

**Case Presentation:
Simple Bailout for Complex Periodontal Dilemmas**

Restorative dentistry, in particular full crown restorations, often causes complex periodontal problems for patients. Many restorative dentists select full crowns to restore teeth that have lost significant tooth structure caused by decay, fracture or resulting from previously placed restorations that were large. Frequently full coverage restorations are the only way to manage cases like these, unfortunately they can trigger issues that ultimately compromise the patient's health. With the ever-increasing body of scientific evidence correlating periodontal infection to systemic disease, any treatment protocol that promulgates infection should be avoided, if possible.

I prefer to use partial coverage restorations to restore teeth because they enable the preservation of biology, which is foremost in my mind as a preventive restorative dentist. Unfortunately, many teeth just need full crowns and there is no other option. Problems are created however with full crowns when the margins of the crown extend into the sulcus, which is somewhat of a paradox, because full coverage is often mandated by pathology that extends subgingivally. However, hundreds of published scientific reports overwhelmingly conclude that subgingival margin placement creates periodontal infection. One does not need a lot of science to document these issues, as they are readily evident upon mere clinical observation of almost ever crown with subgingival margins. Gingival bleeding occurs easily upon probing or vigorous toothbrushing around such restorations, thus providing a portal of entry into the patient's vascular system for the inflammatory byproducts of infection that may prove fatal. A small percentage of patients are immune to iatrogenic periodontal infection, however, it is difficult to determine in advance if the patient is susceptible to this undesirable side effect of our treatment or not. Therefore, it is prudent to avoid subgingival margins in crown and bridge dentistry whenever possible.

Replacing old dentistry that has severely compromised periodontal and pulp health presents one of the greatest challenges in restorative dentistry. Certainly the option of removing the teeth and placing implants is often the easy way out from a treatment perspective on many of these cases. However, many patients simply do not want to lose their teeth. The case presented here represents one such case that my periodontist, Dr. Dan Melker and I treated a number of years ago.



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Fig 1: The clinical appearance of the case before treatment.

Rita (Name changed to preserve the patient's privacy) presented to my office with three full porcelain to metal crowns on the mandibular right quadrant, #29, 30 and 31. Significant bleeding occurred upon probing or vigorous toothbrushing. The teeth had been treated historically with full crowns and shortly thereafter the molars had been treated endodontically. The soft tissue around the crowns was swollen, red, sensitive when probed, and glistened without stippling. The crown margins were open, rough and subgingivally placed. Porcelain was worn and fractured on the molars. Caries was obvious to the touch with an explorer. The occlusal size of the teeth buccolingually was enlarged. Lateral occlusal interferences existed in both working and balancing excursions. Horizontal bone loss in the furcations was significant, especially on #30. The patient reported discomfort when chewing on these teeth. The cosmetics of the case was fair to poor. The patient was unable to clean plaque from the restorations.

My diagnosis of the case was carious and periodontal infection as well as occlusal trauma. The prognosis of the case was good with proper perio-restorative treatment, by me and Dr. Melker followed by the education of the patient of preventive practices. I determined the etiology of the pathology to be iatrogenic crown and bridge dentistry, as well as possible cement sepsis.

When establishing a treatment plan (in this case new crowns after appropriate periodontal surgery) it is imperative to establish the etiology of the pathology to assure that the outcome of proposed treatment would be different than the

outcome of the previous treatment. Often a bit of forensics is required to glimpse into the reason for clinical failures such as Rita's case.

From the patient's history, we learned her crowns were five years old and they were placed to address large fillings and fractures of the teeth. It was easy to ascertain how the current failure occurred after the old restorations were removed. Gross microleakage caused significant decay, cement dissolution, pulp pathology and tissue infection. The suspected cause was cement sepsis, a clinical scenario that plays out under all too many restorations with subgingival margins. Frequently such clinical management results in missed impressions, poor marginal adaptation of provisionals and inflamed tissue at cementation. Cement contamination occurs when restorations are cemented into a pool of blood. The result is cement sepsis; a process where the compromised cement allows microbial growth in the cement zone under the restoration causing carious and periodontal pathology.

Caries results from acids produced under the crown by microbial growth. Likewise, periodontal infection results from the microbial growth under the crown that cannot be controlled by preventive measures. Pulp pathology often is immediate, as was the case with Rita. She advised us that she had experienced extreme sensitivity after the preparation of her previous crowns and suffered a bad taste around the temporaries. This led me to believe that the pulp was insulted both during the provisional phase and later when the crowns were cemented into the pool of blood that accompanies provisionals that do not fit properly.



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Fig. 2: Core buildups and surgical provisionals are required for the protocol

Dr. Melker and I use an exacting protocol for approaching these kinds of cases. It requires a team approach with everyone paying attention to the smallest of details. Our objectives are to create an environment that facilitates the control and prevention of microbial infection so the restorative dentistry is easier, more predictable and profitable. It makes no sense to avoid sending a patient to the periodontist when it makes the case easier, more predictable and more profitable.

Provisionals are required, then removed at the time of surgery to allow vertical access to the prepared tooth. The old restorations and caries are removed and core buildups are done so the extent of compromised tooth structure in an apical direction can be assessed relative to the biologic width.

Rita's crowns were removed along with the gross caries, stain and old filling material. Core buildups were done using a specific bonding protocol for self-cure resin composite. The provisionals were cemented with polycarboxylate cement, which is antimicrobial and sticks to the teeth when the provisionals are removed. The teeth were sealed with SuperSeal before cementation to protect the pulp in #29. Because the cement sticks to the tooth, when microleakage occurs under the provisionals microbial growth is restricted between the cement and the intaglio of the provisional, thus denying microbes access to dentinal tubules.

Surgical provisionals are easily removed, using mosquito hemostats in a gently rocking motion several times from the incisal/occlusal. Aggressive forces should be avoided to prevent tooth fracture. Surgical provisionals must be made of methylmethacrylate, not bis-acryl, because the provisional must be able to flex for its removal. Bis-acryl does not flex, it fractures and is, therefore, unacceptable as a surgical provisional material.

Surgical provisionals and core buildups are done two weeks before periodontal surgery. This two-week period gives the soft tissue an opportunity to heal and to recover from the microbial insult of the microleaking crown and operative damage associated with caries removal and core buildups. It also allows vital pulps to settle down. Many times what seems to be an irreversible pulpitis goes away when the etiology is removed. Sensitivity to hot, cold and biting pressure often occurs in teeth exposed to microbial assault from microleaking crowns. Two weeks of protection from microbes is often all that is required for pulps to become healthy again.



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Fig. 3: Pulpals protected by caries removal, core buildups, sealed dentin, polycarboxylate cement and well fitting provisionals often heal within two weeks. Likewise, soft tissue responds nicely to the absence of microbes and their toxins.



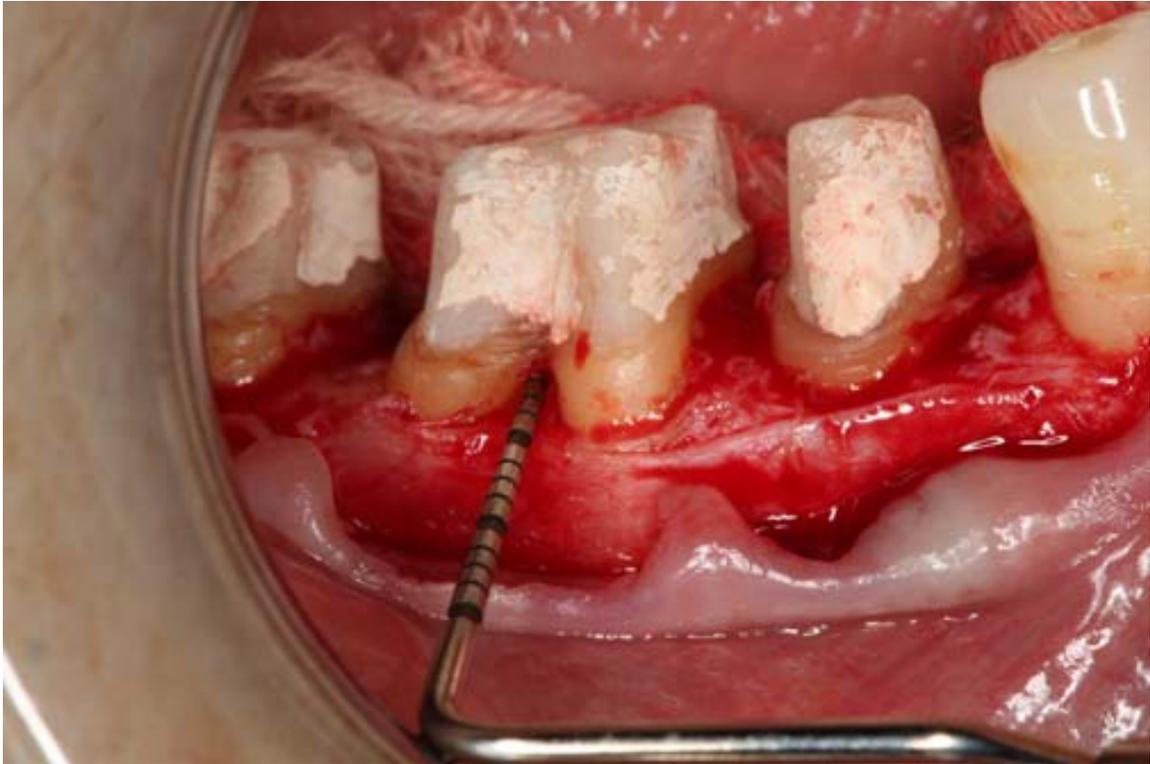
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Fig. 4: Probing is often meaningless in determining the biologic issues that exist around crowns in violation of the biologic width because many of these restorations exhibit minimal probing depth.



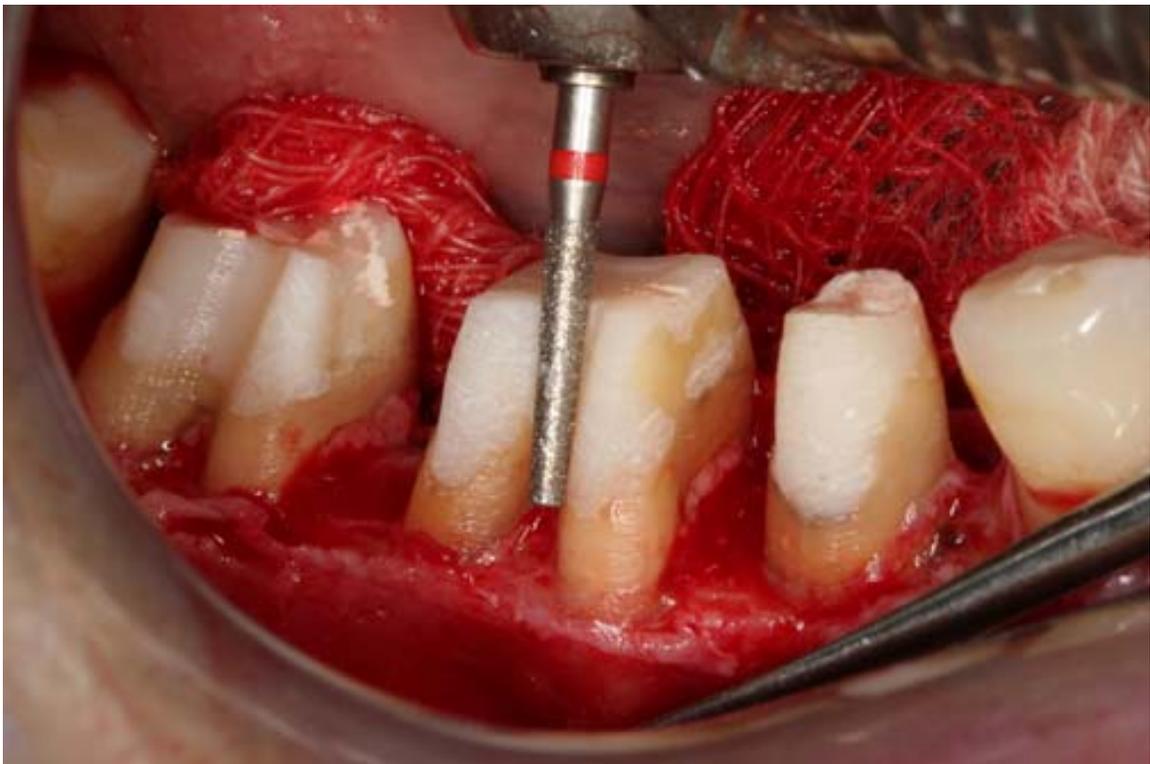
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Fig. 5 Pink tissue is often meaningless in diagnosing biologic issues because inflammation of the inner lining of the pocket triggers the immune response which will further periodontal destruction. Bone loss in furcations frequently occurs after iatrogenic restorative dentistry



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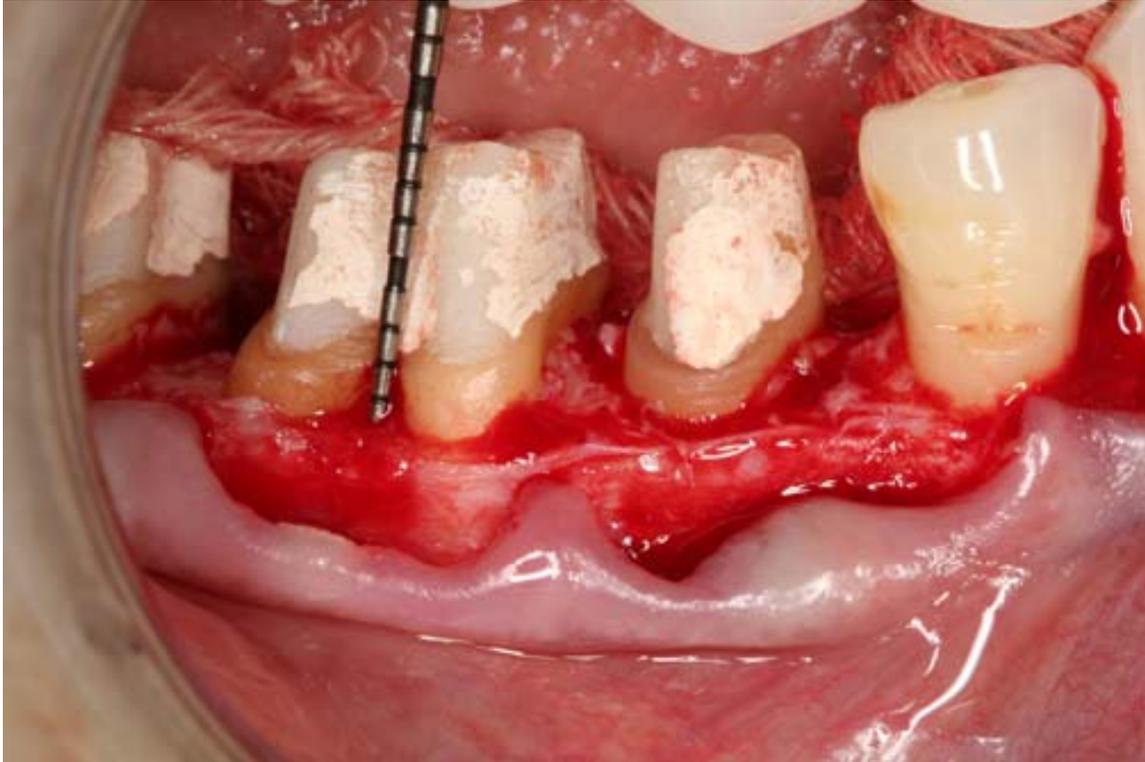
Fig. 6: After making a split thickness flap it is obvious that horizontal bone loss in the furcation extends two millimeters. The margin placed in the furcation fostered “protected” microbial growth, which caused the severe pathology in this case.



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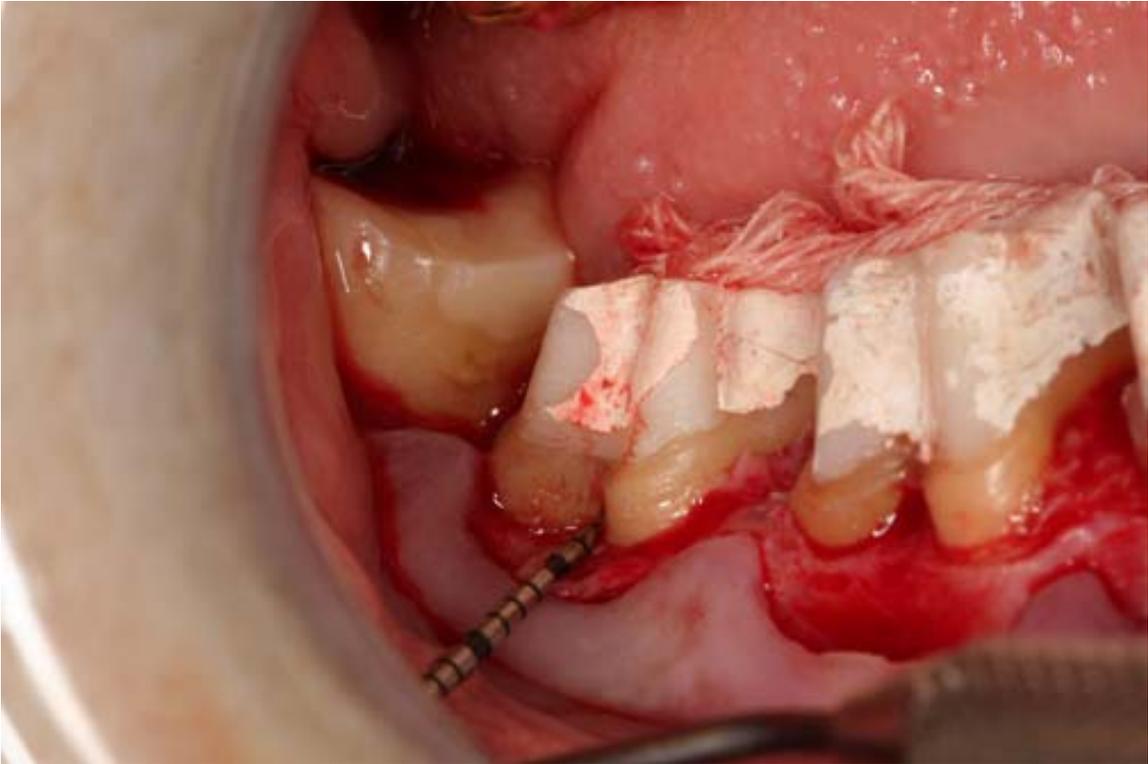
Fig. 7: Biologic Shaping, the approach Dr Melker uses to surgically resolve such complex periodontal conditions, can create an environment where the microbes, which are the etiology of periodontal disease, can be easily removed. The tooth surface has been reshaped 360° all the way to the osseous crest.

The primary objective of Biologic Shaping is to remove the anatomical zones where plaque accumulates and cannot be removed by simple brushing and flossing. In doing so, the patient can practice appropriate preventive procedures which can allow the teeth to survive. Without the ability to totally remove plaque from the restorations the case is destined to failure in 90% of patients.



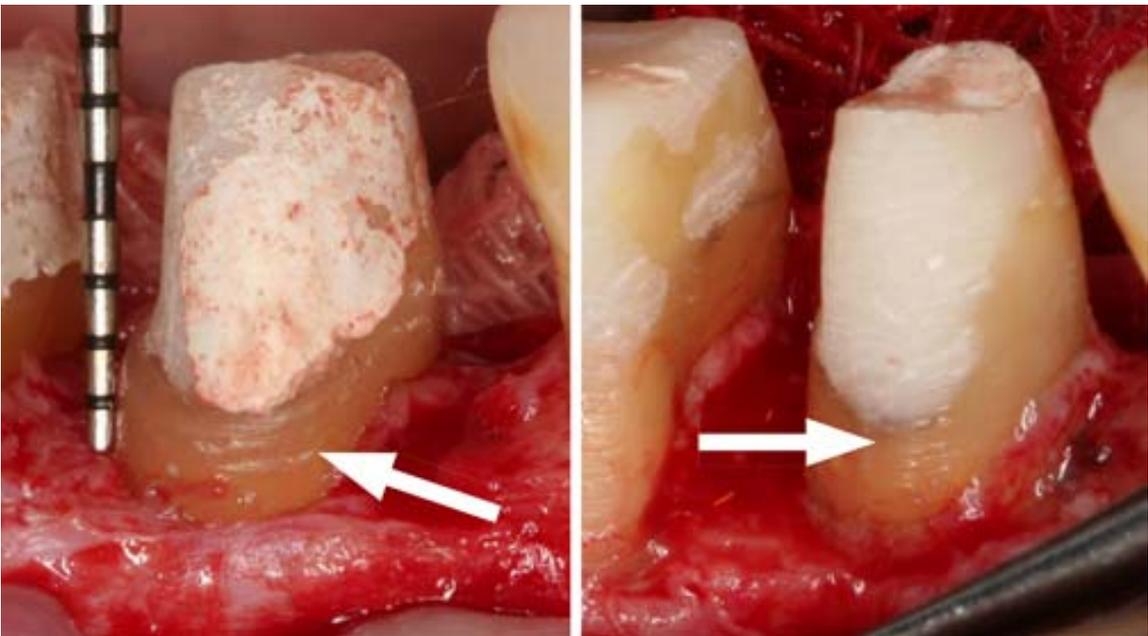
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Fig. 8: Three millimeters is classically the dimension of the biologic width. In this case removing three millimeters of bone away from the margin would open up the furcation so much that the tooth would require extraction.



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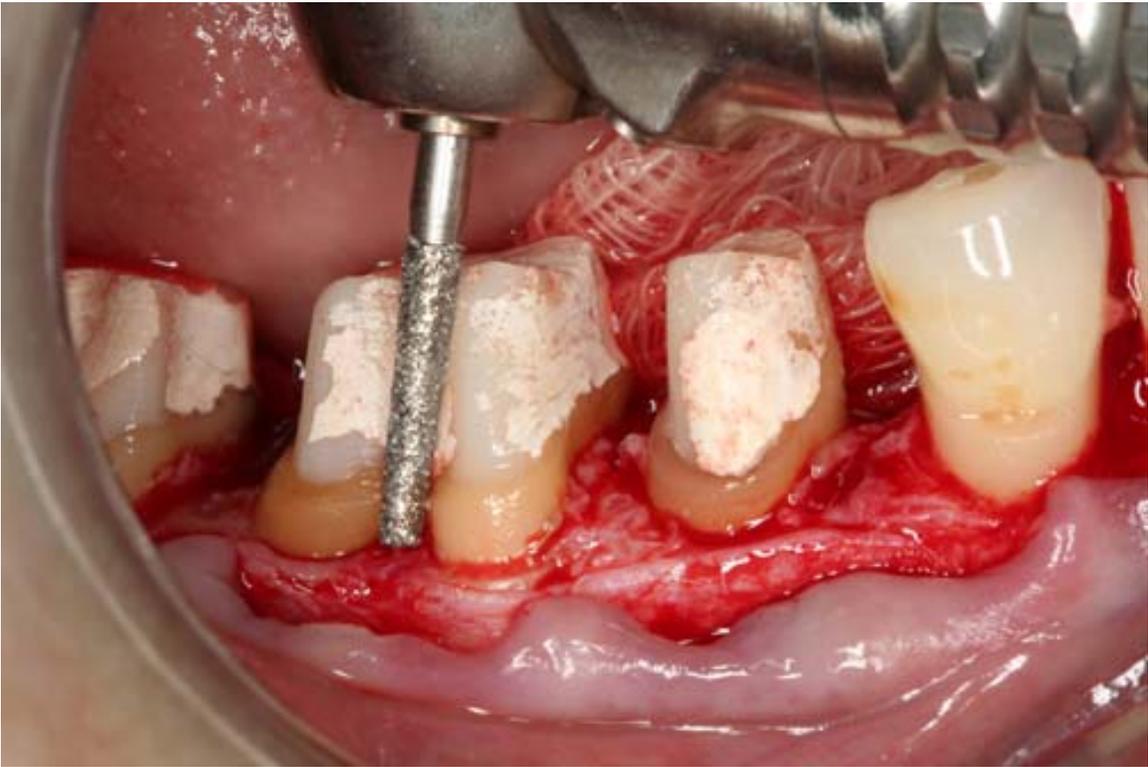
Fig. 9: Biologic shaping can eliminate many zones where plaque can accumulate such as: horizontal components of furcations, proximal concavities, adherent calculus, root surface irregularities, CEJs, anatomical defects and enamel.



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Fig. 10 The most critical element that Biologic Shaping removes is the margin of the old restoration which was placed significantly deep into the biologic width. When the old margin is removed a new margin can be placed which is coronal to the old one and, therefore, out of the biologic width. This aspect is the single greatest advantage over

conventional surgery. It is not necessary to remove bone. All that is required is for the final margin is a ferrule of 0.1 mm apical to the core buildup, which frequently is 1.0-3.0 mm coronal to the old margin.



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Fig 11: Biologic shaping is done by using progressively smoother flat ended diamonds 360° around the tooth from the osseous crest to the occlusal surface of the prepared tooth.



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Fig. 12: Finer grit diamonds leave an ultrasmooth surface on the root to which new gingival fibers will attach.



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Fig. 13: When initial reshaping is finished osseous contouring is done. The periosteum

must be peeled back for access to the bone. A bony parabolic architecture is necessary for success, because tissue contours will always be parabolic and the bone must match that or a pocket will be created.

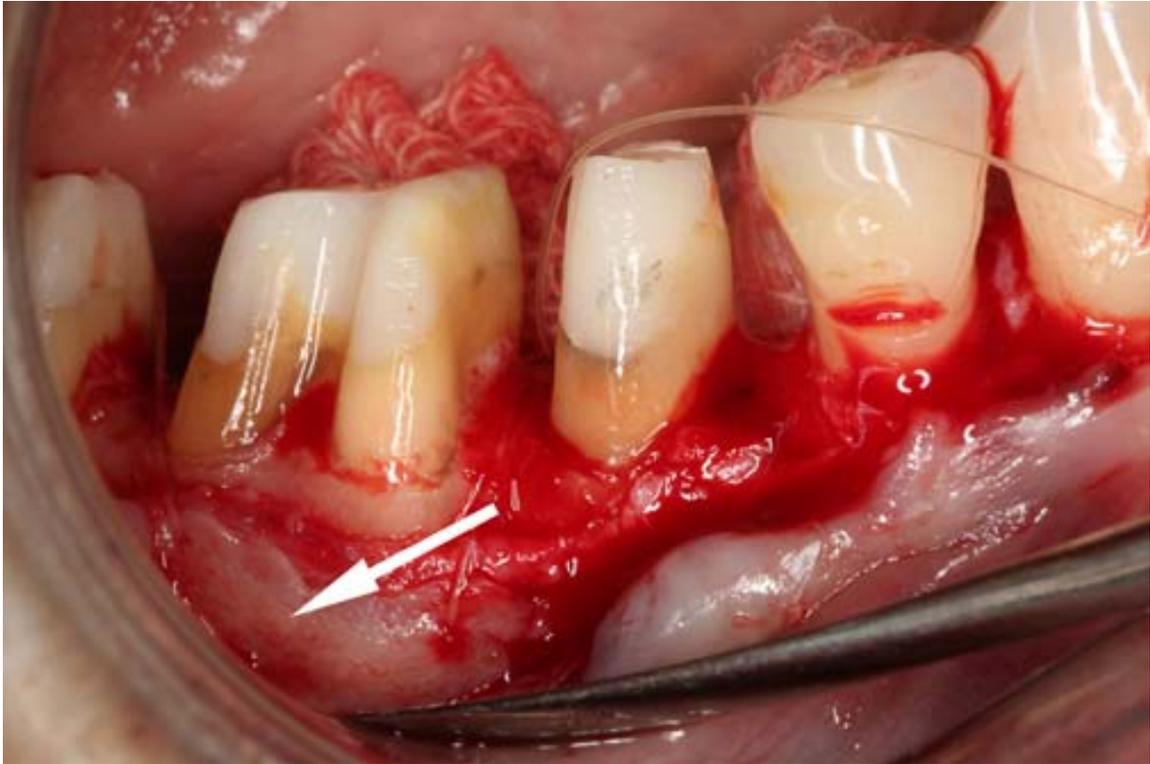
Reshaping the tooth first minimizes the amount of bone removal required. Conventional surgery relies on the position of the old margin as a guideline for osseous contouring requiring 3.0 mm from osseous crest to old margin. Biologic shaping removes the old margin and the only osseous removal necessary is for creation of the requisite parabolic architecture and providing a distance of 3.0 mm from the core buildup/sound tooth interface to the osseous crest.

Excessive bone removal causes mobility and migration. It can also open up a furcation to the point of making the tooth hopeless. The objective of periodontal therapy is to stop bone loss. If periodontal therapy requires bone loss it is counterproductive therapy.



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Fig. 14: When Biologic Shaping is completed the fine diamonds used leave a “polished” surface. The smoothness of the root will minimize plaque accumulation around the final restoration. Final tooth contours have been created to facilitate final restoration contours to allow easy plaque removal.



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Fig. 15: A subepithelial connective tissue graft was placed. The quantity and quality of connective tissue that exists after surgery is the prime determinant in the longevity of cases treated with this protocol termed "Biologic Cosmetic Perio-Restorative Dentistry."



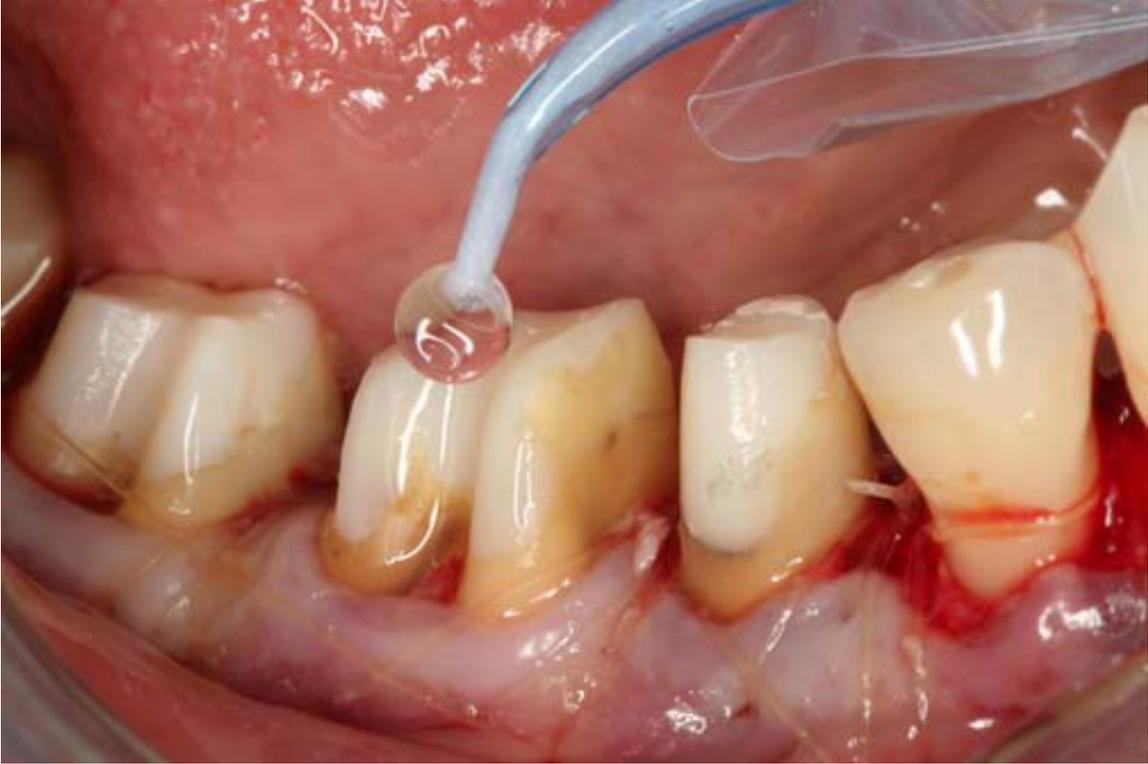
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Fig. 16: The flap is closed by suturing to periosteum. Precise tissue positioning can be achieved this way. The only reason the area of periosteum was peeled back was to allow for osseous contouring.



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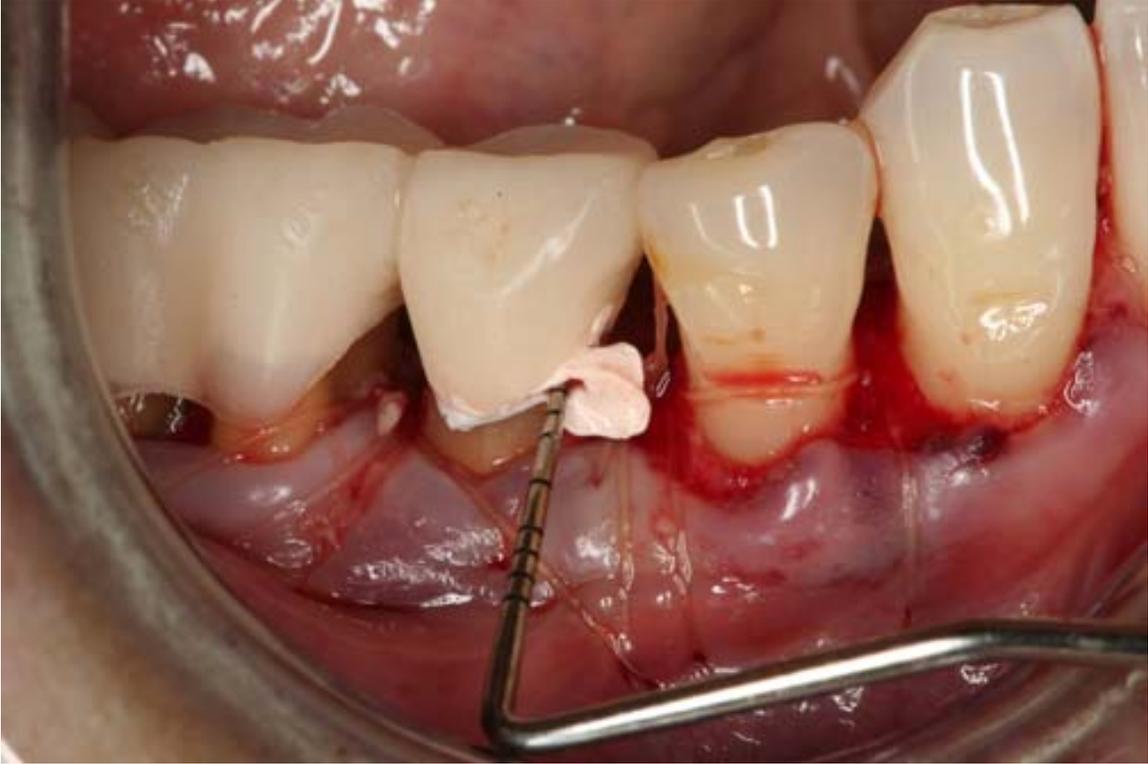
Fig. 17: Occlusal view of Biologic Shaping after grafting and flap closure. The buccolingual dimension of the tooth has been dramatically reduced which will translate into less occlusal force after definitive restorative.



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Fig. 18: SuperSeal is used to seal the dentinal tubules of all vital teeth.

Vital teeth must be sealed, because plaque acids will dissolve the smear layer created by reshaping within 5 days, opening tubules for ingress of microbes that cause pulp pathology and patient discomfort.



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Fig. 19: The periodontist must recontour the provisional, shorten the margins, barrel in the furcal contours and cement it with polycarboxylate to protect dentin that was cut. The cement must be removed before it is set to keep it out of the wound and the sutures.



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Fig. 20: The provisional immediately after surgery. The wound must be allowed to heal without interference from the provisional or cement.



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Fig. 21: Enough healing has occurred at four weeks to allow simple remake of the provisionals.

The provisionals must be remade at four weeks using an indirect technique to avoid resin contact with immature tissue. The margins of the remade provisionals must be left 1.0-2.0 mm supragingivally so that biologic healing can take place without interference.

Post-operative sensitivity is a function of microbial invasion into the tubules. SuperSeal, polycarboxylate cement, fluoride varnish and PERFECT PLAQUE CONTROL will control it.

The tissue must heal for four months from the time of surgery before final preparations can be made. The final restorative margins must be placed at or above the tissue level or the iatrogenic process that destroyed the biology of the previous case will be repeated.



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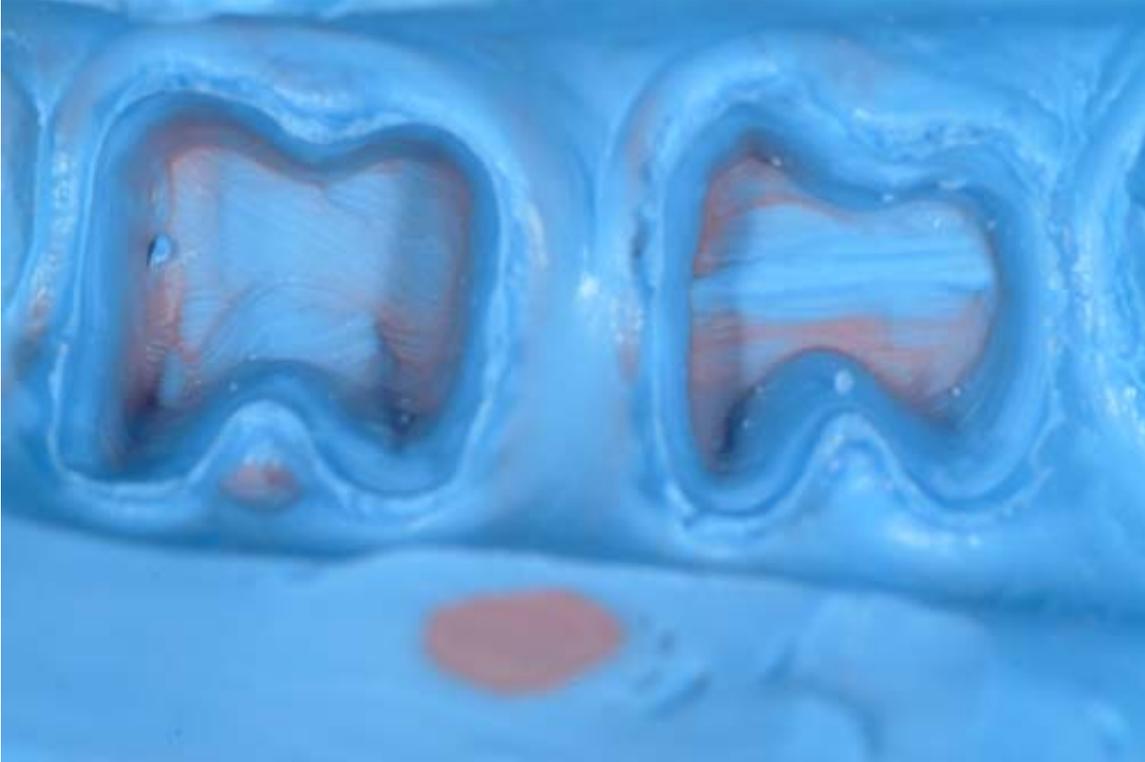
Fig. 22 After four months the tissue has healed completely. There is no place for plaque to hide where it cannot be easily removed with routine preventive procedures.



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Fig. 23: The margin of the bicuspid that was buried to the bone no longer exists. A new

margin can now be created at the tissue level that is significantly coronal to the old margin.



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Fig. 24: The final impression is easy to make, because the margins are all placed at or above the tissue level.

The protocol demands that the restorative dentist NOT disturb the connective tissue protecting the teeth. Preparation and impression technique must be NONINVASIVE. There is no room or no need for two retraction cords. There is no need to cut the tissue either with electrosurge or a laser. It is almost impossible to miss the impression when tissue is healthy and it is left alone.



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Fig. 25: The contours of the final restorations allow the patient to perform perfect plaque control.

These contours must follow the barreled in furcations all the way up to the occlusal surface to allow toothbrush bristles access to remove the plaque. Dental floss will disturb all plaque colonies interproximally without a great deal of effort. The gingival embrasure spaces should be left as open as possible to provide room for interproximal brushes.



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Fig. 26 The buccolingual dimension of the original crowns was excessive. Forces generated from function and parafunction will be much less with the smaller size of the new restorations.



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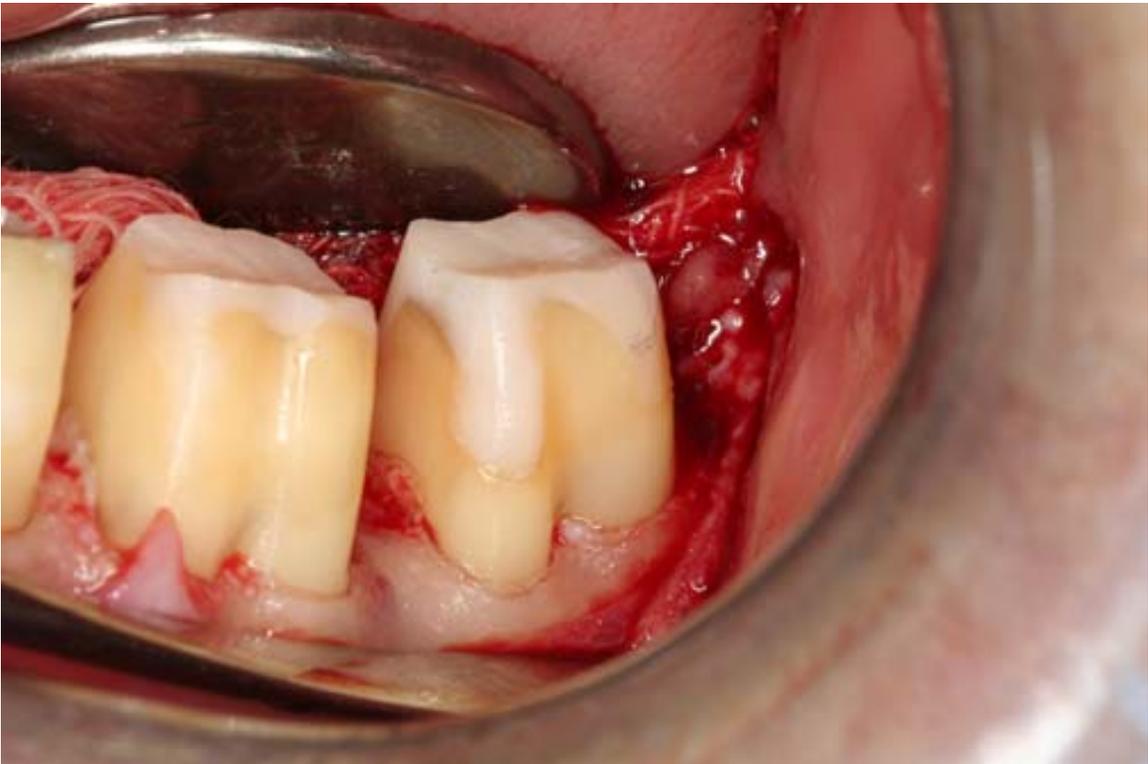
Fig. 27: The final restorations do not have a height of contour, especially in the furcal areas. It is imperative the laboratory understand this concept.

Minimized buccolingual dimension, barreled in furcation contours, sharp occlusal contacts and diligent plaque removal will result in long term success. This statement is based on my clinical experience for over 30 years with this perio-restorative protocol.



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Fig. 28: This is a different case with the same issues periodontally that have compromised the patient's health.



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Fig. 29: After Biologic Shaping has been done by Dr Melker.



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Fig. 30: The quality of tissue health at impression time dictates long term success. Margin design was thin chamfers for refractory porcelain restorations.



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Fig. 31: The final restorations have margins at or above the tissue level that will not negatively affect tissue health.

In summary, the natural dentition is subject to disease processes that compromise the longevity of that dentition as well as the systemic health of the individual. Restorative dentistry is mandatory to replace missing and diseased tooth structure, but the health of the investing tissues after the treatment should not be compromised by such treatment. Iatrogenic dentistry is a disservice to the patient, potentially life-threatening and represents avenues for litigation that could prove costly to the dentist. Perio-restorative protocols that offer predictability with respect to tissue health exist and have been used successfully for over 30 years. These protocols are simple, easy to accomplish and provide enhanced resistance to naturally occurring disease processes. All patients should be informed of the potential health complications associated with the placement of subgingival margins. Restorative dentistry should use the measures available to preserve and respect biology.