most of the infected tissue is beyond the reach of daily oral hygiene by you. The best you can do is hope that root planing and scaling (dental “cleanings”) every 3 months will hold back the infection indefinitely. Sometimes that works sometimes it does not. It works better when we are young and our immune system is robust. Age weakens our resistance so we must work harder, each day, to save our smiles.
Orthodontic Bracket Produces limited access for a toothbrush & floss.

Practical Exercise:
Place the bristles of your usual toothbrush at the gumline (blue arrow) and note how difficult it is to get it under the orthodontic bracket and into the infected gums.

Next:
Ask Dr. Murphy for a special End-Tuft Brush (ETB) and instructions in using it with a special medicine to kill germs. This alone can eliminate 50-75% of your infection.

Finally:
Ask Dr. Murphy to show you a special between-the-teeth floss holder. It’s called a “Platypus” and can be ordered on line at, www.platypusco.com. You can also use a product called “Stim-U-Dents”, soft balsa wood toothpicks that have been proven more effective than floss for many patients. We do not think we can treat patients to the ideal standards unless we have their full cooperation. Please allow us to insure that your beautiful smile also has a healthy foundation.

Notes and Questions: